

JAZZ IMPROVISATION PEDAGOGY: EVALUATING THE EFFECTIVENESS OF A  
BEGINNING JAZZ IMPROVISATION LEARNING ENVIRONMENT FOR MIDDLE  
SCHOOL INSTRUMENTALISTS

By

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## Abstract

In the last century, the practice of improvisation has distinguished jazz and set it apart from other musical genres and their performance practices (Azzara, 2002; Coker, 1978). Despite available resources, improvisation's role in the National Core Arts Standards (NCCAS, 2014), and jazz's significance in school music programs (Azzara, 2002; Sarath, 2002; Watson, 2010), inconsistencies in music improvisation education have persisted. To explain deficiencies in improvisation education, researchers have proposed a lack of teacher experience (Alexander, 2012; Azzara, 1999) and a need for greater pre-service teacher preparation (Watson, 2010; West, 2015). Educators and music students may therefore benefit from research-based best practices for teaching jazz improvisation. Existing research has studied the effectiveness of jazz improvisation instruction in general (e.g., Bash, 1983; Coy, 1989; Watson, 2010) and which personal characteristics predict positive outcomes (e.g., Ciorba, 2009; Madura, 1996; May, 2003). Future research should investigate which methods are most effective (Azzara, 2002; Bowman, 1988; May, 2003) and at which stages of musical development (Azzara, 2002; Bowman, 1988; Kratus, 1995). The purpose of this design-based, sequential explanatory mixed methods study, was to investigate if and how four critical features of a beginning jazz improvisation learning environment affected outcomes for middle school instrumentalists, including whether one of two instructional sequences better supported outcomes. The learning environment was designed to support achievement, self-assessment, self-efficacy, and motivation outcomes. Over 12 weeks, 5<sup>th</sup>-8<sup>th</sup> grade instrumentalists (n=43) at two sites studied jazz improvisation in 6 jazz combos, which were divided into Groups A and B. The design features of the learning environment were consistent between groups; the two conditions differed by harmonic form instructional sequences. Quantitative data for all outcomes was collected pre-,



mid-, and post-instruction, and all instruction was video recorded. Primary findings showed: (a) a significant effect on all measured outcomes over time, not only for the 12-week duration of the instructional period but even in the first 6 weeks; (b) no significant differences between conditions for any outcomes; (c) a significant interaction between assessed task and achievement; (d) minimal significant relationships among outcomes; (e) evidence of how design features acted as sources of positive outcomes.



## DEDICATION

To my mother, Patricia, and my father, Louis, who instilled in me a love for learning at an early age, and who drove me to band practice many, many times.

To my sister, Kathryn, for her love and support, and for always understanding when I had to “work on my paper.”



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## Chapter 1

Inconsistencies in music improvisation education have persisted in schools, despite available resources, improvisation's role in the National Core Arts Standards (NCCAS, 2014), and jazz's significance in school music programs (Azzara, 2002; Azzara, 1993; Coy, 1989; Sarath, 2002; Watson, 2010). The practice of improvisation – “the opportunity [for the musician] to utilize his technical ability to its fullest extent, while enjoying the creative freedom of spontaneous composition” (Coker, 1964, p. 2) – distinguished jazz and set it apart from other musical institutions in the last century (Azzara, 2002; Coker, 1978). Today improvisation remains at the heart of this American art form. A recent review of jazz research found, however, that instruction in instrumental jazz has generally focused on articulation and style over improvisation (West, 2015), a likely practice behind the phenomenon of “school jazz groups that are both musically and technically sound yet that lack improvisation skills” (Watson, 2010, p. 241). Not surprisingly, one recent study found a low correlation between previous experience in school jazz ensembles and jazz improvisation achievement (Watson, 2010). Throughout the following pages, jazz improvisation is defined as spontaneous musical composition within a jazz context, including parameters such as rhythmic feel, melodic content, harmonic form, and stylistic expression.

To explain the deficiencies in general improvisation education and the disparity between jazz ensemble participation and jazz improvisation achievement, researchers have proposed a lack of teacher experience (Alexander, 2012; Azzara, 1999) and inferred a need for greater pre-service teacher preparation (Watson, 2010; West, 2015). Educators cannot teach what they do not know how to do themselves, and even experienced, successful improvisers may struggle to bring students into their community of practice without proper pedagogical preparation. This



scenario suggests a cycle: students with inadequate jazz improvisation educations become the next class of music education majors, they leave college with little to no jazz improvisation experience and without pedagogical training, and subsequently enter the teaching profession lacking skills, resources, and/or confidence. Their students receive an inadequate jazz improvisation education, and the cycle begins anew. Educators, pre-service teachers, and all music students therefore stand to benefit greatly from research that addresses a pivotal element in the cycle: resources. In this case, the key resources are research-based best practices for teaching jazz improvisation. Increasing the availability of empirically proven methods may improve outcomes for future music students as well as contribute to breaking the dysfunctional jazz improvisation education cycle.

### **Problem**

This study sought to address the paucity of jazz improvisation pedagogical research that can inform teaching and promote learning. Pedagogical music improvisation research in general has suffered from a “marginalized status as a research topic” (Sarath, 2002, p. 188) and warrants “replication and expansion” (Azzara, 2002, p. 182); jazz improvisation research in this vein is even more limited. Scholars have therefore encouraged the development of “an approach to teaching improvisation in a way that links the early, musically intuitive behaviours with the mature, musically sophisticated ones” (Kratus, 1995) and called for “nurturing jazz improvisation in a cultural, sequential, and developmental fashion that begins in early childhood and proceeds through adulthood” (Azzara, 2002, p. 182).

Within jazz improvisation pedagogy research, a small segment of an already small research area, researchers have largely studied whether jazz improvisation instruction is effective in general and which factors predict positive outcomes. Existing studies have shown that, even



in a short time period, instruction can improve jazz improvisation achievement (e.g., Bash, 1983; Burnsed, 1978; Coy, 1989; Watson, 2010) and self-efficacy for improvisation (e.g., Davison, 2006; Watson, 2010). Researchers have identified self-assessment (Ciorba, 2006; Ciorba, 2009; May, 2003), aural-imitative ability (Madura, 1996; May, 2003), and jazz theory knowledge (Ciorba, 2006; Ciorba, 2009; Madura, 1996) as the greatest predictors of instrumental and vocal jazz improvisation achievement, in various orders of influence and in relation to assorted tasks. Researchers should investigate which methods are most effective (Azzara, 2002; Bowman, 1988; May, 2003) and at which stages of musical development different methods are best introduced (Azzara, 2002; Bowman, 1988; Kratus, 1995). Studies such as these should examine learning environment designs to suggest developmentally appropriate, effective jazz improvisation instructional settings, teaching techniques, tasks, and sequences.

For readers unfamiliar with the musical elements of jazz and the underlying music theory, the next three paragraphs provide a brief primer that is important to understanding this study, especially with regard to understanding harmonic form and improvisation tasks. The initial improvisation tasks jazz students are likely to encounter will involve improvising over chords and chord progressions. A chord consists of multiple pitches, or notes, built on a scale degree and named either for the scale degree (Roman numerals) or the root note (chord symbols). The chord name indicates the quality of the chord. For example, in the key of C major, the I chord (“one chord”), or C major chord, is a major chord built on the first scale degree, C (Figure 1). A chord sets up a harmonic context over which a musician can improvise melodies using chord tones and related non chord tones, a kind of musical problem solving. For example, improvising over a C major chord suggests creating melodies around the notes C, E, and/or G, including non-chord tones from the C major scale (e.g., the leading tone, B, typically resolves to C).



**SCALE DEGREES IN C MAJOR**

NOTE NAME: C D E F G A B C



SCALE DEGREE: I II III IV V VI VII I

**CHORDS (TRIADS) BUILT ON SCALE DEGREES IN C MAJOR**

C Dm Em F G Am Bm C



I ii iii IV V vi vii I

**I-IV-V-I CHORD PROGRESSION WITH ROOT POSITION CHORDS**

C F G C



I IV V I

**II-V-I CHORD PROGRESSION WITH ROOT POSITION CHORDS**

Dm7 G7 C7



ii V I

Figure 1. Scale degrees, chords, and chord progressions.

Improvising over a chord progression, which combines multiple chords in a sequence, sets up a context in which musicians improvise melodies over multiple chords in that same sequence. Consider two examples, a I-IV-V-I progression and a II-V-I progression. A basic I-IV-V-I progression in C major consists of a C major chord, followed by F major and G major, and resolving to C major (Figure 1). The chords may unfold over a short period of musical time, such as four chords over two measures, or over a longer period of time, such as four chords over four measures. Musicians would consider the latter as having a slower harmonic rhythm than the former (Figure 2). Jazz musicians, including young improvisers, will encounter the II-V-I progression and its variations, a central chord progression in jazz (Figure 1). In the key of C major, a typical II-V-I progression consists of a D minor seventh chord (Dm7, or “D minor seven”), followed by a G dominant seventh chord (G7, or “G seven,” because the dominant quality is implied), and resolving to a C dominant seventh chord (C7, or “C seven”). Jazz



musicians will improvise melodies using these chords' chord tones and non-chord tones, including those from related scales (e.g., for Dm7, a D dorian scale, or G7, a G mixolydian scale), and look for common tones between them.

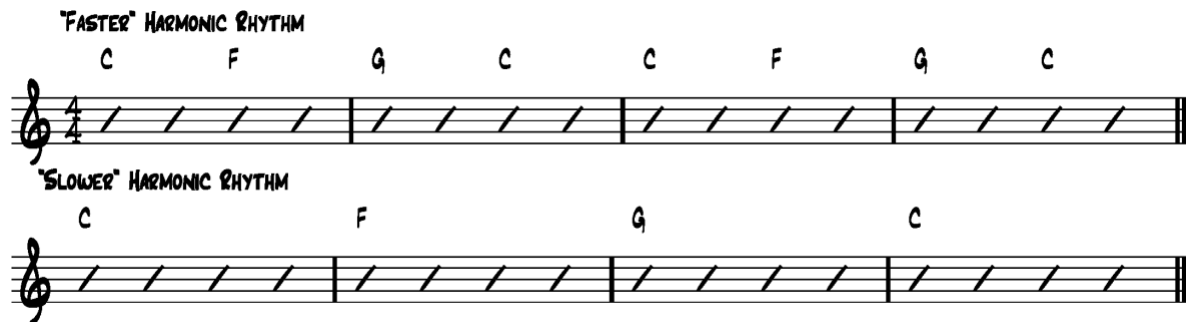


Figure 2. Harmonic rhythm.

Finally, the concept of harmonic form draws a musical “roadmap” that subsumes the previous two concepts (chords and chord progressions). A harmonic form is a chord progression with a specific structure, a context in which the chord progression suggests a recognized form (e.g., a 12-bar blues) or groups of chords suggest sections. For example, AABA is a simple musical form in which the A sections “match.” At a basic level this means they consist of the same or very similar melodic and harmonic content, separated by a contrasting section, B. A harmonic form is the level of a musical form having to do with harmonic content alone, the chord progressions and harmonic rhythm, and can also stand alone as a musical form that is open to melodic content (Figure 3). A harmonic form is therefore ideal for composing the head of a tune (which features a predetermined melody, open to interpretation) as well as improvising.



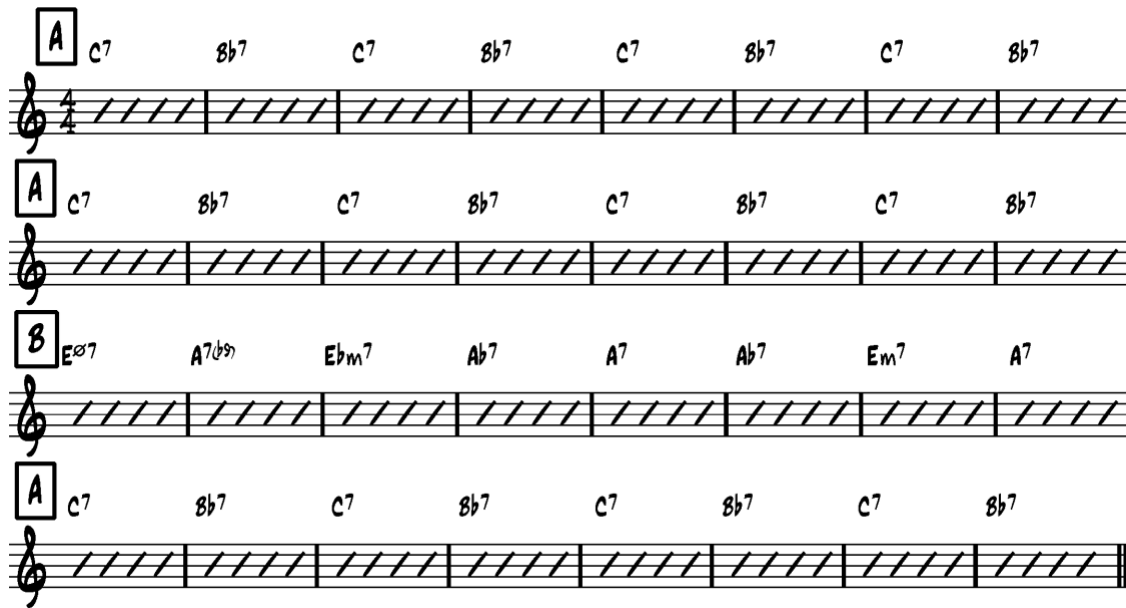


Figure 3. Example of AABA form (harmonic form from “Killer Joe” by Benny Golson).

Although harmonic forms provide the basis for the primary authentic, or real-world, improvisation tasks that jazz improvisation students will perform, developmentally appropriate sequences remain empirically uninvestigated. Looking across existing jazz studies, no definitive connection emerges between choices researchers have made about harmonic forms and participants’ levels of musical development or jazz improvisation experience. Jazz improvisation researchers (e.g., Bash, 1983; Ciorba, 2009; Coy, 1989; Watson, 2010) and method developers (e.g., Aebersold, 1992; Baker, 1989; Levine 1995) alike have placed differing emphases on, and implemented various sequences of, II-V-I patterns, 12-bar blues, modal chord progressions, and 32-bar forms with varying harmonic rhythms. In jazz, a basic 12-bar blues follows a set progression using I, IV, and V chords, simple variations of which substitute chords within the 12-bar structure (Figure 4). Modal tunes may feature a single chord or use multiple chords, in which case the slow harmonic rhythm typically opens each section up to exploring one or two chords (Figure 5). A 32-bar jazz form typically follows an AABA pattern, with four 8-bar, or eight measure, sections of variable harmonic rhythm (Figure 2).



**BASIC 12-BAR BLUES IN C**

The diagram shows a 12-bar blues harmonic form in C major. It consists of three staves, each with four measures. The first staff has a C7 chord above the first measure. The second staff has F7 above the first measure, C7 above the third measure, and C7 above the fourth measure. The third staff has G7 above the first measure, F7 above the third measure, and C7 above the fourth measure. Roman numerals are placed below each staff: I, IV, V, I, IV, V, IV, I, I, IV, V, I.

**12-BAR BLUES IN C WITH SUBSTITUTION CHORDS**

The diagram shows a 12-bar blues harmonic form in C major with substitution chords. It consists of three staves, each with four measures. The first staff has C7 above the first measure, F7 above the second measure, C7 above the third measure, and C7 above the fourth measure. The second staff has F7 above the first measure, C7 above the third measure, and C7 above the fourth measure. The third staff has Dm7 above the first measure, G7 above the second measure, C7 above the third measure, and G7 above the fourth measure. Roman numerals are placed below each staff: I, IV, I, I, IV, IV, I, I, II, V, I, V.

Figure 4. Example of 12-bar blues harmonic form.

The diagram shows a modal harmonic form from "Little Sunflower" by Freddie Hubbard. It consists of three staves, each with eight measures. The first staff has a Dm7 chord above the first measure. The second staff has Ebmaj7 above the first measure and Dmaj7 above the fifth measure. The third staff has a Dm7 chord above the first measure. Each staff ends with a double bar line and repeat dots.

Figure 5. Example of modal harmonic form (harmonic form from "Little Sunflower" by Freddie Hubbard).



A middle school jazz educator like myself may therefore start with modal progressions; perhaps their slow harmonic rhythms will facilitate learning and promote feelings of competence. Or, the same educator might choose 12-bar blues first; despite their faster harmonic rhythms; this hallmark of the jazz idiom may be the right mix of challenge, accessibility, and appeal to motivate beginners and support achievement. The absence of empirical evidence to suggest developmentally appropriate sequencing leaves open the potential that either approach may prove effective, or that one may be more effective than the other. Herein lies an opportunity for inquiry into developmentally appropriate jazz improvisation learning environments.

Ultimately, however, harmonic form sequencing is only one critical element of a beginning jazz improvisation learning environment; a learning environment relies upon multiple interdependent elements designed to support effective instruction and positive learning outcomes. The body of research on music motivation suggests that positive outcomes in that area alone may stem from both long term influences “like role models, opportunity to learn, and sequential instruction” as well as short term, situational ones, such as “short-term...environmental factors like teacher attributes, instructional methods, task attributes, evaluation and feedback, and social motivation” (Smith, 2011, p. 266). These likely interact with students’ individual attributes and attitudes, including their previous music achievement and self-efficacy for the task at hand (Smith, 2011).

Therefore, regardless of the developmental appropriateness of tasks, a learning environment (and possibly the tasks themselves) may not prove effective without considering the larger context. This context should recognize that jazz improvisation is potentially both challenging and rewarding, and therefore provide cognitive and motivational support for achievement and self-efficacy. A learning environment design that promotes these outcomes



may foster students' commitments to studying jazz improvisation and increase their chances for success.

### **Purpose**

The purpose of this study was to investigate how the critical features of a beginning jazz improvisation learning environment affected outcomes for middle school instrumentalists, including whether one of two instructional sequencing conditions better supported desired outcomes. The middle grades are important because they are a formative time when many music students are poised at the beginnings of both their instrumental music careers and their jazz improvisation journeys. These middle school musicians are interacting with certain domain-specific practices for the first time, building core instrumental skill sets, working towards developmentally appropriate band learning goals and objectives, and engaging with new musical learning processes and tasks. Middle school teachers are charged with their own task, "consider[ing] the process of music teaching and learning" amidst "a forest of many trees" (Smith, 2011, p. 265).

This study specifically sought to examine achievement, self-assessment, self-efficacy, and motivation outcomes associated with its beginning jazz improvisation learning environment, in the hopes of assisting jazz educators traveling through the aforementioned pedagogical forest. These educators are likely middle school band directors who are attempting to balance the emphases they place on students' cognitive growth, self-concept development, and motivation towards positive learning behaviors. Researchers and educators alike may weigh these theoretically related concepts when considering best practices in jazz improvisation instruction. The following paragraphs define and briefly discuss the significance of achievement, self-



assessment, self-efficacy, and motivation to this study's purpose, as well as conclude with a rationale for investigating all four in the same study.

### **Achievement**

Achievement was measured in this study as a desired outcome stemming from students' engagement in positive learning behaviors, which were in turn linked back to the learning environment design. Achievement is arguably the most obvious and frequently cited measure of success, but it is, of course, not the only measure of success, and is theoretically related to the other outcomes below.

In this study, achievement was defined as students' abilities to improvise jazz according to domain-specific criteria in the four categories of rhythm, melody, harmony, and style/expression. The rhythmic dimension evaluated players' "sense of time" and their use of rhythm, which included jazz-specific practices such as playing eighth notes in an appropriate rhythmic feel and creating interest through various techniques (e.g., varying rhythmic density, displacing rhythmic patterns, and repeating and developing rhythmic motives) (Watson, 2010, p. 252). Similarly, the melodic dimension assessed players' "use of related or repeated melodic ideas," motivic development, and logical phrase development, as well as their use of sequences, stylistically appropriate patterns, and a concept to which jazz musicians frequently refer, "space" (Watson, 2010, p. 252). When jazz musicians use space, they intentionally include rests, or silence, in their melodic content. The harmonic dimension concerned players' "awareness of harmonic form" and application of jazz theory (e.g., voice leading, note resolution, and use of non-harmonic tones). It also judged players' ability to recover from harmonic "errors" (Watson, 2010, p. 252). Finally, as it suggests, the stylistic and expressive dimension evaluated how players "communicat[ed]...emotional expression," as well as their "use of appropriate jazz



articulations,” stylistically typical “expressive devices,” like scoops and fall-offs, and their instrument’s range (Watson, 2010, p. 252). Akin to rhythm and melody, this dimension assessed players’ abilities to develop their solos, this time with regard to intensity.

### **Self-Assessment**

In this study, self-assessment was both an activity in which participants engaged as well as a desired outcome. Previous studies have found self-assessment to be a strong predictor of jazz improvisation achievement (Ciorba, 2009; May, 2003). These findings suggest that self-assessment may play an important role in students’ jazz improvisation development, although the specific nature of that role remains unclear. Self-assessment in this study’s context is discussed in more detail further below, in the description of the learning environment’s design features, under the heading, “Promoting specific feedback.”

### **Self-Efficacy**

This study explored self-efficacy according to Bandura’s (1977) self-efficacy theory, in which self-efficacy is defined as “people’s judgments of their capabilities to organize and execute courses of action required to attain designated types of performances” (Bandura, 1986, p. 391). Self-efficacy is distinct from self-concept; it is about individuals’ confidence to act in certain conditions rather than “an evaluative judgment of *self-worth*” (Pajares & Schunk, 2001, p. 245). In this study, self-efficacy for jazz improvisation encompassed students’ beliefs about their potential to successfully learn ways to improvise jazz and their abilities to use what they knew to perform jazz improvisation.

Self-efficacy was relevant to this study because of its “situated view of perceived competence” (Linnenbrink-Garcia, Maehr, & Pintrich, 2011, p. 232). Efficacy beliefs are rooted in performing a specific task or goal, and “self-efficacy judgments for very similar tasks may



vary as a function of intraindividual or environmental differences” (Linnenbrink-Garcia, Maehr, & Pintrich, 2011, p. 233). Together, these elements suggested that measuring self-efficacy was particularly suited to researching the critical features of a learning environment like the one I designed for this study.

Self-efficacy was also important in this study because of its positive relationship to learning behaviors. Theoretically, “how people behave can often be better predicted by the beliefs they hold about their capabilities...than by what they are actually capable of accomplishing, for these self-perceptions help determine what individuals do with the knowledge and skills they have” (Pajares & Schunk, 2001, p. 241). Self-efficacy may also affect learning behaviors such as choosing challenging tasks, persisting in the face of difficulty (Bandura, 1977; McPherson & Zimmerman, 2002; Pajares & Schunk, 2001; Zimmerman, 2000), and forming expectations for success (Bandura, 1977; Linnenbrink-Garcia, Maehr, & Pintrich, 2011; Pajares & Schunk, 2001). It may also influence students’ emotional well-being (Bandura, 1977; McPherson & Zimmerman, 2002; Pajares & Schunk, 2001; Zimmerman, 2000).

If self-efficacy has the aforementioned relationship to positive learning behaviors, it follows that these learning behaviors may promote achievement (one of the other desired outcomes in this study), and existing research in the middle grades has in fact shown such effects. Therefore, researchers have investigated sources of self-efficacy in other, non-music domains, such as middle school math (e.g., Usher, 2009), writing, as students moved from elementary to middle to high school (e.g., Pajares, Johnson, & Usher, 2007), middle school science (e.g., Britner & Pajares, 2006) and collections of academic domains with which middle school students interact (e.g., Usher & Pajares, 2006a; Usher & Pajares, 2006b). Researchers’ interests in the sources of self-efficacy have stemmed from its relationship to achievement; one



study explained that “[e]xploring the antecedents of self-efficacy would have limited value if those beliefs were not shown to be important influences on students’ academic achievement” (Britner & Pajares, 2006). In light of self-efficacy’s relationship to other positive outcomes, some of which are directly related to achievement and others of which are not, I would argue that self-efficacy would have more than limited value even if it didn’t promote achievement. That said, a relationship to achievement is certainly desirable, so such a relationship existing in non-music domains suggested that it might prove similar in this study, too.

### **Motivation**

The presence of some of the above learning behaviors associated with self-efficacy, and the degree to which they are present, are also accepted indicators of motivation (Linnenbrink-Garcia, Maehr, & Pintrich, 2011; Smith, 2011). These include student engagement, persistence, and the quality of such behaviors. They also concern outcome expectations, which can form a dependent relationship between students’ beliefs about their behaviors and predicted outcomes (Linnenbrink-Garcia, Maehr, & Pintrich, 2011). Of the many facets of motivation, intrinsic motivation is concerned with the more “affective aspects of motivation” (Linnenbrink-Garcia, Maehr, & Pintrich, 2011, p. 243), and achievement goal theorists have associated the aforementioned learning behaviors with students pursuing mastery goals, or learning goals, over performance goals. According to achievement goal theories, individuals’ goal orientations affect their perceptions of their abilities and performances, which in turn affect their motivation to engage in positive learning behaviors (Linnenbrink-Garcia, Maehr, & Pintrich, 2011). Although researchers have not consistently revealed a direct relationship between mastery goal orientations and positive achievement outcomes, they have consistently observed students with mastery goal



orientations cognitively engaging more deeply and exhibiting self-regulated learning strategies (Linnenbrink-Garcia, Maehr, & Pintrich, 2011).

Students' motivational responses may partially stem from inherent personal traits and past experiences, but students' environments can also influence their motivation (Smith, 2011). Of five factors that may influence motivation for music learning, "teacher attributes, instructional methods, task attributes, evaluation and feedback, and social motivation" (Smith, 2011, p. 266-7), this study considered all but teacher attributes. Task selection, in particular, was relevant to the experimental element of this study, in which applying different harmonic sequences to two participant groups had the potential to suggest appropriate sequences for promoting outcomes. In the end, when features of this study's learning environment combined with students' attitudes toward task value and self-efficacy beliefs (Smith, 2011), a setting like this study's beginning jazz improvisation learning environment had the potential to influence motivational outcomes.

Finally, although motivation is important for learners at all levels, it is especially relevant to middle school students. Reviews of motivation research in the middle grades have raised concerns about decreases in motivation (Anderman & Maehr, 1994; Eccles, 2004) and achievement (Eccles, 2004) among students of this age. The reviewers have cited research showing connections between changes in learning environments from elementary to middle school and negative changes in motivation in school, which involved attitudes towards a variety of subjects, including music (Anderman & Maehr, 1994). As previously stated, the students in this study were at a pivotal point in their musical development, relative novices on their instruments as well as in their jazz improvisation studies. Combined with their status as middle school students, they were particularly in need of motivational support.



**Rationale for Measuring All Four Outcomes**

Together, achievement, self-assessment, self-efficacy, and motivation have the potential to suggest the effectiveness of a learning environment's critical features better than each one on its own. Although any one outcome would have warranted investigation by itself, this study sought to consider multiple outcomes because of the likelihood that students' behaviors are related to and influence one another. Scholars reviewing the body of literature on school engagement have suggested that bringing together multiple concepts to form "a multidimensional construct," such as when researchers have gathered behavioral, emotional, and cognitive processes under the umbrella of "engagement," "is valuable because it may provide a richer characterization of children than is possible in research on single components" (Fredricks, Blumenfeld, & Paris, 2004, p. 60-61). This study was conducted in a similar vein. A beginning jazz improvisation learning environment is as diverse as the students within it, and therefore called for an investigation of the multiple processes in which students engaged, as well as the multiple, related outcomes likely to result.

Some existing music research has suggested similar ideas about the importance of supporting music students in multiple areas of development. For example, two researchers who conducted non-improvisation studies that found self-efficacy to be the highest predictor of achievement for younger musicians (see McCormick & McPherson, 2003; McPherson & McCormick, 2006) concluded that their results both reflected self-efficacy findings in other domains as well reinforced existed music research showing that "whilst practice plays a vital part in the development of a musician's capacity to perform well, it should not be considered in isolation from motivational and related variables (Hallam, 1998; O'Neill, 1997; Williamson and Valentine, 2000)" (McCormick & McPherson, 2003 p. 48). They suggested the importance of



teachers “help[ing] students develop both their competence and their confidence” because “these types of perceptions accurately predict their motivation and the future decisions they make” (McPherson & McCormick, 2006, p. 334) about their continued efforts in a musical pursuit. Choosing to continue is critical; although educators in all domains may work to provide optimal learning environments from the start and persist in their efforts even when students struggle, in instrumental music contexts, teachers are not always afforded that chance. Depending on the school, instrumental music students may choose to discontinue their studies at the end of the semester, the end of the school year, or even at any time. They may continue studying instrumental music but discontinue their jazz studies, regardless of their achievement, simply because they assess their work as poor, possess low self-efficacy, or lack motivation. It is therefore essential that jazz educators have resources that suggest how to best support beginning improvisers in multiple areas of their development.

### **Middle School Instrumental Beginning Jazz Improvisation Learning Environment**

The following figure illustrates this study’s beginning jazz improvisation learning environment design according to Sandoval’s (2004, 2014) embodied conjecture model (Figure 6). The representation demonstrates the underlying process through which I predicted that the learning environment would promote outcomes, as well as shows the predicted interdependence of the learning environment’s elements. A desire to study this system and its potential to support learning processes contributed to determining this study’s design-based research approach. This paragraph and the next introduce the larger ideas at work in the embodied conjecture, while the subsections below break down each critical feature of the embodiment.

Cognitive apprenticeship (e.g., Collins, 2006), which does not explicitly appear in the figure itself, governs this conjecture’s design elements (or embodiment), mediating processes,



Design features	Mediating processes	Outcomes	National Core Arts Standards Addressed
<b>Forming Jazz Combos</b>  Teacher organizes students into jazz combos in which students' established expertise vary	<b>1. Students collaborate</b> 1a. to improve individual and group performance 1b. to create arrangements  <b>2. Students initiate and perform appropriate ensemble roles</b>	<b>Achievement</b>  Students perform developmentally appropriate improvised jazz solos according to domain-specific criteria  <b>Self-Assessment</b>  Students independently and accurately self-assess their jazz improvisations  <b>Self-Efficacy</b>  Students express/possess feelings of self-efficacy for jazz improvisation  <b>Motivation</b>  Students fully engage in jazz improvisation activities  Students persist even when they perceive an improvisation task as challenging  Students show interest in jazz improvisation beyond what the teacher requires or provides	<b>Create</b>  <i>Students "improvise melodic and rhythmic ideas or motives that reflect characteristic(s) of music...studied in rehearsal"</i> (MU:Cr1.1.E.Hs novice)  <b>Perform</b>  <i>Students "[d]emonstrate attention to...expressive qualities in...improvised performances"</i> (MU:Pr1.1.E.Hs novice)  <b>Perform</b>  <i>Students "[d]emonstrate...how knowledge of formal aspects in musical works inform...improvised performances"</i> (MU:Pr4.2.E.Hs novice)  <b>Create</b>  <i>Students "evaluate and refine...improvisations based on knowledge, skill, and teacher-provided criteria"</i> (MU:Cr3.1.E.Hs novice)
<b>Revealing "Hidden" Jazz Improvisation Practices</b>  1. Teacher makes musical elements that are characteristic of jazz explicit, as well as emphasizes them often and in multiple contexts  2. Teacher guides students through identifying and exploring musical elements characteristic of jazz and recognized improvisation strategies in multiple contexts  3. Teacher models articulating musical elements characteristic of jazz and improvisation strategies that she employs, and encourages students to do the same  4. Teacher coaches students	<b>1. Students regularly experiment with musical elements characteristic of jazz and improvisation strategies taught in class</b> 1a. as well as ones not taught in class  <b>2. Students regularly articulate the musical elements characteristic of jazz and improvisation strategies that they will employ, have employed, and/or are trying to employ</b>  <b>3. Students often identify the musical elements characteristic of jazz and improvisation strategies taught in class that they hear other improvisers employ</b> 3a. as well as those not taught in class		
<b>Promoting Specific Feedback</b>  1. Teacher models accurate, specific self-assessment  2. Teacher guides students through self-assessing and giving peer feedback	<b>1. Students regularly engage in accurate, specific self-assessment involving the musical elements characteristic of jazz and improvisation strategies taught in class</b> 1a. as well as those not taught in class  <b>2. Students often give accurate, specific, thoughtful, and supportive feedback to peers involving the musical elements characteristic of jazz and improvisation strategies taught in class</b> 2a. as well as those not taught in class  <b>3. Students often articulate how self-assessment, peer feedback, and/or teacher feedback informs their subsequent improvisations</b>		
<b>Implementing Harmonic Form Sequencing</b>  Teacher chooses improvisation tasks according to a developmentally appropriate sequence of jazz harmonic forms	<b>1. Students apply musical elements characteristic of jazz and improvisation strategies in the context of jazz harmonic forms studied in class</b> 1a. as well as new forms not studied in class  <b>2. Students follow the form, whether listening, playing with a live band, or playing to a recording</b>		

Figure 6. Embodied conjecture for beginning jazz improvisation learning environment.



and outcomes. Because this learning environment is based on cognitive apprenticeship theories, it features characteristic elements of apprenticeship, such as situated learning and coaching, but also emphasizes making cognitive processes, such as those at work in improvising jazz, visible (Collins, 2006; Torff, 2002). Apprenticeship, or mentorship, has long been part of jazz's pedagogical tradition, typically in a private study context. The relationship formed in private jazz improvisation study between a single student and teacher may be considered a more traditional apprenticeship or include aspects of a cognitive apprenticeship in which "the expert identifies, defines, operationalizes, and solves problems...engaging students in all the aspects of expert performance, not just the public ones" (Torff, 2002, p. 182). In contrast, a teacher in a school setting, as in this study, implements instruction in groups; therefore, the relationships formed include both student-teacher ones as well as those between the students in the group.

### **Embodiment: Design Features**

The sections below describe the embodiment, the critical features of the learning environment, in detail. These descriptions include how the design features related to the anticipated outcomes in achievement, self-assessment, self-efficacy, and motivation, and include: (a) forming jazz combos, (b) revealing "hidden" jazz improvisation practices, (c) promoting specific feedback, and (d) implementing developmentally appropriate harmonic form sequencing. The features of this study's learning environment were carefully constructed to take advantage of the relationships formed through a cognitive apprenticeship, as well as to guide the teacher in revealing her thinking. They are likely not the only features of the environment that affected outcomes, but like all the features of the learning environments for both conditions, these critical design features remained constant across conditions.



**Forming jazz combos.** A jazz combo is an authentic setting that is optimal for supporting students in jazz improvisation learning. When jazz researchers point to jazz instruction that has succeeded in furthering students' understanding of style, but fallen short in imparting improvisation skills (e.g., Watson, 2010; West, 2015), the implication is that changes in the learning environment might influence results. And, although typical school jazz instruction itself warrants remediation (as addressed in other critical features of this learning environment), the physical makeup of the environment will likely influence outcomes as well. Perhaps the ensembles to which many students belong, many of them big bands, are not optimal for teaching and learning improvisation. The following paragraphs propose how jazz combos may offer advantages over big bands in general, as well as how they may be integral to collaboration and motivation in ways that homogenous groups may not.

Jazz combos offer several advantages over a big band setting when focusing on teaching improvisation. Both jazz combos and big bands offer situated learning, promote musical independence (Watson, 2014), and motivate through promoting mastery goals, such as “cooperation rather than competition” (Belland et al., 2013, p. 255). In a two-case descriptive case study of two historically successful performing arts high school jazz programs, however, students reported learning the most from jazz combos (Dyas, 2006). Combos can focus more exclusively on improvisation (Watson, 2014) and offer more opportunities for all students to practice and perform improvisation, not just a few. For example, in the big band the second trumpet player or first tenor saxophone may receive some improvisation instruction or perform a solo written into the arrangement, the student who already knows how to improvise may volunteer, or the director may rely upon the student who takes private jazz lessons to work on a solo with her teacher. Even in a big band in which everyone is encouraged to learn how to



improvise, the comparatively larger size of a big band will limit turns in a way a jazz combo will not. The standard 17-piece big band dwarfs any jazz combo, whether a trio, a quartet, or as in this study, a 3-piece rhythm section with multiple horns (technically, some would consider these larger “combos” to be “ensembles,” but for clarity, and to differentiate from a big band, which many schools also refer to as a “jazz ensemble,” I refer to the small jazz groups in this study as combos). In the end, there still exists a partnership between jazz big band and combo in a student’s musical education and experience; the combo experience should not necessarily replace the big band experience, but for the purposes of this learning environment design it was the optimal setting for learning improvisation.

Music learning environments inherently hold potential for collaboration, but the jazz combo environment is especially suited to collaboration. Noted scholar of collaboration and creativity, R. Keith Sawyer (2006), described the potential of musical collaboration in the following way:

Musical collaboration can help us to understand all collaboration. Other scholars who study group creativity can learn a lot from what we know about group creativity in musical groups. And education researchers who are interested in how children learn from participating in communities of practice could gain insights from our knowledge of how children become socialized into communities of musical practice. Musical collaboration provides us with a way of better understanding the essence of group creativity. (p. 164)

As students pursue the academic and creative discipline of jazz improvisation, jazz combos such as those formed in this study can promote collaboration through assisting students in socially constructing knowledge. I predicted that the combos in this study would promote social construction of knowledge partially because each student would have both individual and group responsibilities, and partially because the combos would be comprised of students of various ability and experience. Although the musicians in each group were somewhat close in ability and experience, the natural diversity that exists among musicians of any age existed in these



combos, too. What's more, although all participants were effectively beginning jazz improvisers, they existed along the continuum of little to no jazz improvisation experience. This diversity was intended to promote mastery goals, such as peer modeling of short-term goals, as well as expectancy for success, such as peer modeling of tasks that "promote[d] the perception of optimal challenge" (Belland et al., 2013, p. 259). Studies of late elementary and early middle school students in non-music domains have shown the importance of peer models in supporting self-efficacy and achievement (Schunk & Hanson, 1985) and in predicting motivation towards goals (Wentzel, 1998).

Additionally, this learning environment's jazz combos were intended to motivate students through supporting social and performance goals. First, for students of this age, including those in musical environments, social goals are of a significance that "seem vastly influential on motivation...include[e] responsibility goals, intimacy or relationship tools, and status goals" (Smith, 2011, p. 282). The body of existing music motivation research also suggests that "the degree to which [leadership] roles are available and meaningful to students should be considered" (Smith, 2011, p. 282). Distinct from like-instrument small group lessons, heterogeneous music environments like jazz combos, in which each player has a unique role, can offer these opportunities for responsibility, relatedness, status, and leadership. And, in jazz combos in particular, these roles are less static and more universal than they are in a big band. As students in a jazz combo play, the leadership and supporting roles rotate among all players; when they are not playing they may all contribute to arranging tunes (Watson, 2014). Importantly, because I wanted to promote participants' agency despite their inexperience, combos were not exclusively student-led or teacher-led. More accurately, as the teacher I acted



as a facilitator, encouraging collaboration and leaving room for students to lead when they felt able or inspired.

Finally, although any small group lesson, even like-instrument lessons, may motivate students through promoting belonging, an authentic performing ensemble like a jazz combo can help students establish shared goals and task value. Task value, established through “attainment value” (Belland et al., 2013, p. 252), may pertain to performances during class time – for most students in instrumental ensembles “the primary value of such participation is in the music making itself” (Smith, 2011, p. 283) – or pertain to a literal performance onstage at the end of the instructional period. A performance goal may seem contrary to “good” teaching, but in a performing art, it is part of situated learning.

**Revealing “hidden” jazz improvisation practices.** In this study, revealing “hidden” jazz improvisation practices was intended to help students exhibit learning behaviors that lead to positive outcomes in achievement, self-assessment, self-efficacy, and motivation through capitalizing on a distinguishing feature of a cognitive apprenticeship; unlike a traditional apprenticeship, a cognitive one makes “hidden” cognitive processes visible (Collins, 2006). Because self-efficacy includes individuals’ perceptions that they possess (or will possess) the requisite ways and means for completing a task, in this case, a specific musical task (Bandura, 1977; Linnenbrink-Garcia, Maehr, & Pintrich, 2011; McPherson & Zimmerman, 2011; Smith, 2011), I predicted that gaining access to hidden cognitive processes in this study would be vital to supporting participants’ self-efficacy. Therefore, the cognitive scaffolds that composed this feature of the learning environment were intended to contribute both to participants’ performance as well as their positive self-efficacy. These scaffolds addressed two dimensions of a cognitive apprenticeship, its “content” and “method.” In a cognitive apprenticeship, content is domain



specific knowledge, or “explicit concepts, facts, and procedures associated with a specialized area” (Collins, 2006, p. 49). This dimension is integral but not unique to a cognitive apprenticeship. Alternately, a cognitive apprenticeship’s method is both integral and characteristic; it concerns “giv[ing] students the opportunity to observe, engage in, and invent or discover expert strategies in context” (Collins, 2006, p. 50).

First, in this learning environment the content revolved around four categories of jazz improvisation: (a) rhythm (including rhythmic feel and development), (b) melody (including melodic development), (c) jazz harmonic form (which chords, in what order, for how many measures, at what rate), and (d) style/expression. These elements parsed into vocabulary and smaller, related concepts (e.g., within “jazz harmonic form” is vocabulary like “head,” “chorus,” “turnaround,” and “harmonic rhythm” as well as concepts like II-V-I progressions, AABA form, etc.). As the teacher in this learning environment, I made these elements explicit as well as emphasized them often and in context. This involved the concepts themselves and the strategies for identifying and applying them. For example, I explicitly defined rhythmic feel as distinct from meter, assisted students in singing and playing swung and straight rhythmic patterns, and drew attention to the significance of eighth notes and cymbal patterns in identifying or establishing rhythmic feel. These activities took place in the context of listening to recordings, listening to each other, and playing from lead sheets. The content was not necessarily “hidden,” like the expert strategies discussed below, but it formed the basis for students gaining access to such strategies. It also comprised the domain specific language with which students communicated in class and will use in any future jazz improvisation environment.

Second, this learning environment’s method focused on revealing “hidden” jazz improvisation practices, which included strategies specific to jazz improvisation. These



strategies centered on the same four categories above (rhythm, melody, harmony, style/expression), and included processes such as interpreting musical information on the lead sheet to create rhythmic and melodic sequences, improvising variations on an existing tune's melody, and shaping a solo through phrasing and expression. I used cognitive apprenticeship methods for developing expertise, including coaching, scaffolding, modeling, articulation, and exploration (Collins, 2006). I encouraged students to experiment with jazz improvisation strategies, articulate the strategies they employed or heard others employ, and explored solutions to improvisation on their own. Students therefore benefited from guidance in expert strategies, but also from the freedom to pursue their own interests and devise their own plans for solving musical "problems." Additionally, students not only had access to their teacher's thinking (in this case, mine), but also their classmates' thinking and their own thinking. Both of these advantages were intended to elevate their reflections on their work and their classmates' work, as discussed in the section further below on feedback.

***Cognitive scaffolds.*** In addition to the motivational scaffolding discussed in the previous section on forming jazz combos, as the teacher in this learning environment I provided cognitive scaffolds and followed the cognitive apprenticeship principle of "sequencing." I encouraged a "global before local" task conceptualization in which students developed a "clear conceptual model of the overall activity" (Collins, 2006, p. 52). For example, cognitive scaffolds like chord voicing charts assisted students in performing their role in the larger task without miring them in small details non-salient to the task (e.g., voicing their own chords). In this way students could synthesize the elements of a complete tune and make better "sense of the portion they [were] carrying out" (Collins, 2006, p. 52).



**Modeling.** The modeling that I performed as the teacher in this context put the “cognitive” in cognitive apprenticeship. I took my time, explained my thinking out loud, and explicitly described choices I was making and strategies I was using. Modeling is different from direct instruction; I did not say, “This is what you should do and how to do it,” but revealed, “This is what I am thinking while I perform this task, with this goal in mind.” This type of modeling was also intended to function as “intent participation,” or “observation as participation,” in which students would “keenly observ[e]” and listen “in anticipation of or in the process of engaging in an endeavor” (Rogoff, Paradise, Arauz, Correa-Chavez, & Angellilo, 2003, p178). I predicted that if I performed this type of modeling, students would be more likely to voice their own thinking in a similar fashion, as described in the next section.

Modeling in this context was intended to support cognition but also self-efficacy. As middle school students with little experience performing jazz improvisation tasks, participants were likely to “compare themselves to individuals such as classmates and adults as they [made] judgments about their own academic capabilities” (Usher & Pajares, 2008, p. 753). This meant that my modeling and that of participants’ peers had the potential to assist in building self-efficacy.

**Articulation and exploration.** In this learning environment, identifying, applying, articulating, and exploring jazz improvisation strategies was intended to support self-efficacy, self-assessment, motivation, and achievement. First, experimenting with given strategies, reflecting on their use and efficacy, and exploring their own solutions to musical problems were actions intended to build students’ beliefs that they possessed the ways and means to improvise jazz, and therefore had potential to elevate their self-efficacy for jazz improvisation. As the teacher I consistently encouraged students to articulate jazz improvisation strategies they were



using and hearing others use. Students reflected on whether those strategies helped them improvise, how effective or ineffective they were, and/or how they could use them more effectively. I helped students keep track of strategies in a shared space in the room (in this case, each jazz combo had its own paper poster, and I posted the appropriate one before the combo arrived) as well as embedded strategy reflection in activities. For example, when students self-assessed, I asked students to identify which strategies, if any, were responsible for how they evaluated themselves, or for changes in self-assessment. I also verbally recognized student progress towards short-term goals throughout each class. Together, the students and I summarized individual and/or group progress at the end of each class to establish where students were and what their plans were for the next class meeting.

Second, because a key tenet of a cognitive apprenticeship is acknowledging the importance of fostering intrinsic motivation, this learning environment sought to motivate students through providing a space in which they could explore their own solutions to musical problems. Allowing student choice made tasks more personally relevant (Collins, 2006) and “research from both goal theory and intrinsic motivation theory suggests that the provision of some control and choice for students increases their interest in the task and their cognitive engagement in the task (Ames, 1992; Patall et al., 2008)” (Linnenbrink-Garcia, Maehr, & Pintrich, 2011). Therefore, in this learning environment, students chose from jazz improvisation strategies introduced in class, synthesized hybrid strategies or developed their own, and made decisions about lead sheet arrangements (e.g., background figures, introductions and endings, etc.). Inviting students to make these decisions on their own, about what they would do and what they wanted to learn in the process, was intended to establish an inherently motivating environment in which students “co-design[ed]” their learning (Gee, 2005, p. 7). It also honored



students' agency in the learning process. Finally, this type of exploration was also meant to support achievement through supporting cognition.

**Promoting specific feedback.** In this learning environment, as students experimented with strategies, articulated their thinking, and explored their own solutions to musical problems, they also engaged in cycles of reflection and specific feedback; I predicted that this behavior would support higher motivation and achievement. First, because “[s]tudent evaluation and feedback from the teacher, particularly student perceptions of the meaning of such, emerge consistently as influences on motivation (Ames, 1992; Babad, 1993; Maehr and Midgley, 1996)” (Smith, 2011, p. 280), receiving feedback and giving feedback was integral to supporting student motivation in this jazz improvisation learning environment. Second, I anticipated that when feedback was integrated into all activities – self-assessment, teacher facilitated reflection, and teacher feedback – students would show higher achievement outcomes. Self-assessment has been found to be a strong predictor of jazz improvisation achievement (Ciorba, 2009; May, 2003), which suggests that through participating in and purposefully practicing self-assessment students might develop accurate understandings of their improvisation, which in turn could inform their continuing work.

As the teacher, my role in student self-assessment was to encourage students to focus on mastery goals, including reminding students to “self-congratulate for success” (Belland et al., 2013, p. 255) and emphasizing “the goal of developing competence” (p. 254) over task-completion or comparing themselves to others. In this setting, when students did compare themselves to others, they compared their thinking, reflected on outcomes, and viewed others as models; these practices served as cognitive and self-efficacy supports rather than judgments of self-worth. In this learning environment it was also desirable for students to provide feedback on



each other's playing as part of creating a supportive musical community. In turn, hearing feedback from classmates served to support self-assessment, for example, helping students to better see themselves through discovering how others see them.

Although I sometimes only asked students to articulate improvisation strategies they employed, or to simply identify strategies they heard other employ, I also asked students to reflect on the relative success or failure of these strategies. Success and failure were relative because an improvisation strategy often proved partially successful, successful under certain conditions, or successful based upon a student's evaluation criteria. In this environment a student might conclude that, with practice or a revised approach, a previously less than satisfactory attempt could prove satisfactory in the future. For example, a student might have liked her melodic sequences when she created an original melody using chord tones and non-chord tones, but she might feel that her solo still lacked interest. She or her peers might not reject the strategy outright, but rather conclude that she did not include enough eighth notes to communicate the rhythmic feel, or that she should add more rhythmic density in general to provide interest and depth. My intent was that when students felt like they could affect positive change, they would be motivated to continue to engage in cycles of reflection, feedback, and revision.

**Implementing harmonic form sequencing.** One of the critical features of this design, intended to promote outcomes, was the implementation of developmentally appropriate harmonic form sequencing. In this study, I defined developmentally appropriate harmonic forms as those that would present students with performance tasks that were suited to their ability levels as well as those that presented optimal challenge, discussed in more detail below. As previously mentioned, because existing research has not suggested one particular sequence, each



participant in this study experienced one of two sequences. Group A studied modal harmonic forms followed by 12-bar blues harmonic forms, and Group B studied in the opposite sequence. The relative effectiveness of any sequence in any context may depend upon the relative importance placed upon each outcome. Ideally, I anticipated that outcomes in this context would relate to each other, and the interdependence of the critical features of the learning environment design would lead to gains in multiple areas. In the same way, when comparing the outcomes for one or both instructional sequences, I predicted that one or both would promote outcomes. It knew it was possible, however, that a given sequence might prove more effective for one outcome, but not all.

This jazz improvisation learning environment design featured harmonic sequences that were meant to support achievement through presenting “a sequenced array of learning challenges, each building on the last, and represent[ing] the variety of areas of musical skill.” (Smith, 2011, p. 279). This sequential approach reflected one of the tenets of a cognitive apprenticeship, in which sequential learning requires increasing diversity and complexity of tasks (Collins, 2006). In this context it was possible that (a) the comparatively slow harmonic rhythms of modal progressions or (b) the familiar, characteristic sound of the 12-bar blues would assist students in developing multiple jazz improvisation skills. The former had the potential to support achievement through reducing cognitive load associated with harmonic form, and the latter through presenting an accessible mental model. It was also possible that variety alone, represented in both sequences, would contribute to students’ achievement.

Regardless of which sequence proved more effective, existing research has suggested that jazz educators should offer opportunities for participants to develop multiple skills at the same time, rather than trying to approach this holistic discipline in a compartmentalized fashion. Two



researchers who investigated predictor variables for jazz improvisation achievement found a high relatedness of the variables (Madura, 1995; May, 2003), prompting one to suggest that the “interdependence of these sub-skills...indicates that they should be developed contiguously” (May, 2003, p. 255). I predicted that if the sequences in this learning environment proved developmentally appropriate and effective, students would be able to develop the rhythmic, melodic, harmonic, and expressive elements of their jazz improvisation skills, as well as their strategies for improvisation, in parallel.

This study’s consideration of tasks and sequencing was also crucial because “the opportunity to enjoy early success on developmentally appropriate tasks is an important influence on later motivation” (Smith, 2011, p. 270) and on self-efficacy (Usher, 2009; Pajares, Johnson, & Usher, 2007; Britner & Pajares, 2006; Usher & Pajares, 2006a). In this context self-efficacy and motivation were considered in tandem with achievement; just because students could perform a task did not mean they would believe they could perform it, want to perform it, or want to work on it to improve their mastery of content and skills. Therefore, task selection in this learning environment was built around an effort to provide three major scaffolds intended to support outcomes: (a) posing achievable challenge, (b) creating a demand for learning, and (c) providing authentic tasks. Regardless of which condition under which students experienced harmonic form sequencing, these scaffolds remained in place.

**Challenge.** I predicted that if the tasks in this learning environment were selected so that they were both challenging but achievable, and students perceive them as such, then students would likely persist even in the face of difficulty. Such tasks “appear to be the most likely to promote persistence and satisfaction when mastered” (Smith, 2011, p. 279), and therefore had potential to support self-efficacy and motivation. Assessed tasks in this study included two 12-



bar blues with II-V-I sequences, one 16-bar modal tune, and one 32-bar modal tune, which are described in detail in Chapter 3.

I anticipated that the tasks I chose for assessment were most likely to produce what Bandura (1997) called “mastery experiences,” or successful learning and achievement experiences. Mastery experiences have been found to be sources of self-efficacy for middle school students in non-music domains such as math, science, and writing (Usher, 2009; Pajares, Johnson & Usher, 2007; Britner & Pajares, 2006; Usher & Pajares, 2006a), so I predicted that the same might be true for middle school jazz improvisation students. In turn, I hoped that increasing participants’ self-efficacy would motivate them towards future jazz improvisation.

***Demand.*** Tasks may further motivate students towards jazz improvisation if they create demand, or a “need-to-know” situation, for learning (Blumenfeld et al., 2006; Edelson, 2001; Kanter, 2010). This learning environment borrowed from Kanter’s (2010) ideas about creating demand in project-based science contexts, three strategies called “Try to Apply,” “Highlight the Incongruity,” and “Unpack the Task” (Kanter, 2010). For example, I anticipated that earlier in the instructional period, perhaps even during pre-instruction data collection, students might find that the key signature was only partially helpful when creating melodic content. This was a situation in which they would “try to apply” (Kanter, 2010, p. 533) what they knew, but discover that they needed more knowledge to succeed. Or, I predicted that when presented with any improvisation task, students might struggle with the rhythmic dimension of their improvisations, feeling awkward if they played straight eighth notes against a swung rhythmic feel. This might create a context in which students would be motivated to learn how to identify the rhythmic feel of the tune to which they were improvising, as well as how to interpret and use eighth notes in different rhythmic feels. Later in the instructional period students might know that creating



melodies from a blues scale generally sounded good over a 12-bar blues, but notice that it sometimes created dissonance over part of the form. “Highlight[ing]” this “incongruity” (Kanter, 2010, p. 532) might create a demand for students to improvise with chords tones, analyze chords, or to consider how to effectively use dissonance, in a way that simply telling them to would not. Throughout the instructional period, asking students to figure out what they needed to know to improvise over a form might motivate them to “unpack the task” according to the rhythmic, melodic, harmonic, and expressive dimensions suggested by what they heard or saw on a lead sheet. Finally, as the instructional period progressed, presenting tasks in which students were required to apply all the content and skills with which they had engaged thus far was intended to support the content’s relevance (Kanter, 2010), which I hoped might in turn support motivation.

***Authenticity.*** In this learning environment, the harmonic forms of the improvisation tasks, assessed and otherwise, came from tunes in the jazz canon. This did not mean that students never saw harmonic forms absent of an original melody from the “head” of a tune. It did mean that the harmonic forms that they worked with were all rooted in existing tunes, and therefore deeply connected to them. It meant that situated learning extended beyond the physical context, the jazz combo, into the improvisation tasks themselves. Existing research has shown that students across grade levels have benefitted from authentic tasks in other, non-music domains, and that this kind of meaningful work has been partly responsible for their deeper engagement in learning and higher achievement (Marks, 2000; Fredricks et al., 2004).



### Questions

In an effort to investigate if and how critical features of a beginning jazz improvisation learning environment affect achievement, self-assessment, self-efficacy, and motivation outcomes for middle school instrumentalists, this study sought to answer the questions below:

- 1) Does this beginning jazz improvisation learning environment (forming jazz combos, revealing “hidden” jazz improvisation practices, promoting specific feedback, and implementing harmonic form instructional sequencing) support middle school instrumentalists’ jazz improvisation achievement, jazz improvisation self-assessment, self-efficacy for jazz improvisation, and motivation towards jazz improvisation?
- 2) Does one harmonic form instructional sequence better support one or more outcomes?
- 3) Are there any interactions between other key variables and outcomes?
- 4) Are there correlations or relationships among outcomes?
- 5) Are the critical features of this learning environment sources of positive outcomes, and if so, how do the critical features promote mediating processes to produce positive outcomes?

The critical, tested features of this beginning jazz improvisation learning environment involved four strategic efforts in which I, as the teacher, could potentially support students’ achievement, self-assessment, self-efficacy, and motivation: (a) forming jazz combos, (b) revealing “hidden” jazz improvisation practices, (c) promoting specific feedback, and (d) implementing harmonic form sequencing. The “harmonic form sequencing” feature was part of a comparative case study in which participants were divided into two groups; each engaged in jazz improvisation activities according to a different harmonic form task sequence, one or both of which might have proven effective.



## Chapter 2

This literature review is divided into two sections: (a) harmonic forms, which relates to this study's investigation of developmentally appropriate jazz improvisation harmonic sequencing, and (b) student characteristics and competence, primarily around achievement, self-assessment, self-efficacy, and motivation, which relates to this study's beginning jazz improvisation learning environment's effort to support positive outcomes in these areas. My aim in the first section, in which I review empirical literature and other publications with a lens on harmonic forms, is to reveal any common practices, as well as potential connections between research and practice. This effort is especially relevant to one of my learning environment design goals: to apply what is known and consider what is unknown about harmonic forms to choosing and sequencing tasks for jazz improvisation instruction. In the second section I focus on personal characteristics, some inherent but many unfixed, partially because existing empirical interest in these factors suggests their possible influence on improvisation outcomes. Developing a better understanding of the plasticity of some individual characteristics presents a potential opportunity to design a jazz improvisation learning environment that will positively influence student learning, beliefs about learning, and learning behaviors.

Within these two sections I consider jazz improvisation achievement predictor research, student-centered research in jazz improvisation pedagogy, and instructional sequencing resources, albeit amidst a paucity of literature. When Bowman (1988) reviewed doctoral research at the end of the 1980s he lamented that while improvisation pedagogy research was not new anymore, it “has failed to keep pace with the incredible proliferation of materials developed” and “has not paralleled the veritable explosion of interest in the subject” (Bowman, 1988, p. 71). In the almost three decades since, researchers have investigated models and



methods that predict success (e.g., Ciorba & Russell, 2014; May, 2003; Ward-Steinman, 2008) and inform teaching and learning in schools (e.g., Azzara, 1993; Davison, 2006; Dyas, 2006), but such pedagogical inquiry has not widely expanded or necessarily outpaced interest in other improvisation topics, such as professional jazz improvisation (e.g., Carlson, 1980; Johnson, 2013; Norgaard, 2008), cognition and idea generation (e.g., Hargreaves, 2012; Pressing, 1987; Sarath, 1996), and communication processes (e.g., Seddon, 2005; Sawyer, 1999; Wilson & MacDonald, 2012). As referenced in Chapter 1, in *The New Handbook of Research on Music Teaching and Learning* (Colwell & Richardson, 2002), Azzara proposed that improvisation research warranted “replication and expansion” (Azzara, 2002, p. 182) and Sarath suggested that “the marginalized status of improvisation in the curriculum” is “consistent with, and possibly a result of, its marginalized status as a research topic” (Sarath, 2002, p. 188). Azzara’s and Sarath’s thoughts are confirmed by the very book in which they appear, in which improvisation receives little attention aside from the aforementioned authors’ contributions. Jazz improvisation, specifically, receives even scantier attention; in the over twelve hundred page tome a reader will only encounter one full page and two partial pages dedicated to jazz improvisation (see Azzara, 2002, p. 180-182).

In the absence of a trove of jazz improvisation pedagogy studies, let alone ones focusing on middle school instrumental settings and their critical features, each reviewed resource included here addresses at least one factor significant to this study. First and foremost, studies had to investigate music improvisation. Secondary considerations were participant characteristics (e.g., age, level of musical development, or improvisation experience) and setting (e.g., concert or jazz, instrumental or vocal, school or institution). For example, studies of non-jazz improvisation are included for their relevance to elementary and middle school instrumental



contexts (e.g., Azzara, 1993; Davison, 2006), and studies of vocalists are included for their relevance to jazz improvisation (e.g., Madura, 1995; Ward-Steinman, 2008). Two studies in instrumental jazz improvisation at the collegiate level are included because, although participants were experienced instrumentalists, they had little to no experience with jazz improvisation (see May, 2003; Watson, 2010). Non-jazz resources addressing improvisation readiness are included for their relevance to harmonic form sequencing (see Azzara, 1999; Gordon, 2000), one of the critical features of this study's beginning jazz improvisation learning environment. Earlier studies (e.g., Hores, 1978; Paulson, 1985) and more current ones (e.g., Dyas, 2006; Ciorba, 2009) are reviewed, from both peer reviewed journals and doctoral dissertations. This practice of referencing dissertations alongside peer reviewed journal articles is consistent across the literature, including the most recently published peer reviewed sources. Finally, studies in other, non-music domains are included for what they have revealed about middle school learners' achievement, self-efficacy, and motivation in other school contexts.

### **Harmonic Forms**

This section reviews research around harmonic forms towards designing one of the critical features of this study's beginning jazz improvisation learning environment: implementing developmentally appropriate harmonic form sequences. Reviewed resources and research include: (a) classic published methods, (b) choices jazz improvisation researchers have made about harmonic forms, and (c) one scholar's extensive harmonic sequencing research. Implications for determining developmentally appropriate jazz improvisation harmonic sequencing are discussed.



## Published Methods

During a period of growth in jazz education in the 1960s and 1970s (Baker, 1989; Dyas, 2006; Prouty, 2005), respected educators and authors such as Jamey Aebersold, David Baker, and Jerry Coker opened doors for many students and their teachers (Baker, 1989; Bash & Kuzmich, 1985; Coy, 1989; Dyas, 2006; May, 2003; Tolson, 2013) by publishing valuable instructional materials (e.g., Aebersold, 1992; Baker, 1989; Coker, 1964) and promoting the once novel idea that jazz improvisation can be taught (Bash, 1983; Burnsed, 1978; Ciorba, 2009; Coy, 1989; May, 2003; Watson, 2010). This review considers respected, time-tested methods from Jamey Aebersold, David Baker, Jerry Coker, and Mark Levine (see Aebersold, 1992; Baker, 1988; Coker, 1964; Levine, 1995), all of which agree on total harmonic content: II-V-I patterns, modal chord progressions, 12-bar blues, and “Rhythm” changes. Each method applies them to a variety of common jazz forms, most of which assemble 8-bar phrases into AABA (or 32-bar), ABA, AAB, AB, forms (these forms are, of course, found in other types of music, but with harmonic progressions characteristic of those genres). Finally, all of the considered methods emphasize a canon of jazz literature in which students of jazz will discover the culturally authentic application of the aforementioned harmonic forms.

The above methods suggest harmonic forms for sequential improvisation study but do not imply that these are appropriate for a cognitively young, instrumental novice like the middle school beginning improviser. Jamey Aebersold’s *A New Approach to Jazz Improvisation: How to Play Jazz and Improvise* (1992), first published in 1967, and Jerry Coker’s *Improvising Jazz* (1964) are intended for beginning jazz improvisers or performers of an indeterminate developmental stage. *David Baker’s Jazz Improvisation* (Baker, 1988) is geared towards players, while *David Baker’s Jazz Pedagogy* (1989) is intended for teachers; the pedagogy book



includes coursework required for Indiana University jazz majors, but it is difficult to say how these could specifically apply to teaching middle school improvisers. Finally, Mark Levine's *The Jazz Theory Book* (1995) does not specify an audience. Reduced to their sequences alone, the Aebersold (1992) book presents modal progressions before 12-bar blues and the Coker (1964) text begins with a basic 12-bar blues. The required materials for the first course in *David Baker's Jazz Pedagogy* include the Aebersold (1992) and Coker (1964) texts, among others; the sequence presents work with modal progressions before blues ones. *David Baker's Jazz Improvisation* (1988) first distinguishing between vertical and horizontal harmonic structures (and combinations of the two) and presents II-V-I progressions well before the 12-bar blues, as does Levine's (1995) method.

Some of these methods' features suggest that their sequence and/or pacing is negotiable, or perhaps second in importance to the method's contents as a whole. For example, Aebersold's (1992) play-along tracks progress through dorian mode exercises, II-V-I cadences, and 12-bar blues, and the accompanying "Song List for Beginners" (Aebersold, 1992, p. 57) is a standards list heavy in modal jazz. Aebersold subsequently published volumes 2, *Nothin' But the Blues* and 3, *The II/V7/I Progression*. Looking back on his catalogue, however, currently at 133 volumes, he later suggested a study sequence of volumes 1, 24, 21, 116, 2, etc., placing more intensive modal study ahead of a focus on the 12-bar blues. A simpler example finds Levine's (1995) chapter on "The Blues," a harmonic form that commonly features three chords, adjacent to another titled "'Rhythm' Changes," one of the most advanced harmonic forms in jazz. Levine (1995) explains that these are the two most "common set of chord changes in jazz," but acknowledges that "Rhythm" changes "can be scary for beginners; there are so many chords, and they go by so fast" (p. 237). It is difficult to glean a single "best" harmonic form sequence from



these methods, let alone one for a middle school instrumentalist, if that is what is to be gleaned from them at all.

### **Choices in Research**

Of the jazz-specific improvisation studies considered within this review, most have implemented instruction and/or evaluations with one or two types of harmonic forms, including 12-bar blues, various 32-bar forms, II-V-I progressions, and combinations of the three (e.g., Bash, 1983; Burnsed, 1978; Ciorba, 2006; Ciorba, 2009; Coy, 1989; Hores, 1978; Madura, 1995; Madura, 1996; May, 2003; Watson, 2010). Alongside these harmonic forms, those studies with instructional treatments have taken students through numerous sequences of a variety of rhythmic and/or tonal patterns, the most common of which have been any or all applicable scales and modes (major, minor, pentatonic, blues, dorian, and/or mixolydian). Researchers have most commonly included 12-bar blues in their investigations, regardless of the total harmonic form content, instructional sequence, or participants' levels of expertise, though not to the exclusion of other harmonic forms.

Few studies considered for this review explained the reasoning behind choices of harmonic forms for instruction and/or performance measures, nor did they reflect on how those choices affected the outcomes. Of those that did, one reflected on the task in general (see Watson, 2010), a second reflected more specifically on outcomes as related to tasks, and a third focused on task selection (see Hart, 2011). Upon the conclusion of his study of inexperienced collegiate improvisers, Watson (2010) recognized "the criterion task chosen for demonstration of jazz improvisation skill was a standard 32-bar tune with a relatively slow harmonic rhythm" and that "the selection of different criterion tasks such as blues or modal forms or tunes with faster harmonic rhythm or more complex harmonic structure might produce different results" (p. 251).



Another collegiate study evaluated jazz vocalists improvising over three harmonic forms, the standard, “Summertime,” which the researcher cited as familiar to most vocalists, a 12-bar blues, and the 32-bar “Rhythm” changes, which the researcher identified as less familiar to vocalists (Ward-Steinman, 2008). Participants showed the lowest composite mean achievement scores and the lowest dimension mean scores for creativity/expression for the 12-bar blues and 32-bar harmonic form; Ward-Steinman (2008) suggested that the more sophisticated harmonic structures of those two harmonic forms contributed to lower achievement and artistry. Finally, two researchers separately taught and tested participants improvising over a much simpler harmonic form, the tonic-dominant progression of the folk song “Mary Ann.” One researcher did so in a non-jazz instrumental improvisation study of 6<sup>th</sup>-8<sup>th</sup> graders (see Davison, 2006) and another did so in a study of inexperienced collegiate improvisers enrolled in what was called a “beginning jazz improvisation class” (see Hart, 2011). Hart (2011) followed a sequence of tonic-dominant, tonic-dominant-subdominant, and “tonic-dominant-subdominant with blues vocabulary” patterns, per the non-jazz, research based, instructional series, Azzara and Grunow’s “Developing Musicianship Through Improvisation” (Azzara & Grunow, 2006). Because this series’ sequencing is based on what is likely the only available example of targeted improvisation sequencing research, it warrants further exploration below.

### **Harmonic Improvisation Readiness**

Edwin Gordon has dedicated his professional life to researching “the empirical model of the sequential learning process in music” (Moore, 1995, p. 26), measuring music aptitude, and promoting what one scholar called his “primary contribution to music education...the centrality of the *mental conception* of music, an ability he has termed audiation” (Colwell, 2002, p1132). Azzara (2002) explained, “Audiation is to music what thinking is to language...we audiate music



we have heard as well as the music we are predicting” (p174). Gordon described how sequencing harmonic patterns relates to audiation when he addressed the Music Educators National Conference in March of 2000, explaining “...when it is known that one harmonic pattern is easier to audiate than another, improvisation can be structured in terms of sequential learning, in that learning the simpler forms the foundation for learning the complex” (Gordon, 2000, p. 4).

In the same address Gordon (2000) shared the “harmonic pattern difficulty levels” (p. 7) that he established through research in the 1970s, a three-stage, multi-tiered sequence. He has operationalized this sequence in his many Music Learning Theory publications, as well as developed a two-part improvisation readiness assessment based in part on the sequence, the *Harmonic and Rhythmic Improvisation Readiness Records*, or HIRR and RIRR. Briefly, the difficulty levels stipulate that students begin with improvising major and harmonic-minor tonic and dominant-seventh patterns (I-V7 and i-V7), and dorian tonic and subdominant patterns (i-IV). When students are ready, these yield to progressive additions of chords with other relationships to the tonic, more modes, and combinations of all of the patterns (Gordon, 2000).

Gordon’s harmonic pattern difficulty levels are problematic to jazz improvisation harmonic forms. First and foremost, the II-V-I jazz harmonic pattern (more specifically, ii-V7-I or ii7-V7-I7), arguably the most important harmonic pattern in jazz, contains a chord with a supertonic relationship to the tonic. This type of chordal relationship is only found in the most difficult level of Gordon’s patterns (Gordon, 2000). In the only example of how an adherent to Gordon’s difficulty levels might choose repertoire to teach jazz improvisation, Hart (2011) used five selections from Azzara and Grunow’s “Developing Musicianship Through Improvisation” (2006) to implement his doctoral research, which Azzara himself supervised. They included two



12-bar blues with I, IV, and V7 chords, which met Gordon's beginning level, but, atypical of the blues, did not include I7 or IV7 chords. Four were spirituals or Dixieland, one was a Latin treatment of "Mary Ann," and none intersected with lists like Aebersold's (1992) jam session standards or "Song List for Beginners" (p. 57). Hart (2011) concluded that the novice improvisers in his small sample, 8 non-jazz music majors, were "capable of engaging in meaningful improvisations" (p. 68) over these tunes. Questions ultimately remain, however, about how to reconcile Gordon's difficulty levels with jazz's characteristic chord progressions, harmonic forms, and culturally relevant repertoire.

### **Student Characteristics and Contexts**

This section reviews research into how the characteristics students possess, the competence they may acquire through engaging in learning environments, and environmental contexts themselves can affect outcomes such as achievement, self-efficacy, and motivation. These characteristics and contexts are discussed in four sections: (a) musical aptitude, (b) jazz theory knowledge, (c) self-efficacy, and (d) motivation. Jazz theory knowledge, self-efficacy, and motivation may be considered both pre-existing student characteristics as well as learning outcomes. To contextualize jazz improvisation education research, studies from a variety of domains are included.

#### **Musical Aptitude**

During the 1960s and 1970s, jazz education became accessible to a wider audience of children in schools (Baker, 1989; Coy, 1989; Dyas, 2006; Prouty, 2005), and the "old" idea that improvisation could not be taught went through serious revision (Bash, 1983; Burnsed, 1978; Ciorba, 2009; Coy, 1989; May, 2003; Watson, 2010). Earlier researchers questioned which high school students were more likely to achieve in improvisation, and therefore were more



“appropriate” for instruction (Bash, 1983), as well as whether younger students, such as seventh graders, had the cognitive abilities to learn improvisation at all (Burnsed, 1978). More current thinking and research has supported improvisation education as beneficial to students of various aptitudes (Azzara, 1993; Coy, 1989; Davison, 2006). This is not to say that certain cognitive factors, such as musical aptitude (see Azzara, 1993) or achievement on standardized tests (see Ciorba, 2006; Ciorba, 2009) cannot affect or predict a students’ potential for improvisation achievement, but rather that all students can benefit from and achieve through improvisation instruction.

Three of the above studies explicitly measured musical aptitude using respected music educator and researcher Edwin Gordon’s Musical Aptitude Profile, or MAP (see Azzara, 1993; Bash, 1983; Burnsed, 1978). In the more recent example, teachers engaged 66 fifth grade instrumentalists in aural and movement instruction (Azzara, 1993). Controlling for time, one group received this instruction alone, while the other also received improvisation instruction. Azzara (1993) found that while high aptitude participants achieved more than those with moderate or low aptitude, all students who received improvisation instruction, regardless of aptitude, reached significantly higher overall musical achievement levels than students who did not. Azzara’s (1993) findings align with a more contemporary attitude toward learning potential than found in Bash (1983) or Burnsed’s (1978) work, and are supported by a stronger methodology, but exist in near isolation. They underscore how measuring aptitude can yield more precise results and strengthen design in future studies.

Other existing research supports the current study’s intent to measure musical aptitude as a way to more accurately analyze results and strengthen comparative claims. For example, when the experimental group significantly outperformed the control group in one of the above jazz



improvisation studies (see Coy, 1989), the researcher struggled to draw definitive conclusions because: (a) the groups of middle school instrumentalists were formed without any kind of stratification, (b) the control and experimental groups did not possess comparative scores on the pretest performance measure, and (c) no other measure was administered to establish relative group equivalence. Coy (1989) had to therefore acknowledge that he could not accurately attribute the significance of the experimental group's gains to the instruction. In contrast, a more recent study's analyses were more reliable because 6<sup>th</sup>-8<sup>th</sup> grade instrumentalists (n=76) were assigned to instructional groups based on their scores on Gordon's Harmonic and Rhythmic Improvisation Readiness Records (HIRR and RIRR) (Davison, 2006). Forming groups of relatively equal harmonic readiness assisted Davison in comparing the effectiveness of his two conditions, one in which participants received aural improvisation instruction, and the other in which they received both aural and notated improvisation instruction. Davison (2006) found that his two treatments were equally effective in increasing improvisation achievement and self-efficacy; his results are discussed in more detail later in this review.

### **Jazz Theory Knowledge**

Knowledge of jazz theory differs from a student characteristic like musical aptitude because it is not inherent; while students may be more likely to acquire it based on past academic performance and motivation toward music (Ciorba, 2009; Ciorba & Russell, 2014), they will not acquire it at all without engaging in a learning experience. Studies have confirmed jazz theory knowledge's place in jazz education through its presence in successful performing arts high schools (Dyas, 2006) and its importance in predicting jazz improvisation achievement (Ciorba, 2006; Ciorba, 2009; Madura, 1996; May, 2003; Ward-Steinman, 2008). The significance of jazz theory knowledge to improvisation achievement supports the current study's instructional



sequencing inquiry into harmonic forms, a primary topic in jazz theory, and their potential affect on achievement outcomes. The following paragraphs detail existing findings regarding the influence of jazz theory knowledge on achievement and factors predicting its acquisition.

One predictor-model study, with 73 undergraduate wind players enrolled in jazz ensembles at five universities in the mid-west, questioned whether researchers should parse out individual predictors like jazz theory knowledge or instead consider more global factors (May, 2003). The data analyses revealed jazz theory knowledge as one of five independent predictor variables most highly correlated with improvisation achievement, behind self-evaluation and aural imitation and ahead of improvisation class experience and aural skills (May, 2003). Further analysis to establish a predictor model, however, eliminated jazz theory knowledge and aural skills while still including improvisation class experience. Because jazz theory and aural skills are likely a part of an improvisation class (along with aural imitation, which did appear in the predictor model), May (2003) proposed that this phenomenon, also seen in high correlations between other aspects of the study, suggested the interdependence of many of the technical and non-technical skills associated with jazz improvisation. She therefore encouraged educators to develop these skills “simultaneously rather than in sequential fashion” (May, 2003, p. 255).

Almost a decade earlier, Madura (1995), studying mid-western college students in vocal jazz courses (n=101), came to a similar conclusion regarding the evaluation dimensions themselves (in this case, tonal, rhythmic and expression dimensions). She found strong correlations “not only within the specific dimensions, where they were expected, but also between the dimensions” (Madura, 1995, p. 60), suggesting the possibility of evaluating performances globally. Like May’s initial predictor variable analysis, however, two subsequent studies found that jazz theory knowledge rose to the top (Madura, 1996; Ward-Steinman, 2008).



Using data from her 1995 study she found that jazz theory knowledge was the greatest predictor of jazz improvisation achievement, followed by “jazz experience” (which, in this case, encompassed jazz improvisation lessons, jazz ensemble experience, listening to jazz, parental attitudes towards jazz, etc.) and imitative ability (Madura, 1996). Madura Ward-Steinman continued her work a dozen years later with college vocalists (n=102) in both Australia and the United States (Ward-Steinman, 2008). This time she did not specifically assess jazz theory knowledge, but as May suggested in 2003, and as she herself had anticipated in her 1996 work, she approached factors more globally. Extensive jazz experience, especially listening and study (which subsumes jazz theory), significantly correlated to vocal jazz improvisation achievement.

Given the significance of jazz theory knowledge to improvisation achievement, one study “explored a causal model to determine the influence of motivation and academic achievement on jazz theory knowledge” (Ciorba & Russell, 2014, p. 297), finding that academic achievement and motivation toward music produced significant positive effects. An earlier study showed that the previous academic achievement of 102 Florida and Michigan high school students, as measured by standardized tests, had a large direct effect on their knowledge of jazz theory, along with their motivation for music and self-efficacy (Ciorba, 2009). Ciorba and Russell (2014) subsequently analyzed motivation and achievement alone, and confirmed both motivation toward music and academic achievement as having large direct effects on acquisition of jazz theory knowledge. Implications for this study are discussed in the next section, which, in part, draws inferences between motivation for music and self-efficacy.

### **Self-Efficacy**

Jazz research has not only recognized students’ capacities for conceptual knowledge and technical skill but also the importance of their perceptions of themselves as learners. Existing



research has investigated students' perceptions of technical jazz instruction (see Leavell, 1996), evaluated student confidence, anxiety, and attitude toward learning improvisation, with special attention to male and female characteristics (see Alexander, 2012; Wehr-Flowers, 2006), and investigated how jazz improvisation education in an orchestra setting can motivate students and subsequently reduce attrition (see Alibrio, 1988). Existing research has also studied improvisation and jazz improvisation instruction's effects upon self-efficacy (e.g., Davison, 2006; Watson, 2010), the specific type of self-perception that I will investigate in this study. Bandura's (1977) self-efficacy theory defines the concept as students' beliefs about their abilities and potential to successfully learn and perform a specific task, in this case, jazz improvisation. As referenced in the previous section, Ciorba (2009) and Ciorba & Russell (2014) found that self-efficacy had a large direct effect on jazz improvisation self-assessment and jazz theory knowledge, and a large indirect effect on jazz improvisation achievement. Two other studies, one teaching instrumental improvisation to middle school students (see Davison, 2006) and another teaching jazz improvisation to college instrumentalists (see Watson, 2010), revealed a significant increase in students' self-efficacy following experiences with improvisation instruction. Specifically, Davison (2006) found that after participants engaged in improvisation instruction, among fifteen factors, the greatest self-efficacy gains in instrumental music were for sight-reading. Researchers have noted sight-reading as especially relevant to improvisation because of both activities' spontaneous natures (Azzara, 1993; Bash, 1983; Ciorba, 2009; Coy, 1989; Davison, 2006).

Because self-efficacy likely promotes achievement and positive learning behaviors (Bandura, 1977; McPherson & Zimmerman, 2002; Zimmerman, 2000), self-efficacy research in other domains has investigated sources of self-efficacy. This body of research includes studies



specific to middle school learners. Studies have investigated sources of self-efficacy in middle school math (e.g., Usher, 2009), in writing, as students move from elementary to middle to high school (e.g., Pajares et al., 2007), in middle school science (e.g., Britner & Pajares, 2006) and across the variety of academic domains with which middle school students interact (e.g., Usher & Pajares, 2006a; Usher & Pajares, 2006b). Three of these studies found that all four of Bandura's (1997) predicted sources of self-efficacy—mastery experiences, vicarious experiences, social persuasions, and emotional and physiological indexes—predicted self-efficacy and achievement, but that mastery experiences were the strongest source of self-efficacy in middle school math, science and academics in general (Usher, 2009; Britner & Pajares, 2006; Usher & Pajares, 2006a). One of these studies, which researched writing self-efficacy in 1,256 students across grade levels 4-11, found similar results, with the exception that vicarious experiences were not found to be a source of writing self-efficacy (Pajares et al., 2007). The study's researchers suggested that this inconsistency with other domains “may in part be explained by the context sensitivity of self-efficacy beliefs. It is likely, for example, that different sources influence self-efficacy differently in different academic areas and at different academic levels” (Pajares et al., 2007, p. 107). A fourth study, not included in those cited above, found evidence of a potential fifth source of academic self-efficacy in 468 6<sup>th</sup> graders, “invitations” (Usher & Pajares, 2006b). Researchers pursued this investigation partly based on Bandura's (1997) suggestion that self-efficacy may be rooted in “other important psychological processes” (Usher & Pajares, 2006b, p. 8). This study followed the tenets of invitational theory, which “posits that people can send uplifting and empowering messages to themselves and to others that serve to improve their own functioning and well-being” (Usher & Pajares, 2006b, p. 8). In this study and another, researchers found differences in sources of self-efficacy between



middle school girls and boys—in both studies, social persuasions were a greater predictor of self-efficacy for middle school girls than boys, and vicarious experiences were a greater predictor for middle school boys than girls (Usher & Pajares, 2006a; 2006b).

Despite the potential benefits of investigating self-efficacy using qualitative or mixed method designs, all but one of the above studies used quantitative methods. The one study that used qualitative methods was conducted on a small scale; the researcher selected eight 8<sup>th</sup> grade students from an earlier quantitative study of 824 participants in the same grade level (Usher, 2009). She interviewed these eight students, selected for their reported high and low self-efficacy, as well as their parents and math teachers. Because of the qualitative methods she used, she not only confirmed the important role that previous successes and failures played in participants' self-efficacy, but she also gained additional insight into such sources of self-efficacy and into learning behaviors. For example, one participant's most influential vicarious experience was with his parents, as opposed to his teacher or peers. Another student "credited her teacher's ability to provide her with opportunities" for success as key to her growth in math (Usher, 2009, p. 308). Usher (2009) found that the participants with higher self-efficacy were better self-regulators, using "cognitive and metacognitive strategies" (p. 309), whereas the participants with low self-efficacy not only struggled academically but exhibited few help-seeking behaviors. Perhaps the most unique insight in this study was that although emotional and physiological indexes were a source of self-efficacy for both high and low self-efficacy participants, the two groups of participants interpreted their affect very differently. The high self-efficacy students found "their physiological and affective arousal in math" as motivating, while the low-self-efficacy students interpreted it as "distress that left them feeling disheartened and often paralyzed" (Usher, 2009, p. 308).



Because self-efficacy is so deeply rooted in contexts, it remains unclear how middle school learners' experiences in jazz improvisation may parallel or diverge from students' experiences in math, writing, or science. Self-efficacy is contingent upon students possessing a goal to become competent in a task, as well as believing they possess the ways and means, behaviorally and cognitively, to perform the task. If the tasks are relatively unknown to beginning jazz improvisers, it is not clear how they may judge their self-efficacy prior to studying jazz improvisation. Additionally, because self-efficacy is situated, "judgments for very similar tasks may vary as a function of intraindividual or environmental differences" (Linnenbrink-Garcia, Maehr, & Pintrich, 2011, p. 233). Jazz improvisation learning environments likely share features with other domains as well as set themselves apart from those contexts. Perhaps most obviously, beginning jazz improvisation learning environments are just that: contexts for relatively new learners. Unlike other domains, in which students may enter a learning environment with years of past experiences from which to draw efficacy beliefs, beginning jazz improvisers may only bring with them related experiences (e.g., general music experiences or beginning instrumental experiences). That said, if studies in other domains can be generalized to jazz improvisation (e.g., Usher, 2009; Britner & Pajares, 2006; Pajares et al., 2007), it is important that jazz educators facilitate early successful experiences to promote formation of higher self-efficacy.

## **Motivation**

The following discussion of motivation is divided into two parts, one focusing on motivation in non-music domains in middle school, and another on motivation specifically in music.



**In middle school.** Existing studies of middle school students in non-music domains have investigated a variety of aspects of learning environments that may be associated with motivation and related ideas, such as engagement. Just as self-efficacy presents as bidirectional in nature, acquired through engaging in certain learning behaviors as well as affecting them, this research is predicated on the idea that students may increase their motivation through engaging in activities in certain contexts as well as gain skills when exhibiting behaviors associated with motivation. Researchers have investigated the effects or implementation of learning environments (e.g., Kolodner, Camp, Crismond, Fasse, Gray, Holbrook, Puntambekar, & Ryan, 2003; Marks, 2000; Ryan & Patrick, 2001), and behaviors associated with tasks and goals within learning environments (e.g., Lee & Anderson, 1993; Maehr & Anderman, 1993; Sadler, Coyle, & Schwartz, 2000). As a whole, this literature indicates how greatly learning environments can affect middle school learners' motivation and engagement in learning.

Research into middle school learning environments has found that a variety of factors may support motivation and engagement in school, including social factors, the nature of the work itself, and student perceptions of goal orientations. One study investigated student engagement in math and social studies across grade levels, from elementary to middle to high school (n=3,669), and found that school reforms eliminated previously found effects of students' personal backgrounds (Marks, 2000). These reforms included efforts to provide "socially supportive social environments," "challenging, and interesting work" (e.g., authentic tasks), parental involvement in learning, and school "commitment to equity in the delivery of instruction" (Marks, 2000, p. 159). Another study confirmed the importance of classroom social environments to motivation and engagement for 233 math students as they moved from 7<sup>th</sup> to 8<sup>th</sup> grade (Ryan & Patrick, 2001). Although previous motivation was a predictor of current



motivation, results showed that three factors contributed to positive change in motivation and engagement (students' perceptions of their teacher as supportive, encouraging cooperation and collaboration among students, and promoting "mutual respect among classmates") (Ryan & Patrick, 2001, p. 454). Only one factor was negatively associated with changes in motivation and engagement: students' perception of their teacher promoting performance goals, or competition among and comparison between peers. This is in alignment with findings that have indicated positive effects on learning behaviors or self-efficacy when middle school students perceive learning environments as supporting them socially and emphasizing task goals (Lee & Anderson, 1993; Maehr & Anderman, 1993; Roeser, Midgley, & Urdan, 1996). One study specifically investigated the effect of competition in middle school, in the form of engineering design challenges, and found them "problematic" (Sadler, Coyle, & Schwartz, 2000, p. 312). The study's researchers found that "[a]lthough some students thrive on competition...many of the male students and an even larger fraction of the female students did not feel competent to compete" (p. 312). They concluded that middle school students, "taken as a whole, prefer to concentrate on improvement relative to their own starting point; they are not needful of others for comparison" (Sadler et al., p. 313).

Given findings about the positive motivational and engagement effects of cooperative and collaborative social environments, as opposed to competitive ones, it is not surprising that researchers have sought to develop learning environments that feature such cooperation and collaboration. Two such examples are a framework designed to provide needed motivational and cognitive support in problem-based learning contexts, or PBL (Belland et al., 2013) and a middle school science learning environment called "Learning By Design<sup>TM</sup>," or LBD (Kolodner et al., 2003). Belland et al. (2013) challenged the idea that authentic tasks alone, the kind



featured in PBL, will motivate and engage students. They proposed that an effective PBL environment needs scaffolds that not only support student cognition but also motivation, and established a framework for providing such support. This framework outlined ways to “establish task value, promote mastery goals, provide for social interaction, promote emotion regulation, promote expectancy for success, and promote autonomy” (Belland et al., 2013, p. 249). The developers of LBD also sought to bolster the effectiveness of a PBL environment, specifically, to support middle school students’ deeper understanding of scientific concepts through also supporting their social development, positive learning behaviors, and communication skills. They saw a particular need for scaffolding middle school science experiences because of middle students’ lack of ability to “organize themselves to solve a big problem” and appreciation for “the need to make connections between what they know and what they are encountering” (Kolodner et al., 2003, p. 507). LBD’s goal is deeper understanding, but one of the vehicles through which it achieves this is design of tasks and processes that motivate and engage students. In this environment the teacher acts as a facilitator, establishing classroom cultures that support students cognitively as well as motivate them. These include cultures of iteration, scientific reasoning, and collaboration and interdependence, in which “every member of the community feels responsibility towards helping other learn, and every member of the community knows that her or she can depend on others for help” (Kolodner et al., 2003, p. 512). Apart from the scientific reasoning, these practices of iteration, collaboration, and interdependence are not unlike those at work in the environments in which middle school musicians frequently practice and learn.

**In music.** Considering research in motivation for music in particular, two models of motivation for music learning illustrate the importance of self-efficacy and the learning



environment in supporting motivation, among other factors such as individual personality traits, prior achievement, and environmental influences from places like home and community (Hallam, 2002; Smith, 2011). Hallam's (2002) is the denser of the two, depicting seven interdependent elements: the environment, cognitive processes, motivation, goals, and three types of personal characteristics (cognitive, behavioral, and self-concept). The only relationship in which one element is shown to have a direct, unreciprocated effect on another is one in which "rewards and punishments from the environment" affect "motivation to behave in particular ways or undertake particular tasks" (Hallam, 2002, p. 233). Smith's (2011) model presents a more compact illustration. It shows long-term and situational influences on four measures of motivation: choice, intensity, persistence, and quality of engagement. Long-term influences include early music environment (e.g., opportunity to learn and sequential instruction), prior achievement in music, personality, and attribution of success (Smith, 2011). Situational influences represent the immediate environment (e.g., teacher, instructional method, tasks) and an individual's perceptions and beliefs (perceived task value, goal orientation, self-efficacy, and affective state) (Smith, 2011).

Comparing the two models, Hallam's (2002) model largely considers environmental influences from outside of school, one of which is a student's "place of work or study," but Smith's (2011) model emphasizes how factors situated in the learning environment can affect motivation: teacher attributes, instructional methods, task attributes, evaluation and feedback, and social motivation. Additionally, Smith's (2011) model suggests a linear path towards motivation, through long-term and situational influences, but Hallam's (2002) model indicates the likelihood that behavior associated with motivation may, in turn, influence learning outcomes. In Hallam's (2002) model, motivation directly reflects back upon students' goals and



cognitive processes, suggesting possible indirect effects on “malleable” personality characteristics, such as students’ self-efficacy.

Music researchers have subscribed to different theories to explain what motivates students and how those factors influence learning, including expectancy value theory, attribution theory, achievement goal theory, self-efficacy theory, and intrinsic motivation theories (Hallam, 2002; Linnenbrink et al., 2011; Smith, 2011), but overall, have recognized four indicators of motivation: choice/preference, intensity, persistence, and quality of engagement (Linnenbrink-Garcia et al., 2011; Smith, 2011). This is not entirely problematic, as motivational theories vary in emphases but share elements. For example, researchers in three studies that used the same motivation measure, or an adapted version of it, undertook their investigations through a lens of (a) attribution theory, to study motivation in college non-music majors (n=187) (see Asmus & Harrison, 1990), (b) achievement goal theory, to study motivation in 7<sup>th</sup>-12<sup>th</sup> grade band students (n=300) (see Schmidt, 2005), and (c) no clearly stated theory whatsoever (although the research cited was heavy in attribution theory) to study jazz theory acquisition in high school students (n=102) (Ciorba & Russell, 2014). Ciorba (2009) and Ciorba and Russell (2014) borrowed and Schmidt (2005) modified the “magnitude-of-motivation” measure from an existing study that sought to measure motivation for achievement in music in college non-music majors taking a music appreciation course (see Asmus & Harrison, 1990). The instrument measured “(a) personal commitment to music, (b) commitment to school music, (c) commitment to music compared to other activities, and (d) self-concept of music ability” (Ciorba & Russell, p. 292). Asmus and Harrison (1990) developed the “magnitude-of-motivation” measure from open-ended responses that elementary through high school students gave in earlier studies of motivation towards achievement in music, in which students reported their beliefs about the causes of failure



and success in music (see Asmus, 1985; 1986). Asmus and Harrison (1990) used the instrument alongside a second measure which was intended to capture elements associated with what they deemed “the five major factors that motivate students to achieve in music” (Asmus & Harrison, 1990, p. 261): effort, musical background, classroom environment, musical ability, and musical affect. They found that the college non-music majors in their study most frequently associated musical affect with musical outcomes (Asmus & Harrison, 1990), which differed from students in grades 4-12 (n=589), who more often attributed success in music to effort and ability, shifting further towards ability as they progressed further in grade level (Asmus, 1986).

The researchers above have suggested the importance of teachers at all levels promoting the idea that effort can influence achievement, an idea that may motivate students to engage in positive learning behaviors like practicing (Asmus & Harrison, 1990), and emphasizing the intrinsic and cooperative aspects of music learning, those which may best motivate students in the middle and high school grades (Schmidt, 2005). Ciorba (2009) and Ciorba and Russell (2014) found that motivation towards music had a large positive effect on jazz theory knowledge acquisition in high school students, suggesting that ways likely exist for jazz improvisation instruction to promote motivation toward music. For example, because of the potential of self-efficacy for specific musical tasks to contribute to a student’s overall self-concept of music ability (e.g., Davison, 2006), teachers might implement instructional sequences that promote self-efficacy, such as the ones included in the current study, thereby also promoting motivation. Efforts such as this could directly affect jazz theory knowledge acquisition and directly or indirectly affect achievement, suggesting achievement, self-efficacy, and motivation’s potential interdependence.



### Chapter 3

In this sequential explanatory mixed methods study, I collected and analyzed data around beginning jazz improvisation achievement, self-assessment, self-efficacy, and motivation for two groups of middle school instrumentalists participating in a jazz improvisation course designed to support those three outcomes. Both groups' learning environments included the same critical features: (a) forming jazz combos, (b) revealing "hidden" jazz improvisation practices, (c) promoting specific feedback, and (d) implementing harmonic form sequencing. Participants were divided into six small instructional groups, or jazz combos, half of which studied jazz improvisation according to one harmonic form sequence and the other half of which followed an alternate sequence. Although the participants received largely the same instruction in largely the same environment, the instruction differed in the order in which harmonic forms were introduced. This portion of the study therefore formed a comparative case study within the larger study. It was also an experiment, albeit with low power, that required large effects for those effects to be statistically significant. In either case, one or both sequences had the potential to support desired learning outcomes.

A sequential explanatory mixed methods design met the needs of this study primarily because of its potential to analyze the problem comprehensively (Creswell, 2014). The data was collected and analyzed sequentially in an effort to answer my five research questions (Figure 7). As illustrated in the boxes below labeled "QUANT" and "QUAL", there was a period of data collection that included pre-, mid-, and post-instructional quantitative data collection, all around two 6-week periods of instruction and qualitative evidence collection. The post-instruction data collection was divided into three phases, two quantitative and one qualitative, during which I collected and compiled: (a) participant jazz improvisation recordings and surveys, (b) jazz



improvisation evaluations, and (c) video transcriptions. As the arrows indicate in the figure below, each phase led to the next. The phases of data collection were all driven by the research questions posed in this study. Data collection was followed by two phases of data analysis, first quantitative and then qualitative. A mixed methods, design based research approach suited this particular study because I was interested in outcomes but also processes, because I wanted to see behind the statistics: I wanted to know what happened in the jazz improvisation learning environment and to gain insight into why. I also wanted to match the significance of the numbers with that of student voices. At its core, improvising jazz is a personal endeavor, and I sought to uncover that side of it, to ground the study in statistics but to put a human face on it.

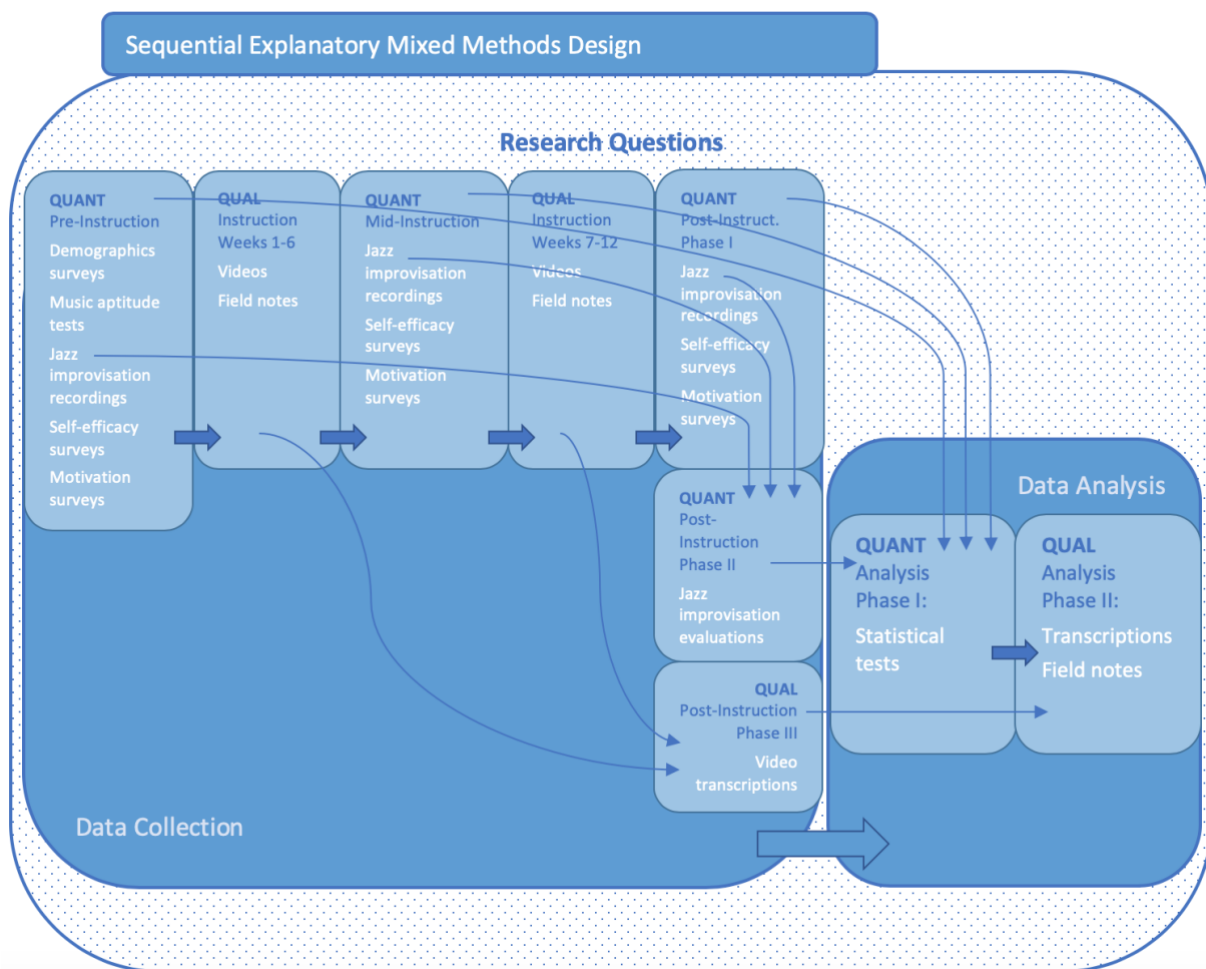


Figure 7. Illustration of this study's sequential explanatory mixed methods design.



In this study, middle school instrumentalists (n=43) with little to no jazz improvisation experience were divided into groups A and B, for which the learning environments differed only according to the sequence in which harmonic forms were introduced (Table 1). Group A's (n=22) learning experience was rooted in modal harmonic forms for the first half of the instructional period and 12-bar Blues for the second, while Group B's (n=21) learning experience followed the opposite sequence. I instructed the 6 smaller instructional groups, or jazz combos (3 in Group A and 3 in Group B), during weekly 45-minute class meetings over a 12-week period. Weekly meetings provided consistency without setting unrealistic expectations for instructional time, and the 12-week period allowed time to facilitate change and accrue measurable amounts of data.

*Table 1.* Instructional Sequences by Group.

<b>Instructional Group</b>	<b>Harmonic Forms Weeks 1-6</b>	<b>Harmonic Forms Weeks 7-12</b>
A (n=22)	Modal	12-bar blues
B (n=21)	12-bar blues	Modal

### Sample

The following three sections detail how I recruited participants, selected them for the study, and organized them for instruction. A fourth section describes the research site.

### Recruiting

I recruited middle school instrumentalists with little to no jazz improvisation experience (n=43) from band enrollment at two schools, School X (N≈73) and School Y (N≈51). The schools are further described below. I electronically distributed recruiting fliers (Appendix A) during a weeklong period in November, 2017, prior to the January 22, 2018 start date of the instructional period. I sent digital fliers to School X band parents and students through my district email, per approval from the District X Board of Education, my employer. My



colleague, the School Y band director, forwarded the same email and similar digital fliers (Appendix B) to his band parents and students via his district email, per approval from the District Y Board of Education. The fliers hyperlinked to the consent documents (Appendix C). Once participants were selected, I communicated with all of them directly through my Rutgers email account.

### **Selection**

I intended to accept any interested middle school instrumentalist to the study, provided that they possessed the requisite musical readiness and that interest did not exceed capacity (48 musicians, or 8 groups of 4-6 students each). I reviewed the pool of potential participants and determined readiness through band director recommendation, my own and that of my colleague at School Y. Criteria included (a) at least a 1.5 octave working range (the range of pitches a student is able apply in aural and notated music contexts) associated with concert B flat, E flat, and F major key signatures (common tonalities in band), (b) knowledge of accidentals and/or previously demonstrated ability to readily acquire new accidentals (flats, naturals, and sharps outside of the key signature), (c) an ability to play with a steady beat, alone and with others, independently or with occasional assistance, and (d) an ability to sight read (upon seeing a piece of developmentally appropriate music for the first time, play it with reasonable pitch and rhythmic accuracy) commensurate with experience.

I was prepared for the potential that the initial recruiting period would not yield enough qualified participants in the middle grades (6-8), either in number or in instrumentation, which did occur. I anticipated that the majority of eligible participants would possess at least 2 years of instrumental experience in general, but I knew it was possible that less experienced players would demonstrate eligibility. For this reason, I included some musically ready 5<sup>th</sup> graders in the



School X invitations (these participants started band instruction in 4<sup>th</sup> grade at School X and therefore had 1.5 years of band experience, like their 6<sup>th</sup> grade counterparts at School Y, who started band instruments in 5<sup>th</sup> grade). Seven of these 5<sup>th</sup> grade horns joined the study, as well as one 5<sup>th</sup> grade, musically ready student from School Y who had prior rhythm instrument experience outside of school. This increased the number of participants and partially remedied some holes in instrumentation.

After the initial recruiting period I had enough participants overall to form 8 small groups, or jazz combos, as intended, but incomplete rhythm sections, which required attention. Because the rhythm sections were key to forming the jazz combos, I took two steps: (a) The School Y band director and I each reached out a second time, via email, to potential rhythm section participants and their parents, this time individually, and (b) I contacted the high school band director for recommendations of School X and School Y alumni who could play a rhythm section instrument but possessed little to no jazz improvisation experience, and contacted them via email. Through the direct contacts at School X, and asking one participant who could have played either guitar or bass guitar to play bass, I was able to recruit enough rhythm section players to assemble 4 rhythm sections, and therefore 4 jazz combos, at School X. Through the high school contacts, I gained a School Y alumnus to play piano at School Y, which enabled me to form 2 rhythm sections and therefore 2 jazz combos there. My remaining concern, then, was that although I had not reached my limit of 48 participants (I had 43 participants), that it was necessary to divide the horn player participants among 6 rhythm sections instead of 8, creating slightly larger groups than intended at School Y. The larger combos were still nowhere near the size of a big band, though, and I felt I could still deliver effective instruction in this way. What's more, each condition included two smaller jazz combos and one larger, making the participation



relatively even for comparative purposes. Finally, instrumentation is rarely ideal in a school band program, which in this case leant authenticity to what otherwise might be viewed as a limitation. Therefore, rather than excluding some interested and eligible horn players in the study simply to make the combos smaller, I decided to proceed with 4 smaller combos at School X and 2 larger combos at School Y.

### **Organization**

For comparative purposes, I divided each site's sample into two groups, A and B (Table 2). School X had 26 participants, 13 in Group A and 13 in Group B, and School Y had 17 participants, 9 in Group A and 8 in Group B. Groups A and B were formed through stratified sampling to ensure that each group represented a similar population. My primary goals were: (a) to make sure there were enough rhythm section members in each group to form the jazz combos, and (b) to make the groups relatively equivalent overall according to instrumental experience (which generally corresponded to grade level) and previous jazz improvisation experience (jazz improvisation experience was defined as currently or previously improvising jazz on a regular basis, from 1-4 times/month, and did not include isolated events such as "just one time" or "a few times"). I was not particularly concerned with stratifying the groups by gender, but they did end up almost identical. I did initially plan to stratify the groups by music aptitude, as determined by Gordon's (1992) Advanced Measures of Music Audiation (AMMA). Ultimately, however, I was concerned that, as a teacher-researcher, having prior knowledge of participants' music aptitude would lead to implicit bias. Therefore, I administered the AMMA prior to the instructional period but I did not score the responses until instruction had concluded. Despite this omission in the stratification process, Groups A and B ended up relatively equivalent in aptitude, each having a high concentration of participants with average aptitude (10



in each group) and high aptitude (11 in Group A and 8 in Group B), and a low concentration of participants with low aptitude (1 in Group A and 3 in Group B). These groups were defined by the ranking norms for the Advanced Measures of Music Audiation aptitude measure (Gordon, 1992; Appendix D).

*Table 2. Sample by Group, School, and Demographics.*

<b>Group</b>	<b>Participants (n=43)</b>	<b>Ensemble roles</b>	<b>Grade levels</b>	<b>Genders</b>	<b>Music aptitudes</b>	<b>Jazz ens. exp.</b>	<b>Jazz improv. exp.</b>
<i>(number of participants for each background variable)</i>							
A	22	13 horns	3 fifth	8 girls	1 low	10 no	17 no
		9 rhythm	8 sixth	14 boys	10 avg.	12 yes	5 yes
	<i>School X=13 School Y=9</i>		6 seventh 5 eighth		11 high		
B	21	12 horns	5 fifth	7 girls	3 low	13 no	18 no
		9 rhythm	7 sixth	14 boys	10 avg.	8 yes	3 yes
	<i>School X=13 School Y=8</i>		5 seventh 3 eighth 1 tenth		8 high		

I employed semi-random assignment to further divide participants in groups A and B into six smaller groups, or jazz combos, for small group instruction (Table 3). Small groups are typical to instrumental music instruction in schools and were conducive to this study's implementation. Forming these particular small groups, authentic jazz improvisation settings known as jazz combos, was one of the critical features of this study's beginning jazz improvisation learning environment. Because the small groups were jazz combos, their composition could not be completely randomized. Ideally, I wanted each small group to include: (a) a guitar or piano player, (b) a bass player, (c) a drum set player, and (d) one or more horn section players (woodwinds or brass). I formed each jazz combo around 3-piece rhythm sections (guitar or piano, bass, and drums), as had been my practice in my regular music classroom. I started with bass and drum set pairs, therefore establishing the number of jazz combos according



to the number of viable rhythm sections. I formed these pairs through considering the bass and drum set players' ensemble experience; if each jazz combo was to have a strong foundation, I decided that I would need to not only form pairs of experienced players, but that I would pair the most inexperienced players, when possible, with a player of comparatively higher ensemble experience. No participants played guitar in the study, so I assigned piano players to jazz combos next, according to the stratifications described above, then finally horns (woodwinds and brass), according to the same criteria. Group A was composed of 3 jazz combos, 2 at School X (Red,  $n=7$ ; Yellow,  $n=6$ ) and 1 at School Y (Blue,  $n=9$ ). Group B was composed of 3 other jazz combos, 2 more at School X (Orange,  $n=7$ ; Green,  $n=6$ ) and 1 more at School Y (Purple,  $n=8$ ). For my own organizational purposes, instead of numbering the six jazz combos I color-coded them (Red, Orange, Yellow, Green, Blue, Purple).

*Table 3. Sample by Group, Jazz Combo, and Demographics.*

<b>Group</b>	<b>Combo Site</b> ( $n=43$ )	<b>Ensemble roles</b>	<b>Grade levels</b>	<b>Genders</b>	<b>Music aptitudes</b>	<b>Jazz ens. exp.</b>	<b>Jazz improv. Exp.</b>
<i>(number of participants for each background variable)</i>							
A	Red School X $n=7$	Flute	2 fifth	3 girls	2 average	4 no	4 no
		Flute	2 sixth	4 boys	5 high	3 yes	3 yes
		Alto sax	3 eighth				
		Trumpet					
		Piano					
		Bass					
		Guitar					
		Drum set					
	Yellow School X $n=6$	Flute	1 fifth	2 girls	1 average	3 no	4 no
		Tenor sax	3 sixth	4 boys	5 high	3 yes	2 yes
		Trombone	2 eighth				
		Piano					
		Bass					
		Guitar					
		Drum set					



B	Blue School Y <i>n=9</i>	Bass cl. Alto sax Tenor sax Trumpet Trumpet F. horn Piano Bass Guitar Drum set	3 sixth 6 seventh	3 girls 6 boys	1 low 7 average 1 high	3 no 6 yes	9 no
	Orange School X <i>n=7</i>	Oboe Alto sax Trumpet Baritone Piano Bass Guitar Drum set	3 fifth 2 sixth 2 seventh	1 girl 6 boys	5 average 2 high	4 no 3 yes	6 no 1 yes
	Green School X <i>n=6</i>	Tenor sax Trumpet Trombone Piano Bass Guitar Drum set	1 fifth 3 sixth 1 seventh 1 eighth	2 girls 4 boys	3 average 3 high	4 no 2 yes	4 no 2 yes
	Purple School Y <i>n=8</i>	Clarinet Alto sax Tenor sax Tenor sax Trumpet Piano Bass Guitar Drum set	1 fifth 2 sixth 2 seventh 2 eighth 1 tenth	4 girls 4 boys	3 low 2 average 3 high	5 no 3 yes	8 no

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## Sites

I recruited participants, conducted all instruction, and executed the majority of data collection at two schools, my 4<sup>th</sup>-8<sup>th</sup> grade school, School X, and a neighboring 4<sup>th</sup>-8<sup>th</sup> grade school with a comparable student population, School Y. School X and School Y are each part of a K-8 public school district in Monmouth County, NJ and have a student population of slightly



fewer than 600 students. They belong to similar District Factor Groups (I and J, respectively, the two highest of 8 total designations), socioeconomic classifications New Jersey uses for comparative purposes (State of New Jersey Department of Education, 2004). Instruction and data collection directly involving participants took place in the school band rooms, with which the participants were familiar and where they were likely the most comfortable. Each band room afforded participants access to similar physical resources: chairs, music stands, a white board, a SmartBoard with audio capability, an external speaker for playing and amplifying audio from a digital music player, a digital piano, guitar and bass guitar amplifiers, and a drum set.

### **Data Collection**

I followed a schedule (Table 4) as I gathered evidence around jazz improvisation achievement, self-assessment, self-efficacy, and motivation, intended to assist me in answering my research questions:

- 1) Does this beginning jazz improvisation learning environment (forming jazz combos, revealing “hidden” jazz improvisation practices, promoting specific feedback, and implementing harmonic form instructional sequencing) support middle school instrumentalists’ jazz improvisation achievement, jazz improvisation self-assessment, self-efficacy for jazz improvisation, and motivation towards jazz improvisation?
- 2) Does one harmonic form instructional sequence better support one or more outcomes?
- 3) Are there any interactions between other key variables and outcomes?
- 4) Are there correlations or relationships among outcomes?
- 5) Are the critical features of this learning environment sources of positive outcomes, and if so, how do the critical features promote mediating processes to produce positive outcomes?



As a preliminary step, I ran a very small pilot study in the fall, using a single small group of 2 non-participants (former students). We met once and completed all the data collection procedures. The goal was not to collect data for analysis, but to provide me an opportunity to make revisions to data collection instruments and procedures prior to beginning the official study. I gained experience administering the music aptitude test, worked out some technical difficulties with making the recordings, and obtained feedback regarding how the Google Form versions of the instruments worked for users.

*Table 4. Chronological Data Collection Schedule.*

	<b>Demographics, including musical aptitude</b>	<b>Achievement and self-assessment</b>	<b>Self-efficacy</b>	<b>Motivation</b>
<b>Pre- instruction</b>	1. Demographic self-report questionnaires ( <i>researcher administered</i> )  2. AMMA musical aptitude tests ( <i>researcher administered</i> )	1. Improvised jazz solo audio recordings ( <i>researcher recorded</i> ) and self-assessment ratings ( <i>researcher administered</i> )	JISEM self-report surveys ( <i>researcher administered</i> )	JIMM self-report surveys ( <i>researcher administered</i> )
<b>Throughout</b>		1. Audiovisual recordings of class ( <i>researcher recorded</i> )  2. Field notes ( <i>researcher recorded</i> )	1. Audiovisual recordings of class ( <i>researcher recorded</i> )  2. Field notes ( <i>researcher recorded</i> )	1. Audiovisual recordings of class ( <i>researcher recorded</i> )  2. Field notes ( <i>researcher recorded</i> )
<b>Mid- instruction</b>		1. Improvised jazz solo audio recordings ( <i>researcher recorded</i> ) and self-assessment ratings ( <i>researcher administered</i> )	JISEM self-report surveys ( <i>researcher administered</i> )	JIMM self-report surveys ( <i>researcher administered</i> )



**Post-  
instruction**

1. Improvised jazz solo audio recordings (*researcher recorded*) and self-assessment ratings (*researcher administered*)

2. JIPAM improvised jazz solo ratings (*researcher and independently evaluated*)

3. Audiovisual transcriptions (*researcher compiled*)

1. JISEM self-report surveys (*researcher administered*)

2. Audiovisual transcriptions (*researcher compiled*)

1. JIMM self-report surveys (*researcher administered*)

2. Audiovisual transcriptions (*researcher compiled*)

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I collected the majority of the quantitative and qualitative data myself, with the exception of rating participants' solos, for which I enlisted the help of two independent evaluators. First, prior to the beginning of instruction, participants filled out demographic questionnaires, for the purposes of stratifying groups A and B, and took Gordon's (1992) Advanced Measures of Music Audiation (AMMA) (Appendix D), for later comparative analysis. Second, quantitative data collection took place in three phases: prior to instruction (January, 2018), halfway through the instructional period (March, 2018), and at the conclusion of the instructional period (late April and early May, 2018). During each phase I employed four instruments to gather evidence of achievement, self-assessment, self-efficacy, and motivation: (a) a performance assessment to measure achievement, (b) a self-assessment rating, and (c) two different surveys to measure self-efficacy and motivation, which are described in more detail further below. Third, qualitative data collection took place throughout the 12-week instructional period (the week of January 22 through the week of April 22, with two weeks off for winter and spring breaks) in the form of (a) field notes and (b) audiovisual recordings of instruction. My field notes were a collection of information not gathered elsewhere: participant attendance, details about choices I made as a



researcher, my thoughts as I reflected on teaching, and general observations. It is important to note that, due to inclement weather (snow days), participants at School Y had two fewer instructional sessions (10 total) than participants at School X (12 total). One cancelled class occurred during the first 6 weeks of the study (before mid-instruction data collection) and another during the second 6 weeks (after mid-instruction data collection). The cancelled classes affected Groups A and B equally, as there was one of each at School Y.

The first three sections below describe quantitative data collection by measured outcome – achievement, self-assessment, self-efficacy, and motivation – detailing the methods and instruments intended to gather evidence towards answering my research questions. The fourth, “Learning Environment”, describes qualitative data collection as a whole, addressing the methods for gathering evidence of the embodied conjecture at work, including evidence of outcomes.

### **Achievement**

I collected achievement data in a two-pronged process. First, I collected evidence from participants during pre-, mid-, and post-instruction, in the form of audio recordings. Judges SM, Y, and Z later scored participants’ playing, producing the raw data intended for analysis. Throughout this study, “SM,” my initials, refers to me, the teacher/researcher.

**Audio recordings.** I recorded student jazz improvisations to investigate the achievement outcomes specified in Research Question 1: “Does this beginning jazz improvisation learning environment (forming jazz combos, revealing “hidden” jazz improvisation practices, promoting specific feedback, and implementing harmonic form instructional sequencing) support middle school instrumentalists’ jazz improvisation achievement, jazz improvisation self-assessment, self-efficacy for jazz improvisation, and motivation towards jazz improvisation?” I recorded



evidence of achievement prior to the instructional period (January 18 and 20, 2018), after Week 6 (March 8 and 10, 2018), and after Week 12 (April 26, April 30, and May 1, 2018). Participants recorded two improvised solos at each phase of instruction: pre-, mid, and post. Each participant's 10 minute recording session included an equipment check, the actual recording, and a recording confirmation, as well as allowed for any personal time the individual participant needed.

Altogether I allotted 8 hours for each stage of recording sessions (pre, mid, and post); recording sessions therefore took place on different days and times from the usual class meeting times. With their parents' or guardians' assistance, participants chose recording times online through SignUpGenius. Participants recorded their improvised jazz solos in School X's band room, one at a time, while participants who were warming up or waiting did so in the general music classroom across the hall. I had initially hoped to offer recording sessions at both sites, but School Y's custodial fees made it cost prohibitive to record there (School X opened the facility to me free of charge as long as custodians were already in the building to cover other events). Participants' parents or guardians supervised them during warm-up/waiting time, since I was recording in the band room. Each participant played into a Shure SM57 microphone, which was connected to my MacBook Pro on which I was running GarageBand software. They were backed by Jamey Aebersold play-along tracks (Aebersold, 1988; 1992) for "Bb Blues" (for "Sonny's Mood for Two") and "Impressions". Unless participants requested that I not, I turned off the left or right channel audio for piano and bass players so that they could improvise as they did in class, as the sole performers on their instruments.

The recording sessions yielded 2 pre, 2 mid, and 2 post instruction recordings per participant, or 258 recordings total. I converted the solos from GarageBand to MP4A files as



they were generated, labeled them with assessed tasks, participant ID numbers, and instructional points (e.g., “Sonnymoon #27 Pre”), and backed them up to both an external hard drive and my Rutgers Google Drive. After the completion of the study I prepared the recordings for distribution to the three judges (two independent evaluators and myself). I assigned random numbers to the 258 recordings so that the judges would not know if a recording had been made pre, mid, or post instruction. I kept a key to which I did not refer back until after scoring all of the solos, when I was ready to analyze the results. Judges accessed recordings through folders I shared with them on Google Drive. During the course of judging we discovered one recording that was damaged and unusable, a mid-instruction recording of “Impressions”. All other recordings were usable, although some suffered from a small but perceptible amount of phasing between the soloist and the backing track. This aberration was likely due to occasional shifts in where participants sat in relation to the external speaker, which provided backing track audio for participants (the recorded version of the backing track was on GarageBand). If I recorded similar data again in the future, I would encourage all participants to practice with headphones at home, as most drum set players already do. This way all participants would be comfortable recording while wearing headphones, eliminating the need to use external audio, and preventing any phasing.

**Evaluation instrument.** Three judges—two independent evaluators and myself—rated participants’ achievement with the Jazz Improvisation Performance Achievement Measure (JIPAM), a 24-item, 7-pt scale divided into four subscales: rhythm, melody, harmony, and style/expression (Appendix E). For each instructional period—pre, mid, and post—each judge compiled a series of item, subscale, and combined ratings. These were later averaged to produce one composite rating per improvised solo.



The JIPAM was revised from a piloted version and has a long lineage. It was adapted from another existing achievement scale (see May, 2003), which was developed from its own pilot study, and established its criteria according to numerous older, existing scales (e.g., Bash, 1983; Burnsed & Price, 1984; Hores, 1977; Partchey, 1973). Original reliability coefficients for the JIPAM's composite scores were between  $\alpha = .85$  and  $.93$ , and interjudge reliability for the JIPAM's original use ranged from  $\alpha = .58$  to  $.90$  for individual items,  $\alpha = .95$  to  $.98$  for subscales. Dr. Kevin Watson, who designed the JIPAM, recently used it in another, soon to be published, jazz improvisation research study (K. Watson, personal communication, July 31, 2017), so this study's implementation was its third known research application.

**Evaluators.** Employing independent evaluators supported internal validity but also required additional steps to ensure interrater reliability. The judges all possessed professional jazz expertise in performing and educational settings. At the time of judging, Judge SM had 16 years of elementary and middle school teaching experience, including teaching middle school jazz and jazz improvisation, and over her teaching career had focused much of her professional development on jazz education (e.g., attending conferences, taking improvisation lessons, completing the Band Director Academy at Jazz at Lincoln Center). She earned an undergraduate degree in music education and a graduate degree in music performance (flute) from the University of Delaware, and at the time of the study had completed her coursework for her Ed.D. in the Design of Learning Environments at Rutgers University. Judge Y had been teaching elementary and middle school band for 19 years at the time of judging, including jazz and jazz improvisation. He earned his undergraduate degree in music education from the University of Iowa. Among his professional pursuits outside of school he plays trombone professionally in a 12-piece, touring show band based in New Jersey. At the time of judging, Judge Z had 9 years



of high school music teaching experience. This included jazz and jazz improvisation, part of which involved running a competitive high school jazz ensemble in New Jersey. He earned an undergraduate degree in jazz drum set performance and a masters degree in music education from the University of the Arts, as well as an Ed.D. in educational leadership from Rowan University. He plays jazz drum set professionally and is a permanent member of an original independent rock trio.

To prepare for judge training I made 20 recordings of myself improvising to the backing tracks, playing various instruments in a variety of styles. I purposely did some things that I had heard over the course of making the recordings, with the intent that the judges and I could discuss our reactions to hearing those recordings and how we might evaluate them. For example, what would we do if a drummer primarily kept time but did improvise fills, or if a bass player primarily kept a walking bass line but improvised melodically? What was our consensus on how to evaluate a horn player who was clearly playing melodic sequences but not using chord tones or scale tones? I also intentionally recorded what I considered low, medium, and high achieving examples of solos overall.

Using my sample solos and a sample version of the JIPAM, the two independent judges and I practiced using the instrument together prior to independently scoring participants' improvised solos. When we met on May 8, 2018, we listened to and scored the sample solos in chunks (high, medium, and low flute solos to Impressions; then drum solos, bass solos, piano solos, and horn solos). I provided a hard copy of the JIPAM in case that was helpful to look at alongside the Google Form version. We compared scores and discussed areas in which we had scored more than 2 points apart. We discussed interpretation of specific items (e.g., "variety of rhythmic density"). We decided that if a soloist made essentially no tonal errors, even though



there were none from which to recover, we would still score that area high (so as not to lower the entire solo over it). It would be as if they had recovered so quickly it was imperceptible. We went over some technical issues I had concerns about, such as the phasing described above; we decided that if there was evidence of phasing in the count off that we would simply listen for if the soloist was in time with themselves. We concluded that it was in fact possible that the drummers were sometimes playing too loud to properly hear the backing track, so again, we would listen to see if they were in time with themselves. In the course of our regular work as music teachers, Judge Z and I had previously discussed the idea of drummers playing melodically. Judge Y inquired about the concept, and through discussion we all agreed that drummers could in fact play melodically, and could therefore be scored in that way. We agreed that for the harmonic elements, the primary component for drummers was “awareness of harmonic form”, and that the other items were not as applicable. So, for drummers, that dimension of the scoring rubric would be a single construct; whatever we graded them for the first item would be what we graded them for the other items. Judge Z was concerned he was generally scoring lower than Judge Y and me, and we discussed the likelihood that it was a product of Y’s and my expectations as middle school teachers vs. Z’s expectations as a high school teacher. We also clarified the importance of not letting tone quality, for which there was no item, affect our scoring – we were only listening for the content of the solo. Finally, I set a deadline of the end of June for completing the scoring. In the interim, each evaluator worked independently, and we checked in with each other periodically to ensure we were all making progress. The judging actually concluded within the first two weeks of July, 2018.



**Self-Assessment**

To collect evidence of self-assessment specified in Research Question 1, during the pre, mid, and post recording sessions, participants reported their self-assessment of each of their two recorded improvised solos. After each recording, I prompted them to self-assess, at which time they entered a single rating, on a 7-pt scale, into a Google Form on a Chromebook. To ensure that participants felt that they were answering this question free from my influence, the Chromebook was placed in a way that prevented me from seeing their response. I provided each participant with a laminated card showing their participant number so that they could enter it following their self-assessment, as well as the name of the task (“Sonnymoon for Two” or “Impressions”). I verbally confirmed with them that they were entering these two pieces of information correctly, and regularly monitored the accuracy of the participant number and task input on my own.

**Self-Efficacy**

To collect evidence of self-efficacy outcomes, as specified in Research Question 1, I used a survey to measure self-efficacy. Participants (n=43) used Chromebooks to independently take Google Form versions of a 5-10 minute survey that I designed, the Jazz Improvisation Self-Efficacy Measure (JISEM) (Appendix F), prior to their Week 1 instructional session and following their Weeks 6 and 12 instructional sessions (Table 4). I administered the JISEM in their respective band rooms, which were also our instructional spaces. My role was twofold: to maintain an atmosphere in which students could focus and take the survey privately, and to assist with any device or connectivity problems. I provided each participant with a laminated card showing their participant number so that they could enter it prior to taking the survey. I confirmed after each class that participants were entering this information accurately.



The JISEM is a 12-item, 5-point scale loosely based on the Jazz Improvisation Self-Efficacy Scale (JISES) (Appendix G), which was developed for use in a previous study of instrumentalists with little to no jazz improvisation experience (Watson, 2010). In the original study, the JISES showed an internal consistency ranging from  $\alpha = .86$  to  $.90$ . At the JISES developer's encouragement and recommendation, I revised the JISES to better reflect self-efficacy as a construct. In the end I kept the 12-item, 5-point construction, and I focused on assessing self-efficacy for novice jazz improvisers. In doing so, it was necessary to revise the language heavily, essentially creating new items. The new items were designed to assess participants' beliefs about their abilities to possess or acquire the ways and means for improvising jazz, and to focus on situated goals in reference to outcome expectations. For example, participants taking the survey reported how strongly they agreed or disagreed with statements such as item 5, "I have the knowledge and skills to improvise jazz on my instrument" or item 6, "When improvising jazz is challenging, I have strategies and resources to help me accomplish my goals." Participants also responded to other, more future-focused statements, such as item 8, "I will be able to improvise jazz over new tunes/harmonic forms in the future" or item 10, "I will be able to learn strategies that will help me when I encounter challenging jazz improvisation tasks."

## **Motivation**

To collect evidence of motivation outcomes, as specified in Research Question 1, I measured motivation with a survey. Participants ( $n=43$ ) used Chromebooks to independently take Google Form versions of a 5-10 minute survey that I designed, the Jazz Improvisation Motivation Measure (JIMM) (Appendix G), prior to their Week 1 instructional session and following their Weeks 6 and 12 instructional sessions (Table 4).



The Jazz Improvisation Motivation Measure (JIMM) is a 21-item, 5-point scale intended to gather evidence of intrinsic motivation for learning jazz improvisation. Of the many facets of motivation, intrinsic motivation is concerned with the more “affective aspects of motivation” (Linnenbrink-Garcia, Maehr, & Pintrich, 2011, p. 243). The JIMM therefore had the potential to capture evidence not measured in the JISEM (the self-efficacy scale), which focused on situated, operational goals and outcome expectations. The JIMM is a musical version of an existing intrinsic motivation measure (original internal consistency,  $\alpha = .90$ ) that was previously used to compare intrinsic and extrinsic motivation in a non-musical setting (see Lepper, Corpus, & Iyengar, 2005). Like the original scale, the JIMM divides items into three subscales: (a) preference for challenge (e.g., “Some musicians like difficult jazz improvisation tasks because they enjoy working them out”), (b) curiosity and interest (e.g., “Some musicians work really hard at improvising jazz because they really like to learn new things”), and (c) desire for independent mastery (e.g., “When some musicians don’t understand how to approach a jazz improvisation task right away they like to try to figure it out by themselves”). I added several items to the “independent mastery” subscale to acknowledge students’ novice status. These additions also acknowledged the likelihood that both mastery approach and performance approach goals would be appropriate and desirable in a cognitive apprenticeship setting such as this study’s beginning jazz improvisation learning environment. I revised all items to match a music education setting and specifically address jazz improvisation, and rephrased them from first person to third person using the root “some musicians”. Suggesting that “some musicians” exhibit a behavior implies that others do not, and in this case hopefully validated participants’ feelings about how true each suggestion was for them. I modeled this format after a version of the intrinsic motivation scale



that predates Lepper et al. (2005), one in which the researcher strove to mitigate socially acceptable response bias through legitimizing a greater range of responses (see Harter, 1981).

### **Learning Environment**

I recorded instructional sessions and took field notes towards answering Research Question 5: “Are the critical features of this learning environment sources of positive outcomes, and if so, how do the critical features promote mediating processes to produce positive outcomes?” First, in order to capture quality audio on a video, and in a musical setting, I recorded class meetings with a Zoom Q2n video recorder with a built-in XY microphone. I uploaded finished recordings from an SD card to my MacBook Pro at the conclusion of each day of class meetings, and labeled them according to week, jazz combo “color”, and video segment (e.g., “Week 1 Blue A”). The video segment labeling (A, B, C) came about because the Zoom Q2n automatically divided video recordings into 17 minute segments or smaller, which I labeled chronologically starting with A. I transferred the recordings from my MacBook Pro to an external hard drive each week, and then backed them up onto another external hard drive and my Rutgers Google Drive. Ultimately, this process generated 51 hours of video recorded instruction, in addition to time before and after each class meeting. Finally, outside of the video recordings, I took field notes. I briefly recorded field notes, when possible, between multiple class meetings on a given day (I met with the Red, Orange, Yellow, and Green Combos consecutively on Tuesdays at School X, and with the Blue and Purple Combos consecutively on Wednesdays at School Y). I set aside time following each day’s class meetings to record lengthier observations. My field notes were a collection of information not gathered elsewhere: participant attendance, details about choices I made as a researcher, my thoughts as I reflected on teaching, and general observations from class meetings.



These video and observation recording efforts were intended to document participants' behaviors in and related to the learning environment. They were meant to provide evidence of skill acquisition and achievement, self-assessment, professed self-efficacy beliefs, and motivation indicators as related to four critical features of the environment: (a) forming jazz combos, (b) revealing "hidden" improvisation practices, (c) promoting specific feedback, and (d) implementing harmonic form sequencing. For example, I was able to observe students experimenting with improvisation strategies and engaging in self-assessment. My plan was to connect engaging in these behaviors – as well as how frequently, to what degree, and in response to what features of the learning environment – with outcomes. I expected that outcomes would be evident in the quantitative measures above, but also on the video recordings of class meetings. For example, I anticipated that students would report motivation through the JIMM described in the previous section, as well as display behaviors associated with motivation during class (e.g., they might ask if we could play something again so that they could improve how they performed a task, or they might get "lost" in the form during a solo but persist and recover, etc.).

### **Data Analysis**

The paragraphs below first describe how I conducted the quantitative analysis followed by how I conducted the qualitative analysis. I cleaned and organized the raw data and used SPSS to conduct a variety of statistical tests, which were intended to (a) establish the reliability of the data and (b) answer Research Questions 1-4. This quantitative analysis drove the next phase of this sequential explanatory mixed-methods study, during which I analyzed the qualitative evidence to (a) potentially uncover evidence as to why the statistical tests revealed what they did, and (b) provide evidence to answer Research Question 5. This included transcribing the audiovisual recordings of instruction and uploading the transcriptions to the online qualitative



analysis platform Dedoose, where I coded them. All analyses focused on examining the data towards answering my research questions (Creswell & Plano-Clark, 2007):

- 1) Does this beginning jazz improvisation learning environment (forming jazz combos, revealing “hidden” jazz improvisation practices, promoting specific feedback, and implementing harmonic form instructional sequencing) support middle school instrumentalists’ jazz improvisation achievement, jazz improvisation self-assessment, self-efficacy for jazz improvisation, and motivation towards jazz improvisation?
- 2) Does one harmonic form instructional sequence better support one or more outcomes?
- 3) Are there any interactions between other key variables and outcomes?
- 4) Are there correlations or relationships among outcomes?
- 5) Are the critical features of this learning environment sources of positive outcomes, and if so, how do the critical features promote mediating processes to produce positive outcomes?

### **Quantitative Analysis**

Before I performed any statistical analyses, I cleaned and organized the raw data. Because I had collected data in Google Forms, I had to transfer data from Google Sheets to Excel spreadsheets. I further organized the data into a variety of Excel spreadsheets and imported appropriate data into SPSS to perform the calculations described below.

I first performed statistical tests intended to establish the reliability and validity of the data. I calculated the interrater reliability for the JIPAM (the independently evaluated achievement measure) and the internal consistency of the JISEM (the self-reported self-efficacy survey) and JIMM (the self-reported motivation survey) for pre, mid, and post instruction. Second, I conducted a correlational analysis (Pearson’s test) of JIPAM items and subscales, then



of subscales and composite scores. The purpose of this test was to determine whether I could conduct the remainder of tests using the composite achievement scores. Third, I conducted descriptive analyses of the JIPAM, self-assessment survey, JISEM, and JIMM for pre-, mid-, and post-instruction. Finally, I conducted independent t-tests to confirm that pre-instruction scores did not differ significantly by group/condition. The following details (a) reliability and internal consistency for the individual instruments (JIPAM, JISEM, and JIMM), (b) validity for all three instruments and the self-assessment ratings, and (c) procedures I followed for conducting ANOVAs for all instruments and the self-assessment ratings.

**JIPAM interrater reliability.** Interrater reliability for the JIPAM was high. Correlational analyses of items, subscales, and composite scores found that all were highly correlated; therefore, I was able to use composite scores for subsequent analyses (rather than the myriad item and subscale scores). Cronbach's alpha interrater reliability coefficients for JIPAM items varied. For pre-, mid-, and post-instruction combined, twenty-one items were above  $\alpha = .70$ , the highest of which was  $\alpha = .83$  (item 2, rhythm subscale). The lowest item was  $\alpha = .62$  (item 23, style/expression subscale). Interrater reliability for separate instructional phases varied from highs of  $\alpha = .80$  (pre-instruction, item 14, melody subscale),  $\alpha = .79$  (mid-instruction, item 14, melody subscale), and  $\alpha = .76$  (post-instruction, item 4, rhythm subscale) to lows of  $\alpha = .48$  (pre-instruction, item 17, harmony subscale),  $\alpha = .60$  (mid-instruction, item 17, harmony subscale), and  $\alpha = .48$  (post-instruction, item 23, style/expression subscale).

Results showed consistently high interrater reliability for JIPAM subscales and composite scores (Table 5). The lowest interrater reliability was consistently for the harmony subscale. Subscale interrater reliability for pre-instruction ranged from  $\alpha = .69$  (harmony) to  $\alpha = .80$  (melody), for mid-instruction ranged from  $\alpha = .74$  (harmony) to  $\alpha = .81$  (melody), and for post-



instruction ranged from  $\alpha = .74$  (harmony) to  $\alpha = .84$  (rhythm). For pre-, mid-, and post- scores combined, interrater reliability ranged from  $\alpha = .80$  (harmony) to  $\alpha = .86$  (rhythm). Interrater reliability for composite scores (all subscales combined) ranged from  $\alpha = .79$  (pre-instruction) to  $\alpha = .81$  (mid-and post-instruction). Combining pre-, mid-, and post-instruction composite scores showed interrater reliability of  $\alpha = .85$ .

*Table 5. JIPAM Interrater Reliability.*

Score type	Pre-instruction	Mid-instruction	Post-instruction	Pre-, mid-, post-inst. combined
Rhythm subscale	$\alpha = .79$	$\alpha = .78$	$\alpha = .84$	$\alpha = .86$
Melody subscale	$\alpha = .80$	$\alpha = .81$	$\alpha = .77$	$\alpha = .84$
Harmony subscale	$\alpha = .69$	$\alpha = .74$	$\alpha = .74$	$\alpha = .80$
Style/expression subscale	$\alpha = .77$	$\alpha = .78$	$\alpha = .79$	$\alpha = .83$
Composites (subscales combined)	$\alpha = .79$	$\alpha = .81$	$\alpha = .81$	$\alpha = .85$

**JISEM internal consistency.** The JISEM showed high internal consistency (Cronbach's alpha coefficients were  $\alpha = .81$  for pre-instruction,  $\alpha = .84$  for mid-instruction, and  $\alpha = .92$  for post-instruction). A correlational analysis of items and composite ratings confirmed that composite scores were appropriate for further analyses. Pearson's tests showed that all mid- and post-instruction items were significantly correlated with composite scores at the .01 level, although pre-instruction was more mixed. For pre-instruction, eight items were significantly correlated to composite scores at the .01 level, three were significantly correlated at the .05 level, and one item (item 9) did not significantly correlate ( $r = .188$ ,  $p = .024$ ).

**JIMM internal consistency.** The JIMM showed high internal consistency (Cronbach's alpha coefficients were  $\alpha = .89$  for pre-instruction,  $\alpha = .90$  for mid-instruction,  $\alpha = .94$  for post-



instruction). A correlational analysis of items and composite ratings confirmed that composite ratings were appropriate for further analyses. Pearson's tests showed that (a) for pre-instruction, eighteen items were significantly correlated at the .01 level and three items were significantly correlated at the .05 level (items 2, 4, and 7); (b) for mid-instruction, twenty items were significantly correlated at the .01 level and one item (item 2) was significantly correlated at the .05 level ( $r=.373, p=.014$ ); and (c) for post-instruction, all items were significantly correlated at the .01 level.

Finally, correlational analyses (Pearson's tests) of items and subscales, followed by subscales and composite scores (all subscales combined), confirmed that I could use composite JIPAM scores for further analyses. All JIPAM items were highly correlated with their subscales at the .01 level for pre-, mid-, and post-instruction. All subscales were highly correlated with their composite scores at the .01 level for each of the two separate assessed tasks ("Sonnymoon for Two" and "Impressions") at all phases of instruction, pre-, mid-, and post-. Additionally, these composite scores (two assessed tasks, two separate scores) were highly correlated with combined composite scores (two assessed tasks, one combined score). I did not use combined composites for the majority of the other statistical tests, because the separate assessed tasks were important to comparing the conditions (see the "Harmonic form instructional sequences" section). Similarly, although self-assessment ratings (two assessed tasks, two separate ratings) for pre-, mid-, and post-instruction highly correlated at the .01 level with combined ratings (two assessed tasks, one combined rating), I also did not immediately use those combined ratings. These high correlations, however, allowed me to use combined composite scores and combined ratings to conduct other, later analyses in which the condition or task was not relevant.



**Validity.** Because I was going to compare results by condition, I conducted independent t-tests to confirm that the pre-instruction measures did not differ significantly by condition. Three measured outcomes did not show significant pre-instruction differences by group: achievement, self-efficacy, and motivation. Although a Levene's test showed that the equality of variances could not be assumed for achievement scores ( $F=7.813, p<.05$ ), an independent samples t-test ( $t=1.92, p>.05$ ) still showed that pre-instruction means for Group A (55.25,  $SD=23.03$ ) did not significantly differ from Group B (46.91,  $SD=16.80$ ). A second Levene's test confirmed that the equality of variances could be assumed for composite self-efficacy ratings ( $F=.060, p>.05$ ) and for all items except item 12. An independent samples t-test showed that pre-instruction composite means for Group A (36.82,  $SD=6.529$ ) did not significantly differ from Group B (39,  $SD=7.280$ ), nor did item ratings for each group, including item 12. A third Levene's test showed that the equality of variances could be assumed for composite motivation scores ( $F=.004, p>.05$ ) and for all items except item 11 ( $p=.049$ ). An independent samples t-test showed that pre-instruction composite means for Group A (73.64,  $SD=11.151$ ) did not significantly differ from Group B (78.19,  $SD=11.927$ ), nor did item ratings for each group, including item 11. One outcome, self-assessment, did show significant differences between pre-instruction ratings by group. This fourth Levene's test confirmed that the equality of variances could be assumed for self-assessment ratings ( $F=1.300, p>.05$ ), but that according to an independent samples t-test ( $t=-2.868, p<.05$ ) pre-instruction means for Group A (3.48,  $SD=1.438$ ) significantly differed from Group B (4.31,  $SD=1.239$ ). Therefore, any results that compared self-assessment by group were likely unreliable.

Later, I conducted t-tests to compare pre-instruction achievement scores for each task, "Sonnymoon for Two" and "Impressions." I did not initially perform these t-tests, but results



discussed in Chapter 4 necessitated confirming that pre-instruction achievement scores did not differ significantly by task. This fifth and final Levene's test confirmed that the equality of variances could be assumed for achievement scores ( $F=3.691, p>.05$ ) and an independent samples t-test ( $t=-1.48, p>.05$ ) showed that pre-instruction means for "Sonnymoon for Two" improvised solos (47.92,  $SD=18.31$ ) did not significantly differ from "Impressions" improvised solos (54.43,  $SD=22.29$ ).

**ANOVA procedures.** My next efforts went towards answering Research Questions 1-4. To explore the possible effects of learning environment overall, the two conditions, and other key variables, I performed repeated measures mixed-design analyses of variance (ANOVAs) for all outcomes, each of which had been measured pre-, mid-, and post-instruction. Second, to investigate possible relationships among outcomes and participants with particular characteristics (age, grade, music aptitude, instrumental experience, improvisation experience), I conducted a correlational analysis of background variables and composite scores for all four measures. Finally, I conducted a correlational analysis to determine whether there were correlations or relationships among outcomes in achievement, self-assessment, self-efficacy, and motivation.

I conducted the ANOVAs using mean composite achievement scores (JIPAM), single-item self-assessment ratings, and composite self-efficacy (JISEM) and motivation (JIMM) ratings. The JISEM and JIMM ratings were composites because each represented a single rating for a single occasion on which a participant took either survey; each composite rating was composed of the sum of a participant's item ratings on a particular instrument, one per participant. This produced 43 composite ratings per instrument at each instructional phase. Similarly, the JIPAM scores were composite scores because each represented a single score for a single task, a score composed of the sum of the items. They were mean composite scores



because they represented the means of the three judges' composite scores. Each participant performed two assessed tasks at, pre-, mid-, and post-instruction, so each participant had two mean composite scores for each task. This resulted in 43 participants with 86 mean composite scores for pre- and post-instruction, and due to a single recording error, 85 mean composite scores for mid-instruction. I used these mean composites for the aforementioned repeated measures mixed design ANOVA as well remaining statistical tests. I simply refer to the JISEM and JIMM composite ratings and JIPAM mean composite scores as "ratings" and "scores" in the remainder of this document. The self-assessment ratings were single ratings from the beginning; participants rated their performances using a single item. Therefore, results were based on 43 participants with 86 ratings for pre-, mid-, and post-instruction each.

### **Qualitative Analysis**

My primary goal in conducting the qualitative analysis was to answer Research Question 5 ("Are the critical features of this learning environment sources of positive outcomes, and if so, how do the critical features promote mediating processes to produce positive outcomes?"), through which I also hoped to gain additional insight into the quantitative results. The qualitative analyses provided information that could account for the improvements in outcomes overall (achievement, self-assessment, self-efficacy, and motivation) and a lack of significant differences between outcomes for the two conditions (Groups A and B). The evidence I had to examine were field notes and video-taped instruction. My process involved selecting combos and instructional weeks on which to focus my analysis, preparing full transcripts, coding those transcripts, and finally, interpreting the field notes and coded transcripts.

**Combos.** I chose to focus on two of the six jazz combos formed for this study, the Yellow and Orange Combos, and their 13 participants (Table 6). I believed that it was likely that



I could gain insight into the quantitative findings by examining a segment of the participant jazz combos, in this case, 2 of the 8 small groups. I was prepared to examine additional small groups if I did not acquire such insight, but that did not happen. I selected the two combos, one from each condition, primarily because their mean scores and ratings were similar to those of the total sample for the majority of outcomes (Tables 7 and 8). This data is discussed in detail in Chapter 4. No combos were similar to the study's means in all outcomes – these two combos were more similar to the study means for achievement, self-assessment, and self-efficacy, and less so for motivation. Both were from the same site, School X. The Yellow Combo had one fewer horn section member than the Orange Combo, but each had the same number and type of rhythm section personnel (piano, bass guitar, drum set). The Yellow Combo had a greater number of older participants: 1 fifth grader, 3 sixth graders, and 2 eighth graders, as compared to the Orange Combo's 3 fifth graders, 2 sixth graders, and 1 seventh grader. The Yellow Combo had two members with previous jazz improvisation experience and the Orange had one (jazz improvisation experience was defined as currently or previously improvising jazz on a regular basis, from 1-4 times/month, and did not include isolated events such as “just one time” or “a few times”). The Yellow Combo had a higher concentration of members with high music aptitude (5 members) than the Orange Combo (2 members).

*Table 6. Yellow and Orange Combos, Demographics by Participant.*

<b>Combo/ Condition</b>	<b>Participant pseudonym</b>	<b>Ens. role</b>	<b>Gr.</b>	<b>Age (yrs.)</b>	<b>Music apt.</b>	<b>Jazz ens. exp.</b>	<b>Jazz improv. exp.</b>
Yellow/Group A	Noah	Woodwind	6	11	High	Yes	
	Tomas	Woodwind	6	12	Avg.		
	Hudson	Brass	5	11	High		
	Seamus	Piano	6	11	High		
	Ruby	Bass guitar	8	13	High	Yes	Yes
	Sam	Drum set	8	13	High	Yes	Yes



Orange/Group B	Joseph	Woodwind	6	12	Avg.		
	Marcello	Woodwind	5	10	High		
	Richie	Brass	5	10	Avg.		
	Michael	Brass	6	12	Avg.	Yes	
	Wyatt	Piano	5	11	High		
	Susanna	Bass guitar	7	12	Avg.	Yes	Yes
	Christopher	Drum set	7	13	Avg.	Yes	

Table 7. Yellow and Orange Combos, Achievement and Self-Assessment Means Comparisons by Combo.

	Combined composite achievement, two tasks one score (min=48, max=336)			Combined self-assessment, two tasks one rating (min=2, max=14)		
	Pre	Mid	Post	Pre	Mid	Post
Yellow	113.06	166.28	199.94	8.00	10.33	11.83
Orange	102.24	149.68	186.29	8.57	10.86	12.14
Study Means	<b>102.36</b>	<b>162.93</b>	<b>182.94</b>	<b>7.77</b>	<b>9.95</b>	<b>11.30</b>
<i>SD</i>	<i>30.90</i>	<i>40.86</i>	<i>38.90</i>	<i>2.56</i>	<i>1.83</i>	<i>1.64</i>

Table 8. Yellow and Orange Combos, Self-Efficacy and Motivation Means Comparisons by Combo.

	Self-efficacy (min=12, max=60)			Motivation (min=21, max=105)		
	Pre	Mid	Post	Pre	Mid	Post
Yellow	37.33	49.00	53.67	69.00	78.67	75.83
Orange	38.29	49.57	51.57	72.57	81.57	93.71
Study Means	<b>37.88</b>	<b>50.47</b>	<b>52.20</b>	<b>75.86</b>	<b>81.63</b>	<b>86.21</b>
<i>SD</i>	<i>6.91</i>	<i>5.26</i>	<i>7.10</i>	<i>11.60</i>	<i>11.16</i>	<i>12.64</i>

**Transcripts.** I prepared full transcripts for 8 of the Yellow and Orange Combos' 24 combined instructional sessions, which represented one third of their total hours of instruction. I chose Weeks 2, 5, 8, and 11, partly because they were equidistant from each other, but primarily because: (a) Week 2 was when I presented the first jazz improvisation strategy in class; (b) Week



5 was a little over a week before mid-instruction data collection; (c) Week 8 was similar to Week 2 in its placement in the second half of the instructional period, and when I introduced another new jazz improvisation strategy; (d) Week 11 was similar to Week 5 in its placement in the second half of the instructional period, a little over a week before post-instruction data collection, and a week when I was encouraging participants to employ a more advanced jazz improvisation strategy. I was prepared to go back and transcribe more class sessions if, after coding, I did not feel I had enough evidence to present findings, but that did not happen.

**Coding.** I inputted the 8 full transcripts into the online analysis platform Dedoose and coded them. I started with an inductive coding scheme based on my embodied conjecture, looking for evidence of mediating processes that I could connect backwards to design elements and forwards to outcomes (Table 9). Although the parent codes were the design elements, I almost exclusively coded using the child codes, which were the mediating processes. I analyzed (a) what participants said to me, to each other, and to themselves, (b) participants' body language, (c) participants' actions regarding strategy use, choice, and persistence, (d) participants' playing, both in and of itself and when used as musical dialogue. During this process I also deductively coded; pretty quickly I realized that I needed codes for the cognitive apprenticeship elements in place: coaching, modeling, and scaffolding. I created a code called "playing other things" for a prevalent behavior in several participants, the relevance of which I was unsure (this was when participants played non-class material upon arriving at class, during class, or immediately upon class dismissal). I also created codes for each student in the class. After I coded all of the transcripts, I exported reports for each of the parent codes. I organized the reports first by week, then, for those parent codes with child codes, by child codes.



Table 9. Inductive and Deductive Coding Scheme.

Inductive codes – design elements and mediating processes	Inductive codes – outcomes	Deductive codes
1. Forming jazz combos <ul style="list-style-type: none"> <li>Students collaborate</li> <li>Students initiate and perform ensemble roles</li> </ul>	1. Achievement	1. Coaching
2. Revealing “hidden” jazz improvisation practices <ul style="list-style-type: none"> <li>Students articulate jazz musical elements and improvisation strategies they will/have/are trying to employ(ed)</li> <li>Students experiment with jazz musical elements and improvisation strategies</li> <li>Students identify jazz musical elements and improvisation strategies that they hear others employ</li> </ul>	2. <i>Self-assessment</i> <i>I did not use this outcome code because, as a mediating process, self-assessment was also a child code of “Promoting specific feedback.”</i>	2. Modeling
3. Implementing harmonic form sequencing <ul style="list-style-type: none"> <li>Students apply jazz musical elements and improvisation strategies to harmonic forms</li> <li>Students follow the form while listening, playing live, or playing to a recording</li> </ul>	3. Self-efficacy <ul style="list-style-type: none"> <li>Evidence of higher self-efficacy</li> <li>Evidence of lower self-efficacy</li> </ul>	3. Scaffolding
4. Promoting specific feedback <ul style="list-style-type: none"> <li>Students articulate how self-assessment and feedback inform their subsequent improvisations</li> <li>Students engage in self-assessment of jazz musical elements and improvisation strategies</li> <li>Students give feedback to peers regarding jazz musical elements and improvisation strategies</li> </ul>	4. Motivation <ul style="list-style-type: none"> <li>Evidence of lower motivation</li> <li>Evidence of higher motivation</li> </ul>	4. “Playing other things”
		5. Noah
		6. Tomas
		7. Hudson
		8. Seamus
		9. Ruby
		10. Sam
		11. Joseph
		12. Marcello
		13. Richie
		14. Michael
		15. Wyatt
		16. Susanna
		17. Christopher

**Interpretation.** My goal in this last step was to develop an understanding of why and how the quantitative results had come about. I hoped that when I compared participant behavior over Weeks 2, 5, 8, and 11 that I would find evidence of participants interacting with the design features of the learning environment and performing predicted mediating processes. I



anticipated this evidence might emerge in behaviors that changed in volume, type, or quality. I kept an open mind because I did not know if this evidence would reveal itself when considering the observed participants as a whole (separate Yellow and Orange Combos) or as individuals.

I read and analyzed all of the Dedoose reports in each category: design features, mediating processes, outcomes, and individual participant reports. I compared these to my field notes. I made lists of transcript and field note excerpts, reread them, and looked for trends and themes to emerge. Next, I created (a) collections of larger transcript excerpts and (b) annotated tables that synthesized and interpreted shorter excerpts, both around those trends and themes. I also found especially compelling evidence of changing behaviors and outcomes when I considered participants individually. I compared the transcript evidence to individual participants' statistical outcomes, and a more complete picture of the learning environment began to develop.

Finally, because this was a mixed methods study, I intended the qualitative analysis to offer insight into how any positive quantitative effects were produced. Through analyzing the qualitative data I sought to address Research Question 5, which was its own question as well as a natural extension of Research Questions 1-4. For example, during quantitative analysis I investigated the potential statistical effectiveness of the learning environment, and during qualitative analysis I investigated (a) participant behaviors associated with these outcomes and (b) design features intended to elicit learning behaviors. During quantitative analysis I also examined potential relationships between instructional sequencing and outcomes, other key variables and outcomes, and among outcomes themselves. Then, during qualitative analysis I examined my field notes and the video transcripts towards potentially explaining those results. The findings that emerged are presented in Chapter 4.



## Chapter 4

This chapter outlines this study's primary results and findings. In keeping with the sequential design of this study, quantitative results are presented first and qualitative findings second. Quantitative results are organized by Research Questions 1-4. Qualitative findings, which address Research Question 5, are organized into sections for each of the four critical features of the learning environment, followed by participant case studies.

### Quantitative Results

To help the reader organize the results, I begin with a summary of the key findings with respect to Research Questions 1-4:

- 1) *Does this beginning jazz improvisation learning environment (forming jazz combos, revealing "hidden" jazz improvisation practices, promoting specific feedback, and implementing harmonic form instructional sequencing) support middle school instrumentalists' jazz improvisation achievement, jazz improvisation self-assessment, self-efficacy for jazz improvisation, and motivation towards jazz improvisation?*

Finding: There was a significant effect on all measured outcomes over time, not only for the 12-week duration of the instructional period but even in the first 6 weeks.

- 2) *Does one harmonic form instructional sequence better support one or more outcomes?*

Finding: There were no significant differences between conditions (different harmonic form instructional sequences for Groups A and B) on any of the measures; both conditions were sources of positive outcomes.

- 3) *Are there any interactions between other key variables and outcomes?*

Finding: There was a significant interaction between assessed task and achievement.

Participants made significantly higher gains improvising to the harmonic form of



“Sonnymoon for Two,” a 12-bar blues, than “Impressions,” a 32-bar modal tune, regardless of condition.

4) *Are there correlations or relationships among outcomes?*

Finding: There were minimal significant relationships among outcomes.

The subsequent sections are organized by research question.

### **Question 1: Investigating the Learning Environment’s Support of Outcomes**

This section describes results indicating that the learning environment produced statistically significant positive effects on all outcomes. Evidence was collected throughout the study’s instructional period, during which participants (a) recorded jazz improvisation solos (self-assessed immediately and later scored by judges) and (b) self-reported on their self-efficacy and motivation, all at three intervals: pre-, mid-, and post-instruction. Results below are discussed in two sections, first regarding the effects of the learning environment, then regarding the effects of background variables. Interactions between condition and outcomes, among other key variables and outcomes, and among outcomes themselves, are discussed further below in the sections for Research Questions 2, 3, and 4.

**Overall effects.** Repeated measures mixed design ANOVAs revealed a significant effect on achievement, self-assessment, self-efficacy, and motivation for all participants over time,  $p < .05$ , not only for the length of the instructional period (12 weeks) but even in the first half (6 weeks). Mean achievement scores and self-assessment, self-efficacy, and motivation ratings increased over time for all participants performing all assessed tasks, regardless of condition (Tables 10 and 11; Figures 8, 9, 10, 11). Results are grouped in two tables below. Achievement and self-assessment are reported together (Table 10), followed by separate plots for achievement gains, with a 168 point possible maximum (Figure 8) and self-assessment increases, with a 7

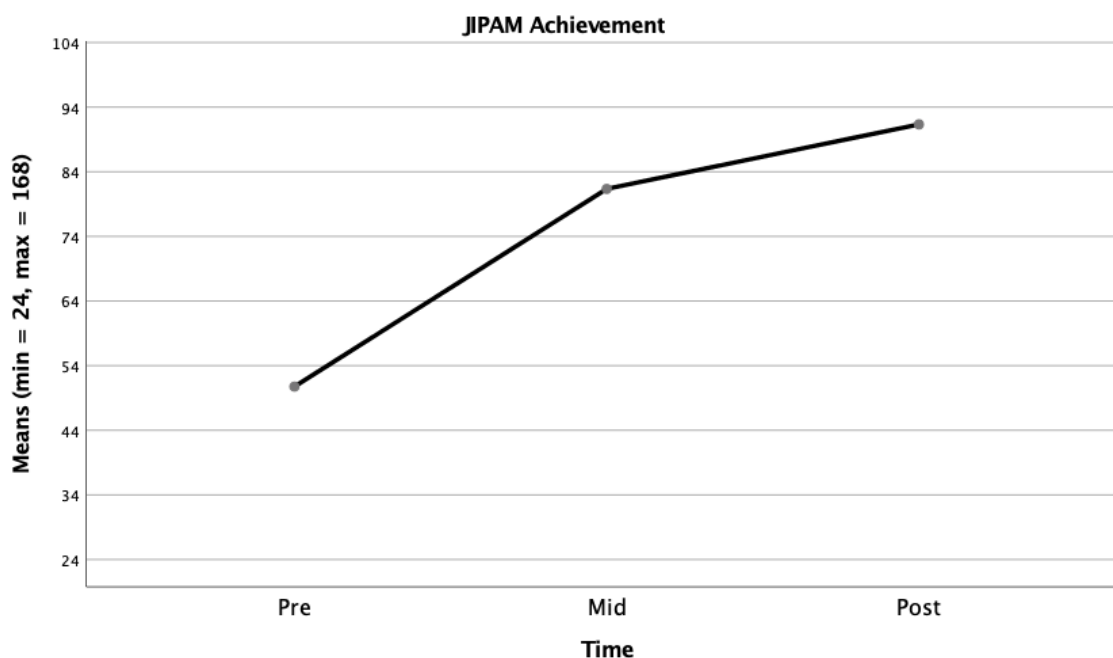


point possible maximum (Figure 9). Self-efficacy and motivation are reported together (Table 11), followed by separate plots for self-efficacy gains, with a 60 point possible maximum (Figure 10) and motivation increases, with a 105 point possible maximum (Figure 11).

*Table 10.* JIPAM Achievement and Self-Assessment Mean Scores by Pre-, Mid-, and Post-Instruction.

Instructional phase	N	JIPAM achievement mean (min=24, max=168)	SD	Self-assess. mean (min=1, max=7)	SD
Pre-	86	51.18	20.54	3.88	1.401
Mid-	85*	81.35	23.77	4.98	1.116
Post-	86	91.47	23.64	5.65	1.015

\*Due to a technical recording error, n=85 for mid-instruction achievement.



*Figure 8.* JIPAM achievement mean scores by pre-, mid-, and post-instruction.



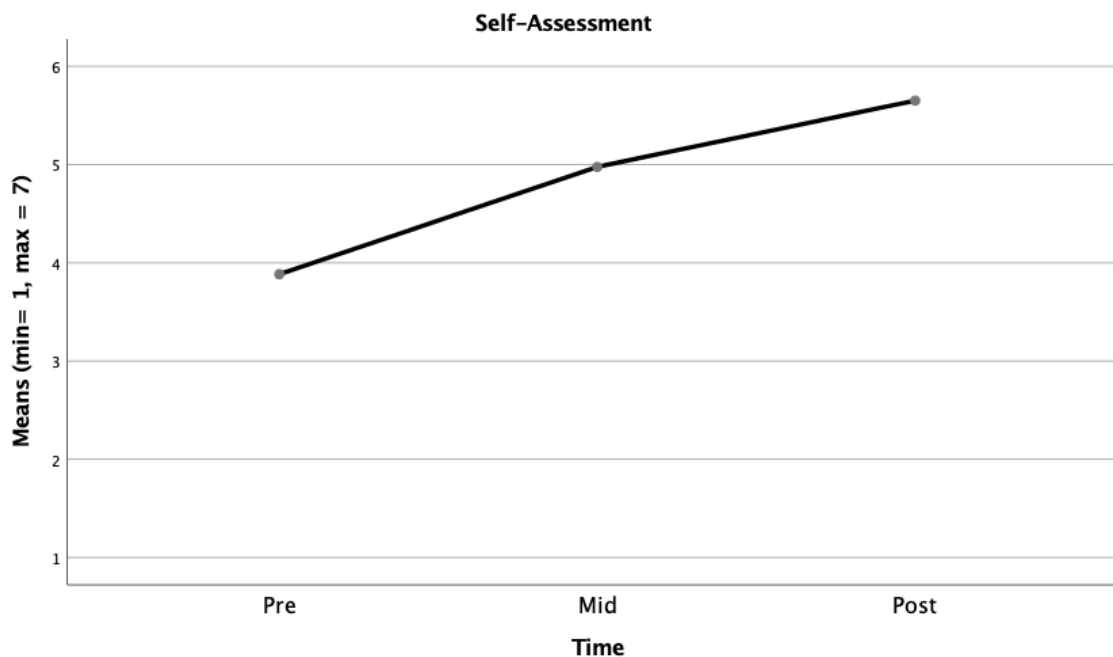


Figure 9. Self-assessment mean ratings by pre-, mid-, and post-instruction.

Table 11. JISEM Self-Efficacy and JIMM Motivation Mean Ratings by Pre-, Mid-, and Post-Instruction.

Instructional phase	N	JISEM self-efficacy mean (min=12, max=60)	SD	JIMM motivation mean (min=21, max=105)	SD
Pre-	43	37.88	6.912	75.86	11.628
Mid-	43	50.47	5.261	81.63	11.163
Post-	43	52.21	7.100	86.21	12.637



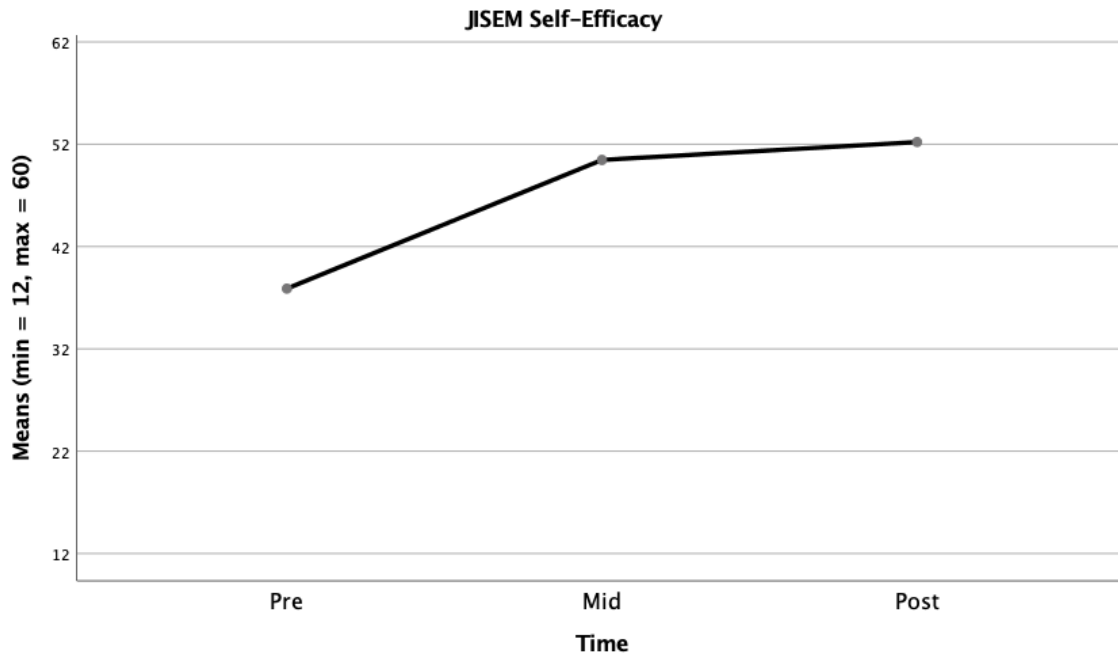


Figure 10. JISEM self-efficacy mean ratings by pre-, mid-, and post-instruction.

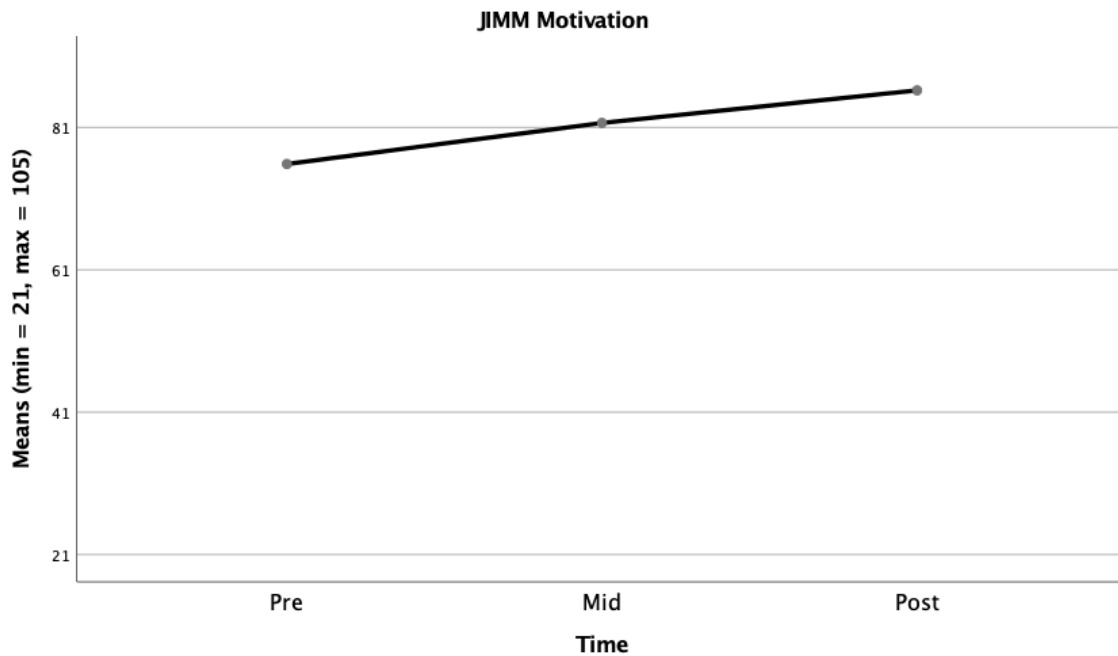


Figure 11. JIMM motivation mean ratings by pre-, mid-, and post-instruction.



**Background variables and outcomes.** Analysis of background variables revealed no correlations between half of the background variables and outcomes, but significant correlations between the other half of the background variables and just one outcome: achievement. To determine whether any background variables interacted with outcomes, I conducted repeated measures mixed design ANOVAs for 8 background variables and 4 outcomes (achievement, self-assessment, self-efficacy, and motivation). Background variables included: (a) school ensemble experience (.5-1.5 years, 2.5-3.5 years, 4.5-5.5 years); (b) previous jazz ensemble experience (yes or no); (c) previous jazz improvisation experience (Level 0: never improvising or improvising in isolated events, such as “just one time”/“a few times” or Level 1: improvising currently or previously on a regular basis, from 1-4 times/month), (d) grade level (5, 6, 7, 8, or 10); (e) music aptitude (low, average, or high); (f) private lessons outside of school (yes or no); (g) gender (male or female); and (h) section (horn section, woodwind; horn section, brass; or rhythm section).

Results indicated a significant interaction between four variables and achievement outcomes (Table 12). There were no significant correlations between four of the background variables and any measured outcome, including achievement: private lessons outside of school, jazz improvisation experience, gender, and section. The remaining four variables had significant correlations with achievement only: school ensemble experience ( $p<.05$ ), previous jazz ensemble experience ( $p<.05$ ), grade level ( $p<.05$ ), and music aptitude ( $p<.01$ ). These results did not include the single 10<sup>th</sup> grade participant in the study because the participant was missing a mid-instruction JIPAM score (due to a technical recording error). The table and figures below indicate a maximum possible achievement score of 336, which is a combined score composed of both 168 point assessed tasks.



*Table 12. Achievement Means by Background Variable with Significant Interactions and Sample Size.*

<b>Back. var.</b>	<b>Group type</b>	<b>Samp. size (n=42*)</b>	<b>Pre-inst. means (min=48, max=336)</b>	<b>SD</b>	<b>Mid-inst. means (min=48, max=336)</b>	<b>SD</b>	<b>Post-inst. means (min=48, max=336)</b>	<b>SD</b>
School ens. exp.	.5-1.5 yrs.	15	104.47	29.33	140.49	29.09	161.09	31.59
	2.5-3.5 yrs.	21	97.47	26.69	166.97	32.84	182.35	30.27
	4.5-5.5 yrs.	6	116.45	48.75	204.89	57.59	236.22	36.39
Jazz ens. exp.	No	22	100.45	28.32	141.64	27.97	163.35	30.86
	Yes	20	105.13	34.68	186.35	40.45	203.47	37.16
Grade level	5th	8	99.54	22.66	149.54	22.92	179.42	24.20
	6th	15	107.05	30.91	145.65	39.76	160.78	37.67
	7th	11	96.03	27.61	167.98	27.46	185.94	28.01
	8th	8	106.79	45.26	201.79	49.03	221.33	39.23
Music apt.	High	19	96.68	31.83	175.61	46.94	196.44	42.30
	Avg.	19	113.14	30.00	148.35	32.21	167.73	31.98
	Low	4	81.50	17.57	171.92	30.07	185.91	39.20

*\*Due to a mid-instruction technical recording error, one participant was excluded.*

The plots below show that although participants overall made significant achievement gains, participants of particular demographics made higher gains than others. For example, participants with more than 4 years of experience in a school ensemble achieved higher gains than those with less than 4 years (Figure 12), participants with jazz ensemble experience made higher gains than those without (Figure 13), and 8<sup>th</sup> grade participants made the highest achievement gains among the grade levels (Figure 14). Additionally, participants with high and low music aptitude made higher gains than those with average music aptitude (Figure 15). The high and average music aptitude groups were equal in size (n=19); the low aptitude group was small in comparison (n=4). Finally, it is likely that more overlap occurred among the higher



achieving groups for the “school ensemble experience,” “jazz ensemble experience,” and “grade level” variables than between those groups and the higher achieving groups for “music aptitude.”

Because music aptitude is akin to a “musical IQ,” aptitude is not related to age or experience.

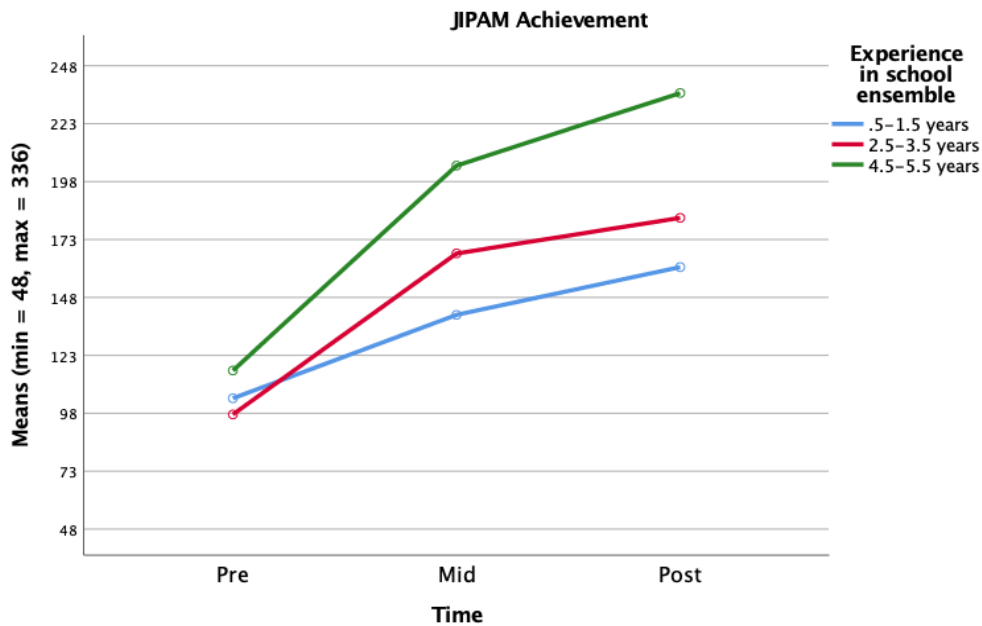


Figure 12. JIPAM achievement mean scores by school ensemble experience.

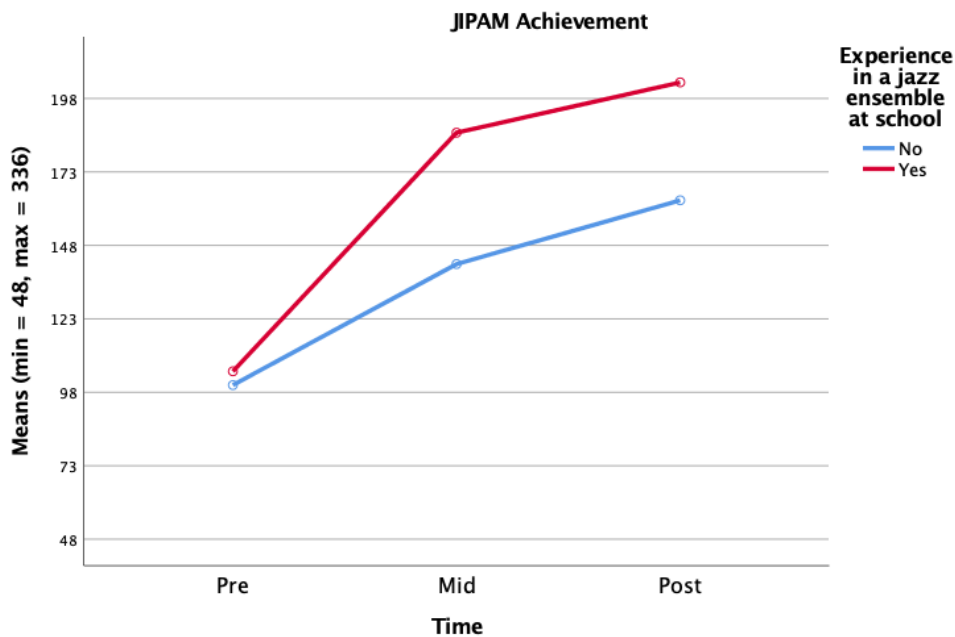


Figure 13. JIPAM achievement mean scores by jazz ensemble experience.



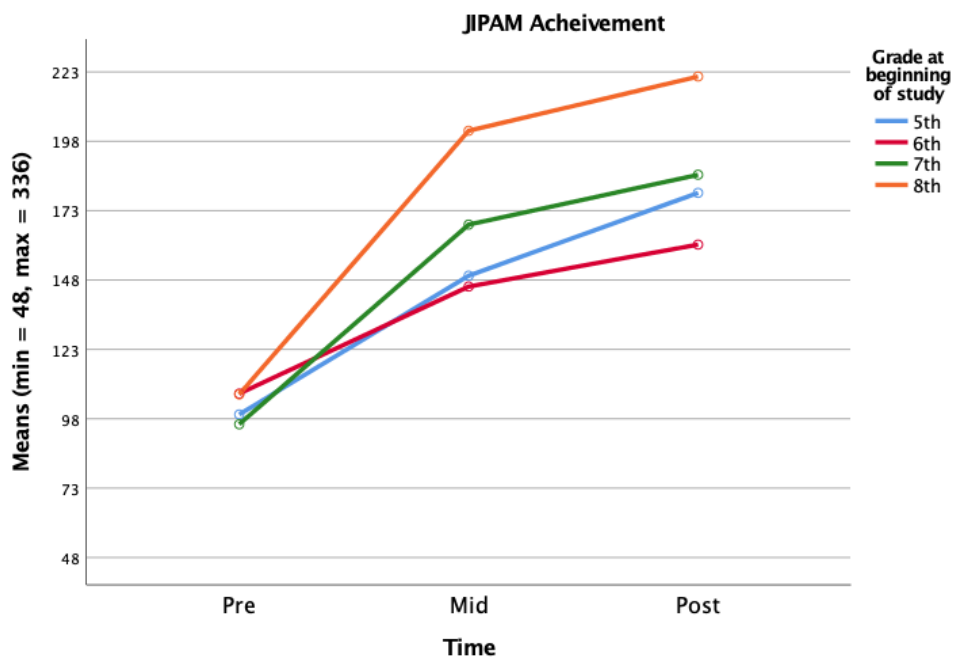


Figure 14. JIPAM achievement mean scores by grade level.

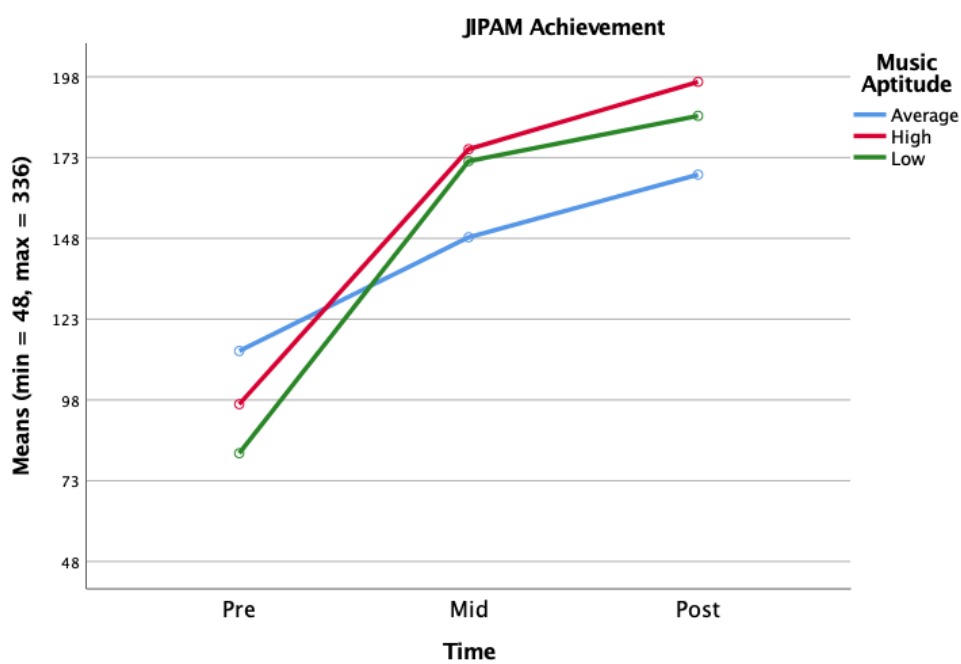


Figure 15. JIPAM achievement mean scores by music aptitude.



**Question 2: Investigating Harmonic Form Instructional Sequences**

When addressing Research Question 2, “Does one harmonic form instructional sequence better support one or more outcomes?”, I found no significant interaction between the two conditions and any measured outcome. Both conditions were sources of positive outcomes. The following explicates this result.

Repeated measures mixed design ANOVAs revealed no significant interaction between the two conditions and any outcome over time ( $p>.05$ ). Below are tables of means (Tables 13 and 14) and accompanying plots (Figures 16, 17, 18, 19) that reveal this absence of effect for condition. Outcomes are grouped into one table for achievement and self-assessment (Table 13) and another for self-efficacy and motivation (Table 14). These results are evident in the similar gain trajectories for Groups A and B, shown in the plots for each outcome: achievement (Figure 16), self-assessment (Figure 17), self-efficacy (Figure 18), and motivation (Figure 19) over time. Results associated with Group A refer to the group of participants ( $n=22$ ) who studied modal harmonic forms for the first 6 weeks of instruction and 12-bar blues harmonic forms for the second 6 weeks of instruction. Results associated with Group B refer to the group of participants ( $n=21$ ) who studied 12-bar blues harmonic forms for the first 6 weeks of instruction and modal harmonic forms for the second 6 weeks of instruction.



*Table 13. JIPAM Achievement and Self-Assessment Mean Scores by Condition and Instructional Phase.*

<b>Instructional phase and group</b>	<b>N</b>	<b>JIPAM mean (min=24, max=168)</b>	<b>SD</b>	<b>Self-assessment mean (min=1, max=7)</b>	<b>SD</b>
Pre-Group A	44	55.25	23.03	3.48	1.44
Pre-Group B	42	46.91	16.80	4.31	1.24
Mid-Group A	43*/44	84.14	23.79	4.68	1.20
Mid-Group B	42	78.49	23.69	5.29	0.94
Post-Group A	44	92.34	23.86	5.41	1.02
Post-Group B	42	90.56	23.66	5.90	0.99

*\*Due to a technical recording error, n=43 for mid-instruction Group A achievement.*

*Table 14. JISEM Self-Efficacy and JIMM Motivation Mean Scores by Condition and Instructional Phase.*

<b>Instructional phase and group</b>	<b>N</b>	<b>JISEM mean (min=21, max=60)</b>	<b>SD</b>	<b>JIMM mean (min=21, max=105)</b>	<b>SD</b>
Pre-Group A	22	36.82	6.53	73.64	11.15
Pre-Group B	21	39.00	7.28	78.19	11.93
Mid-Group A	22	49.00	5.52	78.77	11.34
Mid-Group B	21	52.00	4.62	84.62	10.40
Post-Group A	22	51.18	5.54	84.50	9.57
Post-Group B	21	53.29	8.45	88.00	15.26



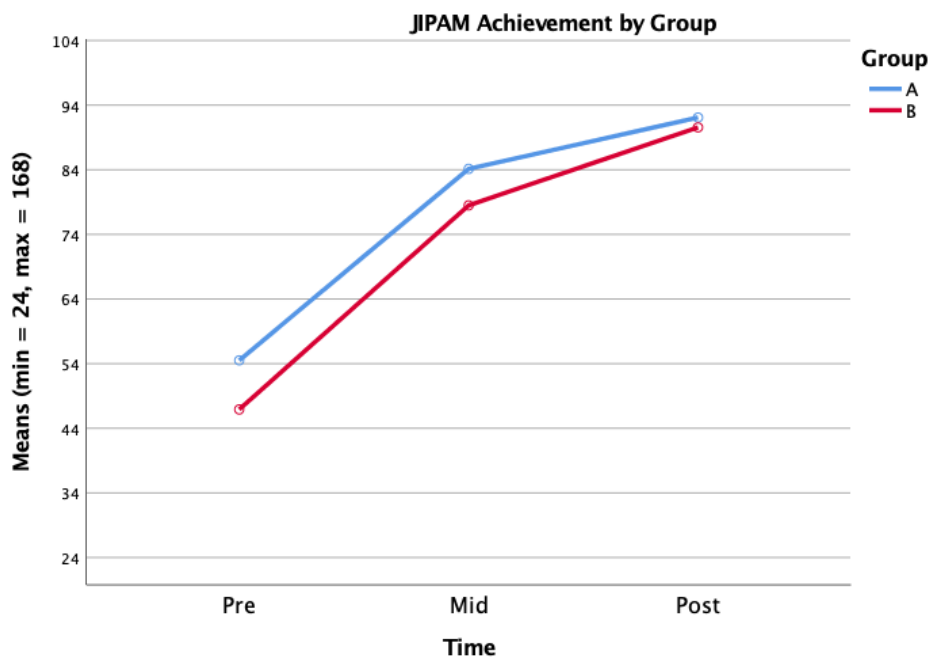


Figure 16. JIPAM achievement mean scores by group/condition.



Figure 17. Self-assessment mean scores by group/condition.



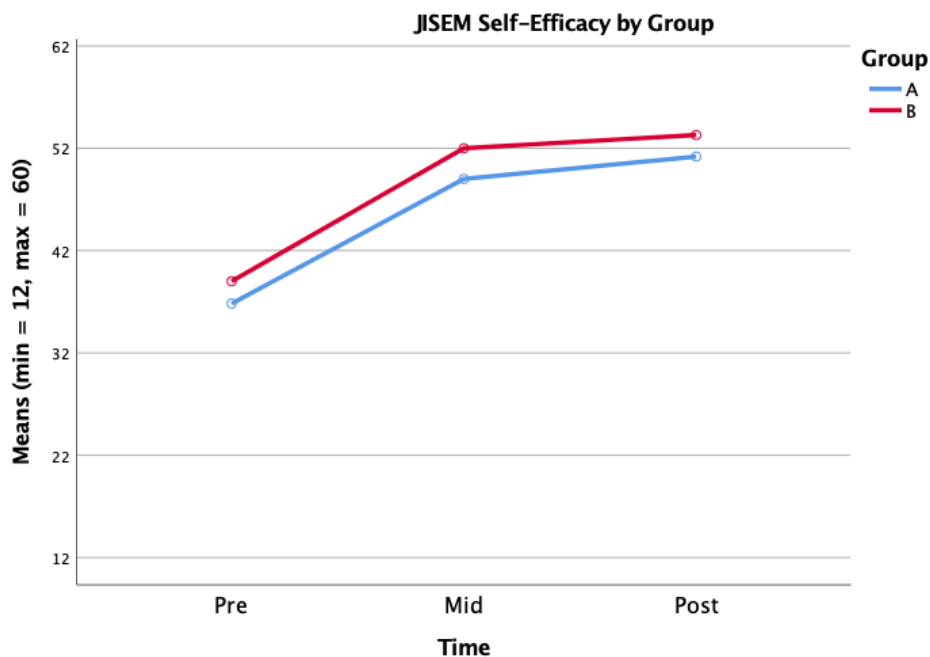


Figure 18. JISEM self-efficacy mean scores by group/condition.

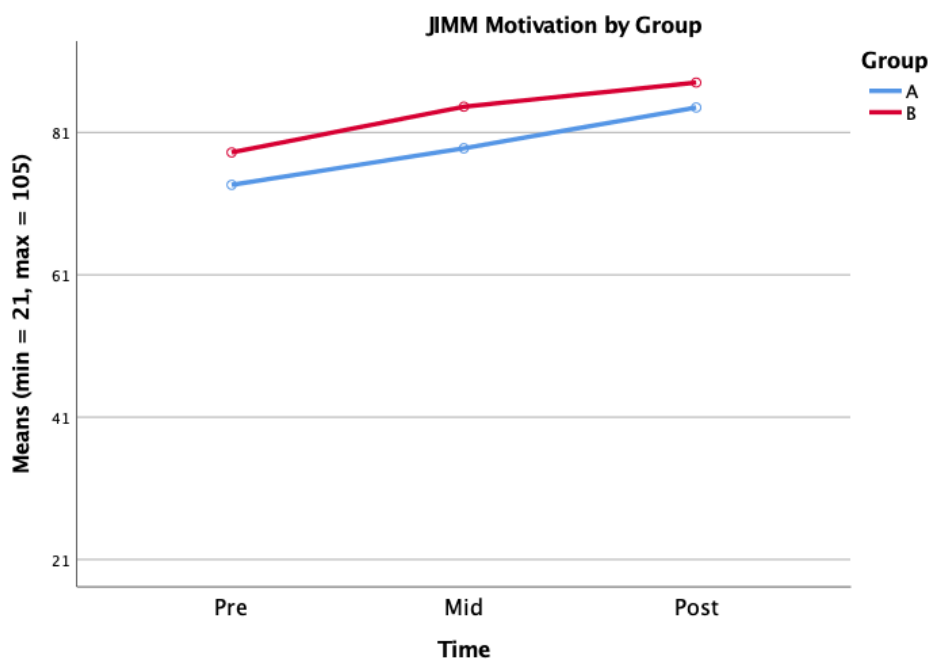


Figure 19. JIMM motivation mean scores by group/condition.



### Question 3: Investigating Relationships Between Key Variables and Outcomes

When I addressed Research Question 3, “Are there any interactions between other key variables and outcomes?”, I found a significant interaction between assessed task and achievement. There were two assessed tasks in this study, variations of the same assessment. One task required participants to improvise over the harmonic form for a modal jazz tune, “Impressions,” and the other required participants to do so over a 12-bar blues, “Sonnymoon for Two.” There were no interactions between task and any other outcomes.

The achievement gains for the “Sonnymoon for Two” jazz improvisation task outpaced those for “Impressions” regardless of instructional phase and condition (Table 15, Figure 20). Participants overall achieved significantly higher scores improvising over the 12-bar blues form of “Sonnymoon for Two” than the 32-bar modal form of “Impressions,” not only over the length of the instructional period (12 weeks) but even in the first half (6 weeks).

*Table 15. JIPAM Achievement Mean Scores by Task.*

<b>Instructional phase and task</b>	<b>N</b>	<b>Mean (min=24, max=168)</b>	<b>Std. Dev.</b>
Pre-Sonnymoon	43	<b>47.92</b>	18.31
Pre-Impressions	43	<b>54.43</b>	22.29
Mid-Sonnymoon	43	<b>88.70</b>	23.67
Mid-Impressions	42*	<b>73.83</b>	21.66
Post-Sonnymoon	43	<b>100.29</b>	22.42
Post-Impressions	43	<b>82.65</b>	21.65

\*Due to a technical recording error, n=42 for mid-instruction



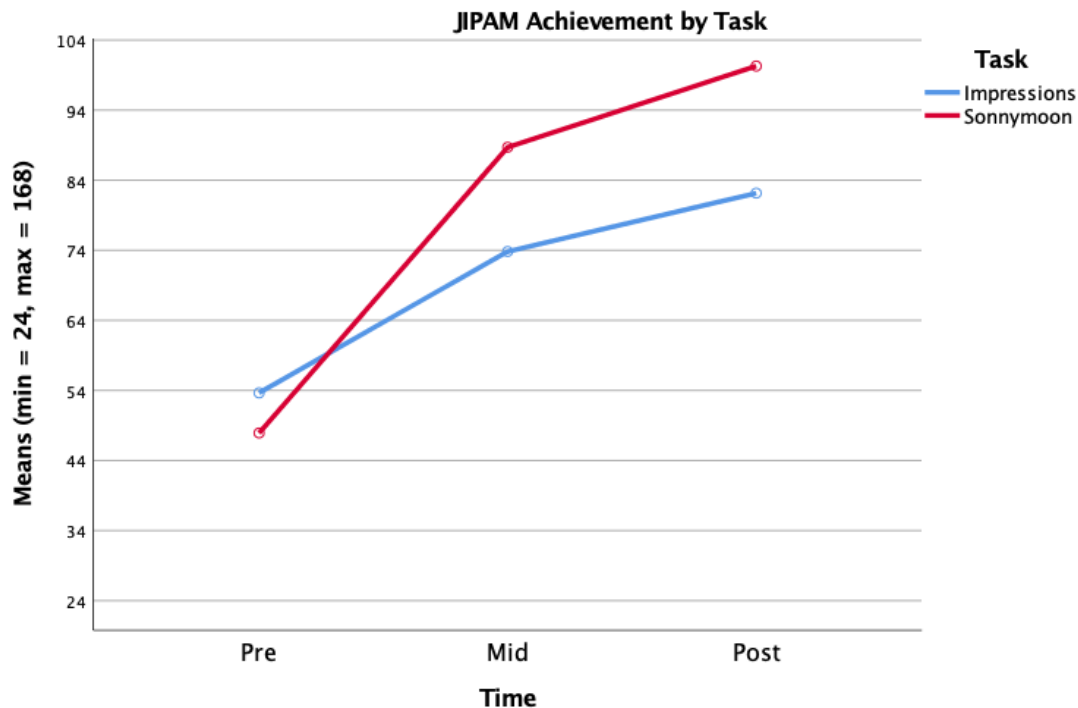


Figure 20. JIPAM achievement mean scores by task.

These results were of particular interest because participants in one of the conditions, Group A, did not study 12-bar blues harmonic forms during the first 6 weeks. Participants in Group A did show similar overall learning outcomes to participants in Group B, as described in the previous section. However, because the study's design (a) did not schedule Group A to study 12-bar blues harmonic forms in Weeks 1-6, but (b) did schedule data collection for both assessed improvisation tasks for all participants at mid-instruction, and (c) all participants performed significantly better on one task than another, it became apparent that Group A participants were able to transfer what they had learned about improvising over one harmonic form to improvising over another (Figure 21). Group A was introduced to and applied musical elements characteristic of jazz and jazz improvisation strategies to practicing modal harmonic forms in Weeks 1-6 ("Impressions" by John Coltrane and "Cantaloupe Island" by Herbie Hancock), which is represented in the figure below by the white hexagons. Group A studied 12-bar blues



harmonic forms in Weeks 7-12 (“Sonnymoon for Two” by Sonny Rollins and “Blues in the Closet” by Oscar Pettiford), which is represented in the figure below by grey circles. Group B was introduced to and applied the same elements and strategies, in the same order, but first to the 12-bar blues and then to the modal tunes. All participants, regardless of condition, were tested on both the “Impressions” and “Sonnymoon for Two” improvisation task at pre-, mid-, and post-instruction, which is represented in the diagram below by a white hexagon (“Impressions”) inscribed in a grey circle (“Sonnymoon for Two”). The arrows from data collection to outcomes show that both Groups A and B performed significantly better on the “Sonnymoon for Two” improvisation task than the “Impressions” one at mid- and post-instruction data collection. Group A’s mid-instruction performances were therefore evidence that when those participants made mid-instruction recordings they performed one of the mediating sub-processes in the embodied conjecture: applying knowledge and skills to harmonic forms not studied in class.

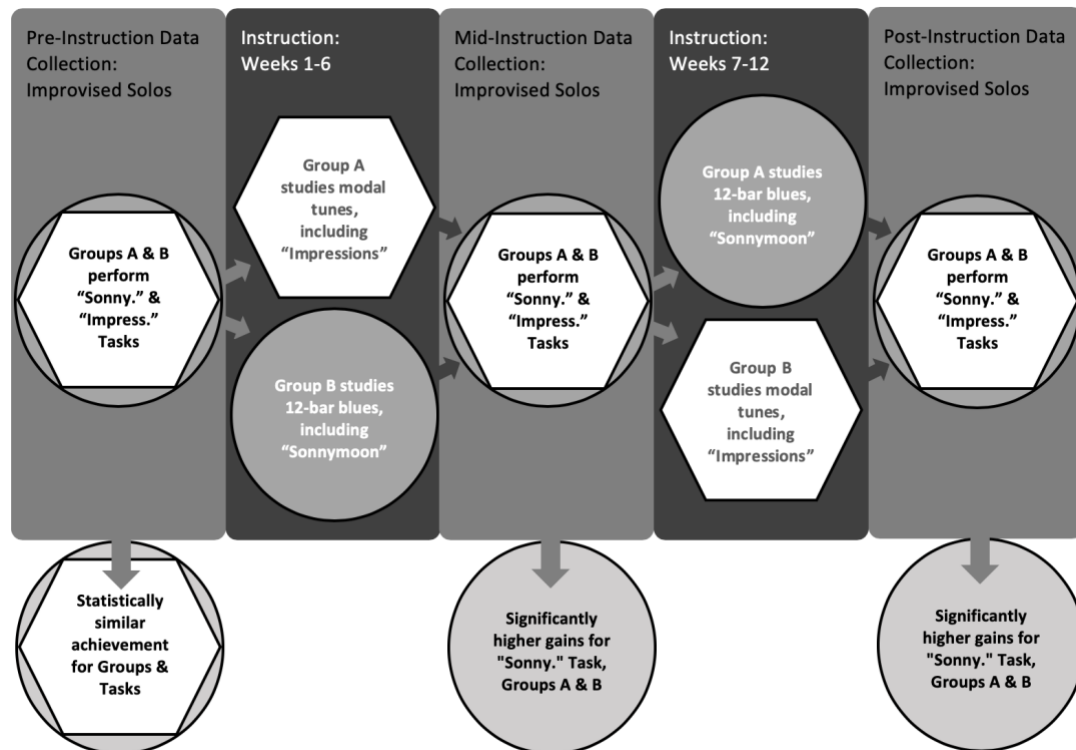


Figure 21. Harmonic forms assessed and taught, including achievement outcomes.



The tables and figures below confirm that, regardless of condition, participants performed significantly better on the “Sonnymoon for Two” task. The table shows the two conditions’ mean scores for the two assessed tasks (Table 16), and the accompanying plots illustrate how Group A (Figure 22) and Group B (Figure 23) both performed significantly better on the 12-bar blues “Sonnymoon for Two” task than the modal “Impressions” task. The final two figures bring Groups A and B together, charting their mean scores for a single task on a single plot (Figures 24 and 25). These plots show the similar gains both groups made within each task. Both groups peaked on either side of 100 points for “Sonnymoon for Two” (Group A mean=102.68; Group B mean=97.79) (Figure 24), significantly higher than where they peaked for “Impressions,” just above 80 points (Group A mean=82.00; Group B mean=83.33) (Figure 25).

*Table 16. JIPAM Achievement Mean Scores by Task and Group.*

<b>Instructional phase, task, and group</b>	<b>N</b>	<b>Mean (min=24, max=168)</b>	<b>Std. Dev.</b>
Pre-Sonnymoon A	22	<b>50.55</b>	23.59
Pre-Sonnymoon B	21	<b>45.17</b>	10.23
Pre-Impressions A	22	<b>59.95</b>	21.98
Pre-Impressions B	21	<b>48.65</b>	21.62
Mid-Sonnymoon A	22	<b>89.55</b>	22.70
Mid-Sonnymoon B	21	<b>87.81</b>	25.17
Mid-Impressions A	21	<b>78.48</b>	24.11
Mid-Impressions B	21	<b>69.18</b>	18.30
Post-Sonnymoon A	22	<b>102.68</b>	20.80
Post-Sonnymoon B	21	<b>97.79</b>	24.26
Post-Impressions A	22	<b>82.00</b>	22.55
Post-Impressions B	21	<b>83.33</b>	21.19



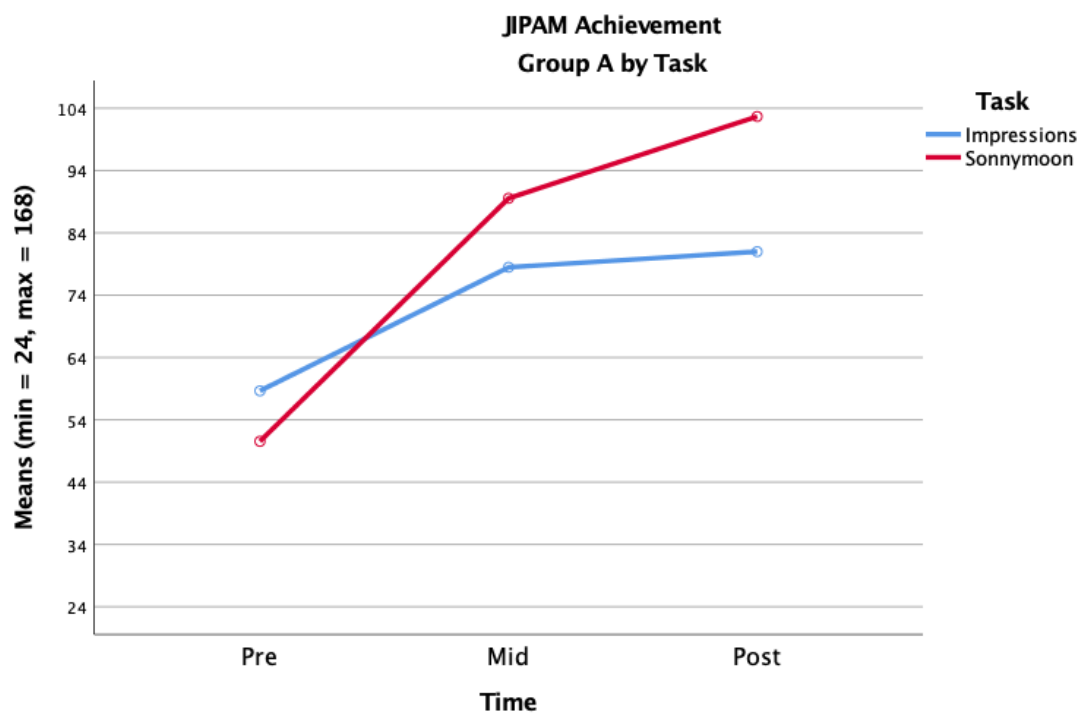


Figure 22. JIPAM achievement mean scores, Group A by task.

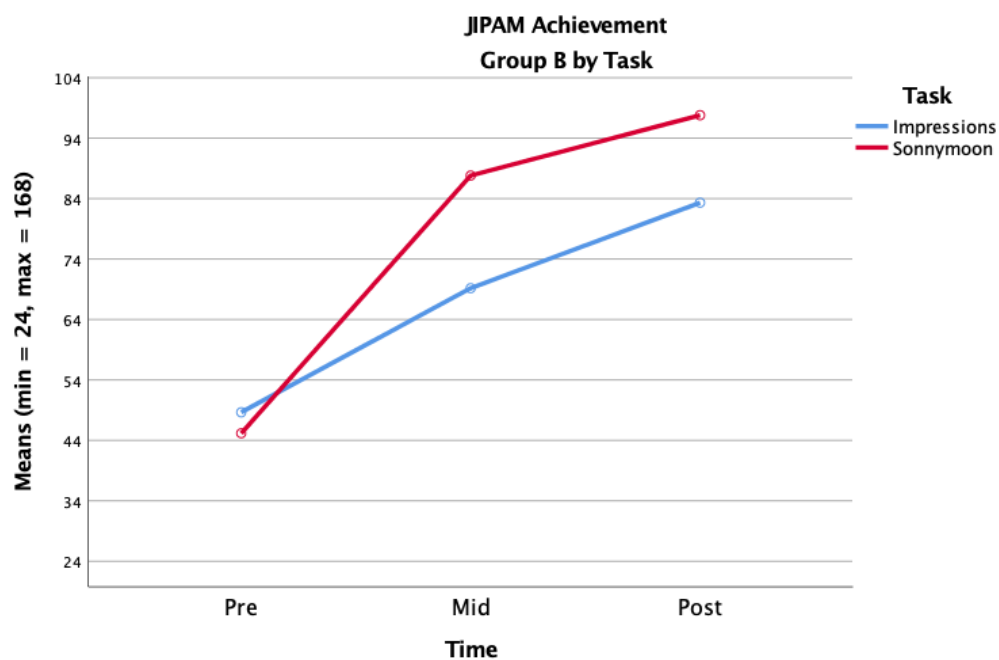


Figure 23. JIPAM achievement mean scores, Group B by task.



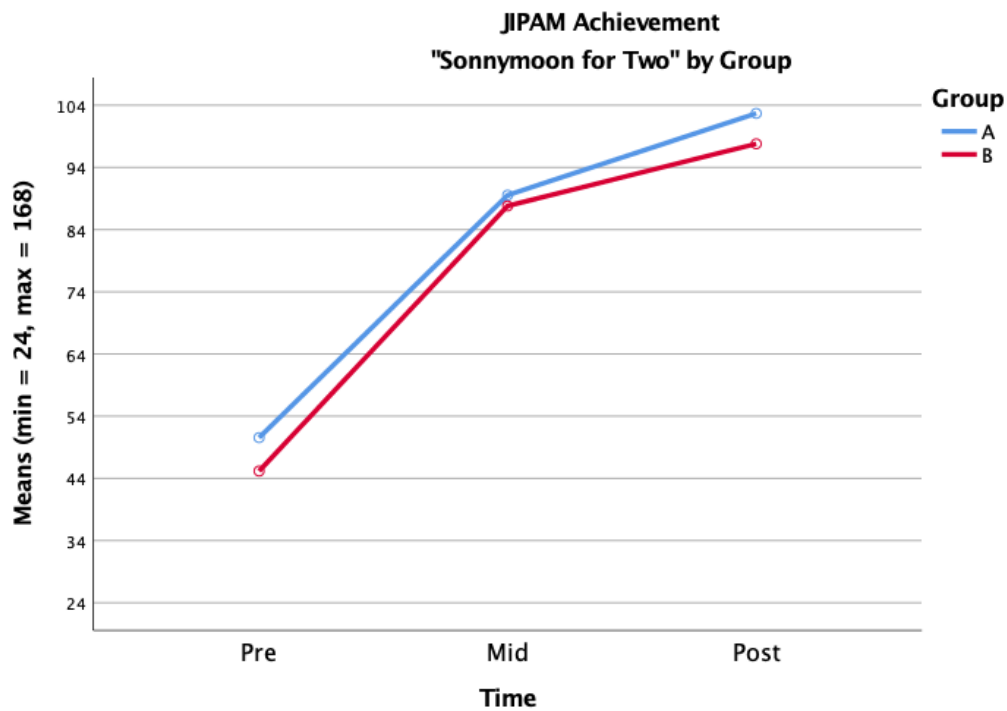


Figure 24. JIPAM achievement mean scores, “Sonny's Blues” by group.

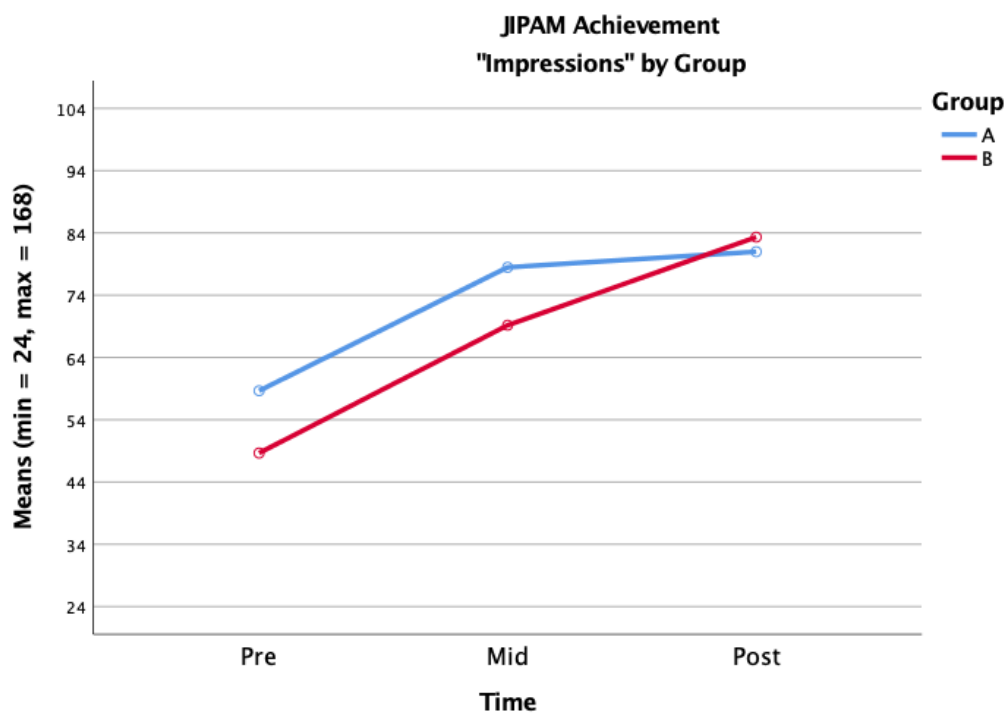


Figure 25. JIPAM achievement mean scores, “Impressions” by group.



**Question 4: Investigating Relationships Among Outcomes**

Finally, to answer Research Question 4, “Are there correlations or relationships among outcomes?”, I conducted a correlational analysis that revealed very few relationships among achievement, self-assessment, self-efficacy, and motivation outcomes in the context of this study. There were no significant correlations among composite scores and ratings for achievement, self-assessment, self-efficacy, and motivation.

Overall, the quantitative results showed that the learning environment supported outcomes. There was a significant effect on all measured outcomes over time, not only for the 12-week duration of the instructional period but even in the first 6 weeks. There were no significant differences between the two conditions (different instructional sequences), but there was a significant difference between how participants performed on the two assessed tasks (improvising over different harmonic forms), regardless of condition. Participants achieved higher scores improvising over the 12-bar blues harmonic form than they did the modal one. Significant relationships among outcomes did not emerge. The qualitative findings below help explain participants’ significant gains, both over the length of the instructional period as well as during the significant first half.

**Qualitative Results**

The major qualitative findings in this study addressed Research Question 5: “Are the critical features of this learning environment sources of positive outcomes, and if so, how do the critical features promote mediating processes to produce positive outcomes?” I found that the critical features of the learning environment did support positive outcomes, which answered the first part of Research Question 5. The second part of the question is more fully answered below, through an investigation of each of the learning environment’s four design features as well as



four case studies of individual participants. Those numerous findings can be sorted into two categories: (a) findings of when and how participants successfully performed mediating processes, which were connected back to design features and forward to outcomes; and (b) findings of changes in participants' needs regarding design features and their sub-elements, including their related performances of mediating processes, which suggested learning.

The three large sections below present qualitative results that explicate how the learning environment shaped students' learning. Within each section, I have attempted to integrate findings as they related to the outcomes: achievement, self-assessment, self-efficacy, and motivation, which is appropriate because outcomes are indeed integrated with each other in the learning environment. The three sections present: (a) a detailed description of the embodied conjecture as it proved to be instantiated in the actual implementation, providing evidence of how the learning environment acted as a source of outcomes; (b) a case study of a drummer, focusing on self-efficacy and contextualized with evidence of achievement; and (c) a collection of smaller case studies of three other participants, organized around achievement but considering all outcomes, especially motivation.

The organizational structure described directly above is consistent with the original intent behind collecting and analyzing qualitative evidence in this mixed methods study: I sought to (a) gain insight into how participants behaved in the learning environment and interacted with its design features and (b) illuminate how the quantitative results were produced. For example, quantitative results showed that participants made significant positive gains in all outcomes, and qualitative findings revealed why and how participants made these gains. Quantitative results showed that both instructional sequences were sources of positive outcomes, and qualitative findings confirmed that participants in both conditions performed mediating processes associated



with these outcomes. Finally, quantitative results revealed a significant interaction between assessed task and achievement outcomes, and qualitative findings offered potential explanations.

As a reminder to the reader, my qualitative findings are based on transcriptions of the Yellow and Orange Combos for Weeks 2, 5, 8, and 11, as well as my field notes. The Yellow (Group A) and Orange (Group B) Combos were two of the eight small groups in the study, and included 13 of the 43 participants. All participant names below are pseudonyms. As the teacher/researcher in this study, I refer to myself as “SM”, my initials, in transcript excerpts. For more details about the participants in the Yellow and Orange Combos, including why I chose them as representatives of the larger sample, please refer back to Tables 2 and 3 in Chapter 3.

### **Question 5: Investigating the Critical Features of the Learning Environment**

This lengthy section provides evidence for the overall conclusion that the sources of the positive outcomes were the design features of this study’s learning environment. The findings are explained in four smaller sections, one per design feature: (a) design feature 1: forming jazz combos; (b) design feature 2: revealing “hidden” jazz improvisation practices; (c) design feature 3: promoting specific feedback, and (d), design feature 4: implementing harmonic form sequencing. Under each design feature I provide evidence of mediating processes, connecting them backward to the design features and forward to the outcomes. This evidence serves to answer the second part of Research Question 5, regarding how the design features acted as sources of positive outcomes.

**Design feature 1: Forming jazz combos.** This section describes evidence that supports the finding that forming jazz combos supported achievement, self-efficacy, and motivation outcomes. In this learning environment, forming jazz combos meant organizing participants into small groups in which participants filled unique musical positions, with the intent that they



would collaborate and perform ensemble roles. Forming jazz combos elicited (a) the expected mediating processes in which participants collaborated as well as initiated and performed appropriate ensemble roles and (b) an unexpected, although reasonable in retrospect, mediating process in which participants developed a sense of entitativity. Individuals' feelings of entitativity concern their perceptions of a group to which they belong as being a solid entity, one in which the members possess a high level of relatedness to each other and work towards common goals (Stewart & Lonsdale, 2016). The presence of the described mediating processes suggests that forming jazz combos supported outcomes. Evidence of collaborating, performing ensemble roles, and developing entitativity, as well as their related outcomes, are discussed below.

***Collaborating.*** Overall, I found that the mediating process of collaboration contributed to outcomes throughout the 12-week instructional period, with one kind of collaboration supporting outcomes primarily in the first half and another in the second. Although I anticipated that participants would collaborate to improve their individual and group performances, as well as to create arrangements, their collaborative behaviors primarily focused on group improvement. First, in Weeks 1-6, participants primarily worked together towards improving ensemble cohesiveness, an aspect of group performance in which individual members of an ensemble seek to perform as a whole (tempo, style, expression, etc.). Because these efforts were so closely tied to participants' unique musical jobs in the ensemble, they are discussed in the section on the next mediating process, "performing ensemble roles." Second, in Weeks 7-12, participants collaborated to create their own arrangements of tunes. Please refer to the section "Performing ensemble roles" for more details about how collaboration supported outcomes in the



first half of the study, and continue reading below for how they did so during the second half of the instructional period.

In the second half of the instructional period, participants collaborated in their jazz combos to create arrangements; they played background figures as well as created introductions and endings, which likely supported achievement and motivation outcomes. Background figures are short, repetitive motives that musicians perform underneath a soloist. Players can plan them ahead of time or perform them spontaneously, which is considered improvisatory. I considered performances of background figures collaborative because initiating them indicated a participant's desire to musically interact with the other members of the ensemble or to support a soloist, and because doing so typically inspired other participants to do the same. Because playing background figures was tied to participants' understanding of the harmonic form, and in their spontaneous form required participants to improvise, the act of playing background figures was likely related to achievement and possibly self-efficacy outcomes. The student agency, choice, and social nature of creating introductions and endings was more likely related to motivation outcomes. I considered creating introductions and endings as collaborative because doing so required multiple participants to suggest ideas, build on each other's ideas, and experiment with them. None of these activities were a primary focus of instruction, nor did they occur frequently. Participants did, however, engage in these behaviors, and they likely only occurred because of the small size and mixed instrumentation unique to jazz combo setting.

For the most part, instances of playing background figures occurred later in the instructional period. Per my lesson plans, I did not formally introduce the idea of playing background figures until Week 7, and I did not invite participants to arrange their own endings until Week 10. I did suggest to horn players in earlier weeks that they were welcome to play



chord tones while other members improvised. Playing chord tones in the background was intended to reinforce the harmonic form. It was also a first step to planning or improvising actual background figures, which would incorporate rhythmic motives, and a good segue to introducing balance and ensemble sensitivity. From what I observed in the Weeks 2, 5, 8, and 11 Yellow and Orange Combo videos, two players performed background figures on their own earlier than when I introduced them in Week 7; in Week 5 Michael played backgrounds in the Orange Combo and Joseph joined in. They used root notes and a “Charleston” rhythm (dotted quarter/eighth note pattern) that they likely heard the piano player performing while comping (a chordal accompaniment that is part of the piano player’s ensemble role). Richie did the same in Week 8 and Marcello joined in. In Week 11, Hudson initiated backgrounds on two different occasions, and I joined in. I asked if anyone noticed us doing that, which prompted Noah to respond that he did, and wanted to do the same, which he did. These three occasions led to a group discussion in the Yellow Combo about whether to plan backgrounds ahead of time or perform them spontaneously. In my field notes for Week 11 I noted that “all the combos had students come in with backgrounds” that week but that participants had “varying ideas about whether to plan them ahead of time or be spontaneous.”

Like background figures, arranging endings occurred later in the instructional period. Per my lesson plans, I did not formally invite participants to arrange their own endings until Week 10. In Week 11 videos I observed the Orange Combo arrange endings and the Yellow Combo arrange introductions. This involved participants sharing ideas, trying them out, and reflecting on them. The process was more involved than when we performed endings to produce “finished products” in previous weeks; those performances typically ended with an improvised ending after the final head of the tune (e.g., a final sustained chord, and maybe an improvised drum fill).



For my part, I suggested and encouraged the activity of arranging endings, but refrained from making choices. For example, the excerpt below from the Orange Combo shows my primary role as a facilitator, and the participants' roles as designers, in creating an ending to "Cantaloupe Island." In this excerpt, "SM" refers to me, the teacher/researcher:

*SM: "How do you want to end this?"*

*Joseph: "With a trill."*

*Michael asks for clarification about when the written intro is included in the form.*

*SM points out that the last four bars are the same as the intro, so the last head of the tune is "still only 16 measures."*

*SM: "So how should we end it?"*

*Wyatt: "Why don't we all do a bass note?"*

*Richie suggests splitting up the notes, so SM asks everyone to pick a note from the last chord. Participants volunteer for various notes.*

*SM: "How do you want that to happen?"*

*Marcello: "Really long note. Really long."*

*Richie: "Can we trill them?"*

*Michael is playing a few melodic ideas to himself.*

*Joseph gasps, "Michael just gave me an idea!"*

*Joseph sings his idea (it's a drop or fall, which is a musical effect characteristic in jazz horn playing).*

*SM: "These are a lot of different ideas. I think we could combine them."*

*SM suggests playing the long note, then a trill, then a fall.*



*SM: “If it sounds good, we’ll do it that way again. If it sounds terrible, we’ll never do it that way again!”*

*Everyone is trilling.*

*SM counts off.*

*Everyone plays the last four bars and performs the ending plan.*

*Joseph: “I think we should do a trill, and then not do a trill.”*

*Michael: “I think we should do a trill and then ‘bump’.” Michael sings a stinger (a short, accented, final pitch).*

*Marcello demonstrates a fall.*

*SM: “We should look at Christopher for when to do the ‘bump’.” SM gestures to the drummer.*

*SM: “Can you end it?” SM gestures a cut-off.*

*Marcello: “Like a ‘pshhh’.” Marcello imitates the sound of a cymbal choke.*

*Christopher plays a cymbal crash.*

*SM asks Susanna’s opinion*

*Susanna replies that she can’t trill “so I’ll just do this.” She demonstrates a single note.*

*SM counts off.*

*Everyone plays the last four bars and performs the new ending plan.*

*Christopher crashes a cymbal and Wyatt adds a glissando on the piano to end it.*

*SM: “It’s a little sloppy sounding, but it’s a cool sloppy sound. We’re all riffing on it. Is there anything else you want to change?”*

*Susanna: “No, I like it.”*

*Marcello suggests everyone throw their instruments in the air.*



*Richie asks if the fall can come after the cymbal crash. The group discusses how to do that.*

*SM counts off.*

*Everyone plays the last four bars and performs the newest ending plan.*

*Marcello: "I don't like it."*

*Richie: "Yeah, I don't like it."*

*SM: "Well, it's good we tried it."*

*Wyatt asks SM's opinion on performing an ascending or descending glissando on the piano.*

*SM: "What do you think?"*

*Wyatt decides on a descending glissando.*

In this same week in the Yellow Combo, I did not even need to perform my role as a facilitator in the arranging process. The Yellow Combo initiated arranging an introduction to a tune, an element I had not included in my lesson plans:

*Sam: "Before we start, I have an idea. What if Seamus plays four measures by himself, then we jump in?"*

*The group tries Sam's idea, starting with the piano player, and layering in members of the rhythm section, first bass, then drums.*

*The combo performs a little more of the tune and stops.*

*SM: "That was a great idea, Sam. That was awesome."*

*Sam explains that she had been remembering a tune from sixth grade jazz band, "Low Rider," and thought the same idea from that introduction could work with this tune.*

A short time later, the Yellow Combo continued the same discussion:



*Ruby, Seamus, and Sam talk to each other while SM conferences with Tomas.*

*Sam: "We were just deciding, we do the full intro, then I do a fill and jump in."*

*SM: "Oh, yeah – you set it up."*

*The three players demonstrate: Seamus plays the introduction, Sam sets up Ruby's bass line entrance and then keeps time.*

*Participants nod their heads and make sounds of approval.*

*Sam: "We're so creative."*

Finally, participants' positive responses to arranging elements of their own performances, such as the one in the Yellow Combo directly above, were likely a result of the active roles they took in making choices and carrying them out, and also related to motivation outcomes. Participants' positive feelings about arranging may have also affected their positive feelings about entire performances. For example, after the Orange Combo performed a complete arrangement of "Cantaloupe Island" in Week 11 (the head of the tune, improvised solos, the return of the head of the tune, and the newly created ending), Marcello responded with a general affirmative comment that turned out to have roots in the group's arrangement. When the performance was over, Marcello declared, "That one was really good," and when I asked him to be specific about what was good, he immediately clarified, "The ending." His response suggested to me, as the teacher, that he was probably pleased with not only the actual performance of the ending but with performing an ending that he and his fellow combo members had created themselves.

***Performing ensemble roles.*** Because the design of this learning environment included forming jazz combos, participants in this study were expected to exhibit the mediating process of performing ensemble roles appropriate to the context. At a basic level, a horn player's role in a



jazz combo includes playing the melody to the head of the tune and performing background figures to support soloists. A piano player's role requires comping over the harmonic form, which is a type of rhythmic chordal accompaniment performed for the head of the tune and to support soloists. A bass player's role is to perform a walking bass line over the harmonic form, establish the pulse with the drummer, and support soloists. The drummer's role is to establish a rhythmic feel for the tune, maintain the pulse with the bass player, and support soloists. The piano, bass, and drum set players' roles include working as a team referred to as the "rhythm section." The following paragraphs describe how performing these roles was unique to the jazz combo context and embedded in improved ensemble cohesiveness over time; the latter was likely related to positive achievement outcomes.

Performing these particular ensemble roles was unique to this study's jazz combo context because of the musical knowledge and level of musical independence the roles required, as well as the special "status" imparted on each member for performing the unique role. If participants had performed these ensemble roles in a like-instrument setting, such as a small group lesson, each participant would have played the same instrument, and therefore performed the same role. No one participant would have been more vital to the group's performance than another. If participants had performed these roles in a larger jazz ensemble, like a big band, they would have still been afforded the "status" of having a unique part. They would have potentially done so, however, without the same level of independence or understanding; big bands have conductors to keep the ensemble together, and they typically perform from arrangements, not lead sheets. Therefore, players can perform appropriate ensemble roles simply through reading and playing what is on the page. For example, a piano player in a big band may not have to interpret chords on a lead sheet and comp behind a soloist, because all the chords and rhythms are written ahead



of time on sheet music. The drummer in a big band may not have to know how to perform the rhythmic feel of a tune because the sheet music notates how to keep time. This distinction held true for all of the ensemble roles participants performed in this study. Although participants had scaffolds to assist them in performing their ensemble roles, they were required to interpret lead sheets and perform them independently.

Performing ensemble roles was connected to increased achievement because: (a) evidence showed that participants' ensemble role understanding and performance improved over time, as observed in the videos and recorded in my field notes; and (b) each ensemble role required knowledge and skill associated with achievement. For example, all ensemble roles required participants to accurately perform a swung rhythmic feel, which was associated with the first of the four evaluated improvisation performance elements (rhythm). They also required participants to follow the form, which was associated with the third evaluated improvisation performance element (harmony).

Positive change in performing ensemble roles was overwhelmingly associated with participants assessing and seeking ensemble cohesiveness. At its most basic, a cohesive ensemble "stays together," with all members agreeing on tempo and following the form. Per my lesson plans, I established ensemble cohesiveness as a goal in Week 1 and carried it forward throughout the 12-week instructional period. The Orange Combo exemplified how participants could cooperate towards this goal and make progress in their understanding and performance of it. Their relative instrumental inexperience compared to the Yellow Combo meant that they had the need and potential for a more dramatic improvement over the course of the study than a combo of more experienced ensemble players.



The Orange Combo showed growth in understanding and achieving ensemble cohesiveness over the 12-week instructional period, including their understanding of and ability to perform their ensemble roles and follow the harmonic form. These tasks were associated with the rhythm and harmony components of achievement. For clarity, I am referring to “tasks” as a general term, as opposed to the related but very specific “assessed tasks” to which I refer to in other parts of this chapter (those that were part of quantitative data collection and scored). In Week 1 I recorded in my field notes, “Orange Combo had the lowest ensemble cohesiveness for the first day.” Two weeks later, in my Week 3 field notes, I reflected on ensemble role performance and ensemble cohesiveness at School X overall, to which the Orange Combo belonged. In the excerpt below I refer to “tears,” which are tempo or pulse issues between players. I recorded the following mixed review:

*Some of the difficulties with ensemble cohesiveness, primarily tears in the rhythm section, don't seem to be getting in the way of improvising. They're also part of everyone developing their ears and paying attention to ensemble roles, so I think it's fine. One issue, not entirely unexpected, is drummers losing time during their solos.*

Around this same time, in the Week 2 Orange Combo video, I observed the type of behavior just described. I observed that participants could identify the basic tasks of their ensemble roles (e.g., performing the melody, chords, bass line, or rhythmic feel), but that they struggled to perform them accurately in an ensemble context. In some instances they seemed unaware that the ensemble was not cohesive, in others they showed awareness but were unable to “diagnose” the problem, and in still others, participants correctly assessed the issue but were unable to “fix” it independently. For example, in Week 2, a participant showed a lack of awareness that the horn section was ignoring an eighth note rest in the melody, the piano player was following an incorrect harmonic rhythm (changing chords at the incorrect times) and the drummer was performing double time. I asked the Orange Combo, “Do we sound together?” and Michael



responded that we did, although we did not. At a different point in the same week, participants showed awareness that the ensemble was not cohesive, but struggled to identify the problem. I observed that the drummer was performing the correct rhythmic feel, but rushing (gradually increasing the tempo over time). When I asked, “What’s happening there?”, participants could not identify Christopher’s rushing; Susanna thought she was perhaps going “a little bit fast” again, Michael agreed, and Marcello suggested that the issue was that bass player was “just lower sounding.” After three unsuccessful attempts, with coaching, the ensemble finally gelled in a fourth attempt. As the teacher, though, I was unsure if the participants knew the difference between the unsuccessful and successful attempts, or could replicate the successful result. In a third example, a participant showed awareness of an ensemble issue, and identified it accurately, but still needed assistance to resolve it. Susanna brought it to my attention that she was “get[ting] ahead at one part”, which she knew because she was “finish[ing] like a measure early.” After some coaching she was able to resolve this individual issue.

In Week 5, Orange Combo participants showed better command of their ensemble roles and greater understanding of the concept of ensemble cohesiveness, even if they were still inconsistently performing as a unit. For example, after several attempts to get the ensemble together, they had a successful run, and spontaneously broke into applause at the end. This showed me that, unlike in Week 2, they recognized the difference between an unsuccessful and successful attempt.

Later in Week 5, Marcello initiated an exchange that showed how dramatically the ensemble’s understanding had grown around their musical relationships to each other and their awareness of the harmonic form. Participants not only identified their own roles and the roles of others in the ensemble but also pointed to the importance of those roles for following the form,



establishing ensemble cohesiveness, and keeping everyone's place in musical time. Their increased understanding was evident. What's more, the conversation began because a participant independently sought musical support from another member to better perform his own role. As in other excerpts, "SM" refers to me, the teacher/researcher:

*Marcello: "There was one thing. I didn't really hear Wyatt."*

*SM agrees and checks if Wyatt is plugged into the amp and if his volume is turned up.*

*SM: "Why is it so important to hear the piano?"*

*Marcello: "It keeps the beat."*

*SM: "It keeps the beat. Matt's keeping the beat, so why's the beat on the piano so important?"*

*Michael: "It has notes."*

*Richie: "You can keep track of it easier?"*

*SM: "You're keeping track of what?"*

*Joseph: "Time."*

*SM: "Yeah, time going by. Exactly. When you can't hear the chords, do you know what line you're on?"*

*Michael: "Nope."*

*Wyatt and Richie: "No."*

*SM: "If you heard the same chord the entire line, which [of the three] line[s] [of music] are you on?"*

*Wyatt's hand is up.*

*Richie is pointing to his music.*

*Michael: "The first one!"*



*SM: “If you heard a different chord every measure, which line are you on?”*

*Wyatt raises his hand.*

*Richie and Marcello point to their music.*

*Michael: “The bottom one.”*

*SM brings up the Week 2 discussion about the drummer and the form.*

*SM: “Why is so important for the drummer to know the harmonic form? To know that the chords are happening? The drummer’s not playing chords. Why would Christopher want to know what the chords are?”*

*Richie: “So he can keep time.”*

*SM: “Yeah, so he can keep track of where we are in time. What else?”*

*Wyatt interjects with an observation related to the previous part of the conversation about listening to other members of the ensemble to check for agreement.*

*Wyatt: “I was just gonna say, that happened with me not knowing where I was.”*

*Wyatt explains that he had an experience when he was playing chords for the second line but realized everyone else was playing musical material for the third line.*

This excerpt emphasized that through performing their ensemble roles, Orange Combo participants developed greater understanding of the harmonic form, which was essential to their improvisation achievement in the evaluated area of “harmony”.

In the second half of the instructional period, Weeks 7-12, the above improvements in the Orange Combo’s increased understanding of ensemble cohesiveness and harmonic form translated to observable improvements in group performance. In Week 8 there was only one instance of an ensemble tear, which participants immediately identified and diagnosed:



*Richie: "That was terrible."*

*Marcello: "Wait, you're already finished?"*

*Michael: "I don't think we're all at the same tempo."*

There were no ensemble issues for rest of Week 8. In Week 11, there was one incident in which the drummer turned the beat around (placed emphasis on the opposite beats than intended, which suggested to the rest of the ensemble that the first and third beats of the measure had shifted and that the measures were starting in a new place in musical time), but the ensemble listened to each other and got back together. I pointed to the Orange Combo's progress in my field notes for Week 10, reporting that "I feel like the Orange Combo is really coming together more than ever," and concluding in Week 12 that the Orange Combo may have "made the most progress as a group...in ensemble cohesiveness." This was not to suggest that other combos did not make progress, but that it was significant that a group of comparatively young, inexperienced players (the most 5<sup>th</sup> graders of any combo, and one of only two combos with no 8<sup>th</sup> graders) was able to perform as cohesively as groups of older, more experienced players.

Overall, the Orange Combo's growth in the mediating process of performing ensemble roles, especially around ensemble cohesiveness, was likely associated with their improved achievement outcomes. Over time, they showed increased understanding of and ability to perform tasks associated with the rhythm and harmony components of achievement. They were able to perform their roles and these tasks more accurately, consistently, and independently.

***Developing entitativity.*** The examples of the mediating process of developing entitativity, although limited, suggest that the potential for such development exists, and that the phenomenon may relate to motivation outcomes. Entitativity is related to a sense of belonging, but is larger than that; it includes individuals' perceptions of a group to which they belong as



being a cohesive whole, one in which the members possess a high level of relatedness to each other and work towards common goals (Stewart & Lonsdale, 2016). Although I did not formally anticipate that participants would develop a sense of entitativity, as a music educator who directs multiple ensembles, the concept was familiar to me. Therefore, I was not surprised to observe evidence of it in an ensemble in general, but rather to observe evidence of it emerging in a short period of time. Participants in the Yellow Combo displayed evidence of entitativity in two ways. In Week 2 Seamus asked if they could give themselves a “band name,” an idea which other members quickly latched onto. They settled on “Grandma and the Grumpies” and, per my field notes, referred to themselves that way in subsequent weeks. In Week 5, three of the six participants in the group referred to themselves as a “fam” or a “family.” This evidence is not extensive, but it is likely that the jazz combo setting, a small group in which individuals take on unique, but interrelated roles as they work towards common goals, was at least partly responsible for its presence.

**Design feature 2: Revealing “hidden” jazz improvisation practices.** In this section, I provide evidence to support the finding that the second design feature supported achievement, self-efficacy, and motivation outcomes. In this learning environment, revealing “hidden” jazz improvisation practices meant that the teacher (a) made musical elements characteristic of jazz and jazz improvisation strategies explicit; (b) guided participants through experimenting with these concepts, articulating ones they employed, and identifying ones others employed; (c) modeled these behaviors for participants; and (d) coached participants individually. These sub-elements of revealing “hidden” jazz improvisation practices were designed to make the teacher’s thinking visible to participants, who would in turn experiment with, articulate, and identify musical elements characteristic of jazz and jazz improvisation strategies. In addition to the



evidence presented directly below, the case study further below provides evidence to show how this design feature supported self-efficacy outcomes (“A case study in self-efficacy and achievement: Sam”). In this immediate section I focus on likely sources of outcomes, including modeling, scaffolding, and coaching, as well as evidence of participants engaging with jazz improvisation strategies. First, I establish that the learning environment was consistent for all participants, regardless of combo or condition. Second, I outline how the sub-element of modeling jazz improvisation strategies changed throughout the study. Third, I describe the presentation and use of scaffolds over time. Fourth, I briefly discuss how coaching changed over the 12 weeks of instruction. Fifth, and finally, I address the mediating processes associated with this design feature, describing the evolution of participants’ understanding and performance of improvisation strategies.

***Consistency in the learning environment.*** The videos and my field notes confirmed that although the conditions varied by instructional sequence, the core of instruction remained the same regardless of combo or condition. This core instruction was associated with two of the sub-elements of revealing “hidden” jazz improvisation practices: (a) making musical elements and improvisation strategies explicit, and (b) guiding participants through identifying and exploring musical elements and improvisation strategies. Per my lesson plans, and as observed in video recordings of the Yellow and Orange Combos, participants in both conditions experimented with the same jazz improvisation strategies and were afforded the same scaffolds in the same weeks of instruction (Table 17). The table below shows an instructional sequence of warm-up procedures, musical elements and vocabulary characteristic of jazz, improvisation strategies, and scaffolds. For clarity, the activities, concepts, strategies, and scaffolds appear in the table when I introduced them into the learning environment, and are not repeated later in the



table. As the teacher, however, I repeated the majority of the ideas in the table after their initial introduction into the learning environment, carrying them through the weeks of instruction.

*Table 17. Instructional Content by Week Introduced.*

<b>Week</b>	<b>Group - Tune(s)</b>	<b>Warm-ups</b>	<b>Content</b>	<b>Improvisation strategies</b>	<b>Scaffolds</b>
1	A - Impressions  B – Sonnymoon	Playing related dorian, blues, or mixolydian scales with quarter notes and swung 8 <sup>th</sup> notes	Swung rhythmic feel/ 8 <sup>th</sup> notes  Ensemble roles*  Head of the tune	Knowing the head of the tune	Play-along tracks for home practice  Suggested piano chord voicings  Suggested bass lines
2		Listening to professional recordings	Harmonic form  Root notes  Neighbor tones  Syncopation	“Root note rhythms” (creating rhythmic motives/phrases /variations using swung and syncopated rhythm patterns and root notes)  “One bar phrases” (orchestrating rhythmic motives/phrases on the drum set)	Chord tone sheets  Student rhythmic choice  One-bar phrases for drummers (Riley, 1996)  Cueing  Google slide illustrations of harmonic form
3		Looping swung and syncopated rhythmic motives and phrases, using chord tones, over the harmonic form (teacher and student generated)	Space  Chord tones  Passing tones  Chorus  Balance/ ensemble sensitivity	“Chord tone rhythms” (creating rhythmic motives/phrases /variations using swung and syncopated rhythm patterns and chord tones)	Animated chord tone video  Student melodic choice  Teacher and student singing/counting behind the soloist  Groups A and B listening collections of professional recordings



4	A – Cantaloupe Island  B – Blues in the Closet		“Question and answer” (creating melodic sequences)  “Drum set melody” (orchestrating the melody of the head of the tune on the drum set)	Student strategy choice
5				Community improvisation strategy space
6				
7	A - Sonny Moon  B – Impressions	Background figures  Trading 4s		“Blank” 12-bar, 16- bar, and 32-bar forms  Student arranging choice
8		Rhythmic displacement	Creating variations on the head of the tune  Creating rhythmic variations with strategic use of rests, displacement, and elasticity	Google slide illustrations of rhythmic variations
9			“Storyline” (creating rhythmic and melodic development, performing with expression)	Groups A and B listening collections of professional recordings



10	A – Cantaloupe Island  B – Blues in the Closet	Arrangements	
11			Student performance choice
12			

\* Ensemble roles refer to the typical “jobs” each player or section perform(s) as part of a jazz combo; e.g., the drum set player establishes the rhythmic feel, the bass player lays down a walking bass line, the guitar and piano player comp the chords of the harmonic form, and the horn players perform the melody of the head of the tune.

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Over the 12 weeks of instruction I introduced a variety of vocabulary and conceptual content, as well as 9 improvisation strategies (2 for all participants, 2 just for drummers, and 5 for all participants except drummers). All participants were introduced to major concepts, like “swing,” “harmonic form,” and “chord tones” in Weeks 1, 2, and 3, respectively. In Week 1 I established the importance of knowing the head of the tune to improvising. This meant that it was important for all players, even the rhythm section, to be able to sing and/or play the melody with the appropriate rhythmic feel (in this case, swing). In weeks 2-6 I introduced three primary strategies for horn, piano, and bass players: (a) creating swung and syncopated rhythmic patterns, motives, or phrases using root notes (“root note rhythms”); (b) creating swung and syncopated rhythmic patterns, motives, or phrases using all chord tones (“chord tone rhythms”); and (c) creating “question and answer” melodic sequences. As explained in detail in chapter 1, a chord is composed of chord tones, or notes; in this study participants interacted with seventh chords, which have four chord tones (root, third, fifth, and seventh). Many players built on the root note and chord tone strategies through using neighbor tones to move away from root notes and back, or passing tones to move between chord tones. In that same period, I introduced drummers to two related strategies in which they orchestrated rhythmic and melodic ideas using the various



tones they could produce with their drum kits (“one bar phrases” and “drum set melody”). Later strategies included creating variations on the head of the tune (the original melody), employing more sophisticated rhythmic ideas (e.g., rhythmic displacement), and engaging in melodic development and expression, which we called the “storyline” strategy.

Throughout the 12 weeks I consistently referred to strategies the same way, regardless of combo or condition. Strategies that participants and I referred to by name in class included “question and answer,” “one bar phrases,” and “storyline.” The names “root note rhythms” and “chord tone rhythms” are printed here to make it easier to refer to each strategy in subsequent paragraphs. In class, however, I presented and referred to those strategies more as a process than a name; for example, I typically referred to “root note rhythms” not as a name but as “creating rhythmic patterns using swung 8<sup>th</sup> notes and root notes” (Week 2). In a future iteration of this learning environment I would consider using the “root note rhythms” and “chord tone rhythms” names, in the hope that participants would then use the names of those strategies as they did with the “question and answer” and “storyline” strategies. The names better represented both aspects of melody: rhythm and pitch. I discuss this issue in more detail under the section further below titled “Articulating elements and strategies,” where I explain participants’ tendencies to articulate one element of melody without acknowledging the other.

**Modeling.** Participants’ need for modeling, a sub-element of the design feature “revealing ‘hidden’ jazz improvisation practices,” changed over time and was associated with achievement outcomes. The evidence presented in the previous section suggests that participants likely benefitted from strategies I introduced in class, making them explicit and guiding them through the strategies. Modeling, however, extended beyond introductions and guidance. As the teacher, it included singing, playing, and making my thinking visible around musical elements



and improvisation strategies. The need for modeling did not decrease by volume over time, but the need for certain types of modeling decreased quickly.

My perception of a change in participant needs, as evidenced by a change in my modeling behaviors, suggests a change in participants' achievement. The biggest difference I observed in types of modeling was between Week 2 and all the other weeks I reviewed (5, 8, and 11). In Week 2 I observed myself (a) singing examples of scales, chord tones, and swung rhythmic patterns, (b) playing examples of chord voicings, swung and syncopated rhythmic patterns, chord tones, and improvisation strategies, (c) articulating the improvisation strategies that I planned to use or had just used (as a model for what participants should do). For example, to introduce the "root note rhythms" strategy in Week 2, I said, "My strategy right now is to use these root notes, and when I'm done, you tell me what I did with the root notes...I told you part of my strategy, see if you can figure out the rest of it," and "I had a goal going in, that I wanted to use a lot of swung 8th notes, because I wanted to match the swing feel of the tune."

In Weeks 5, 8, and 11 I performed minimal modeling of musical elements characteristic of jazz; instead I almost exclusively engaged in the third type of modeling described in Week 2: articulating my own improvisation strategies. For example, in Week 5 I announced, "My strategy is going to be question and answer," and "My strategy is to try to do the question and answer thing we did last week. So if there are 4 lines to the tune, AABA, I'm going to have 4 questions and 4 answers." Week 8 I continued to articulate my own improvisation strategies, for example: "I'm switching my chord tones. I'm going to do thirds and sevenths," "I was trying to do a variation on the melody. I took the melody and I changed the rhythm a little," and "I really tried to use one of those ideas [about rhythmic variations and displacement]. I did the second one where I added rests to the melody I was doing." Because I was introducing a new



improvisation strategy in Week 8 (types of rhythmic variations and displacement), I also sang and played examples of these strategies. In Week 11 I exclusively modeled articulating my own improvisation strategies. For example, after a student in the Orange Combo reported attempting to improvise a variation on the melody of the head, I replied, “I tried to do that, too. I used this little thing,” pointing to a motive in the third line, and in the Yellow Combo I described how I attempted to shape my solo using the “storyline” strategy, “I was trying to have my climax be the highest notes I was playing, or the loudest.” Later I modeled how I might use dynamics and rhythmic density to approach the same strategy.

In both Weeks 8 and 11 I primarily articulated my improvisation strategies after I had already used them, as opposed to announcing my intentions before I began. In my field notes for this time period I recorded my intention to fade the process of always prompting participants to articulate their strategies out loud before they started. Instead, I began asking them to articulate their strategies after the fact. I followed this procedure up with asking participants if they found themselves formulating strategies prior to improvising even when I did not specifically ask them to articulate them out loud. In my field notes I recorded that participants reported that they did.

As a sub-element of “revealing ‘hidden’ jazz improvisation practices,” modeling played a role in achievement outcomes. Initially it supported participants in their need for examples of musical elements characteristic of jazz, but ultimately it served to make the teacher’s thinking around improvisation strategies visible. The later section titled “Participants engagement with strategies” details participants’ interactions with these strategies, including the mediating processes they performed in response to “revealing ‘hidden’ jazz improvisation practices.”

***Scaffolding.*** Unlike modeling, I did not observe a change in the need for or use of most scaffolds over time, but participants’ continued use of scaffolds suggests that they were related to



achievement, self-efficacy, and motivation outcomes. Throughout the study participants used a variety of scaffolds, introduced in specific weeks as indicated in the previous table (Table 17). Cognitive scaffolds included printed, audio, and video materials, and are described in the first section. After a lengthy analysis of one of the cognitive scaffolds, motivational scaffolds are addressed in the second section. These included group singing and counting activities, as well as a related motivational element: choice. Choice was not a scaffold per se, but was an element intended to support motivation that required scaffolding.

*Cognitive scaffolds.* Participants' continued use of cognitive scaffolds suggested to me that they found them useful, that they were likely sources of achievement, and that participants were motivated to attempt improvisation tasks and felt higher self-efficacy when they had their support. Printed scaffolds included playing assignment graphic organizers and chord tone sheets that I created myself, suggested piano voicings and bass lines from "The Real Easy Book" (Zisman, 2003), "one bar phrases" and graphic form organizers from the John Riley (1994) drum set book, and "blank" graphic form organizers I made. Participants posted improvisation strategies for their own reference in community spaces (paper posters), which acted as both a mediating process (articulating improvisation strategies) as well as a "make your own" scaffold. Participants also had access to a variety of media-based scaffolds for use at home. First, they had access to Google Slides illustrating harmonic form and various rhythmic concepts. I initially presented these in direct instruction and in subsequent weeks displayed single slides on the SmartBoard for participants to reference. Participants also had home access to a video I made about chord tones, links to listening collections of professional recordings of the tunes they were studying, and play-along tracks that their parents purchased for home practice. These play-alongs featured rhythm sections looping the harmonic forms of the four tunes we studied in class,



to which participants could practice the head of the tune or improvise. Piano and bass players were able to adjust the right and left channel audio output to eliminate hearing their own instrument in the play-alongs. Because drum set players did not have this option, I used Sibelius notation software to make play-alongs with only a bass line and the melody.

I recorded evidence of participants using scaffolds in the transcripts and my field notes. On the videos I observed participants taking out printed scaffolds before and during class, looking at their music stands, on which they had the printed scaffolds, and asking for extra copies if they had not brought theirs. In my field notes, I recorded multiple occasions on which participants asked for a chord tone sheet because they had arrived at their recording session without one. The following paragraphs describe participant's use of two of the non-printed cognitive scaffolds, ones that I did not prepare ahead of time, in more detail. I start with cueing, a scaffold upon which participants showed a decreased reliance over time, and conclude with an analysis of the improvisation strategy posters. These were intended as a cognitive scaffold, but ultimately revealed evidence of students performing the mediating process of articulating strategies, which was associated with achievement outcomes.

*Cueing.* Cueing—a cognitive scaffold that was associated with achievement and self-efficacy outcomes—was the one scaffold that occurred less frequently over time. I made a conscious effort to fade cueing so that I did not continue to do it when participants no longer needed it. Cueing involved me physically indicating to a participant, with a conducting gesture or a nod of the head, that the previous soloist was finishing a chorus and the new participant's turn was beginning. The purpose of this scaffold was to assist participants in following the form while improvising or when waiting for a turn to improvise. The hope was that participants would become successful enough following the harmonic form that they would not need cueing



and would instead end their improvised solo at the end of the form or enter for their solo at the beginning. Ultimately, if participants got to a point at which they were choosing whether to solo over one or more choruses, I hoped that they would cue each other through communicating musically or non-verbally. I cued almost every soloist in Week 2, and only some soloists in Week 5. Most of the soloists who I cued looked to me for assurance about when to enter, which typically happened when the previous soloist got lost in the form (got lost and stopped, went on too long, or ended early). When we were working on new tunes in Week 8, plus a new concept, trading 4s, I again cued most participants, even counting 4s for some of them. In Week 11, however, I cued very infrequently; I cued a drum set player who misplaced ensemble hits in the head of the tune, and several times I cued one soloist following another soloist who got lost in the form. Participants' decreased reliance on me for cueing suggested to me, as the teacher, that they felt self-efficacious enough to follow the form themselves. Regardless of the participants' estimation of their ability to follow the form, my agreement that they actually did not need the cueing at a certain point suggested to me that they were making achievement gains.

*Improvisation strategy posters.* As described above, participants posted improvisation strategies for their own reference on paper posters (one per combo), which was intended as a "make your own" scaffold activity (Figures 26-31). Ultimately, these posters also provided evidence of participants articulating improvisation strategies, a mediating process associated with achievement outcomes. Combos made the first set of posters in Week 5, and in subsequent weeks I reposted each combo's poster prior to that class time (the Week 5 Yellow Combo poster is edited to show a participant's pseudonym instead of her actual name). Participants made a new set in Week 10 and I reposted those until instruction ended. I participated in the posters in Week 10, writing either "Improvise swung rhythmic patterns using



chord tones” or “Question and answer with chord tones,” and during a group discussion about one poster I wrote ideas the group discussed (specifically, “swing” to clarify a student’s “8<sup>th</sup> notes” and “range” to describe a student’s “octaves”).

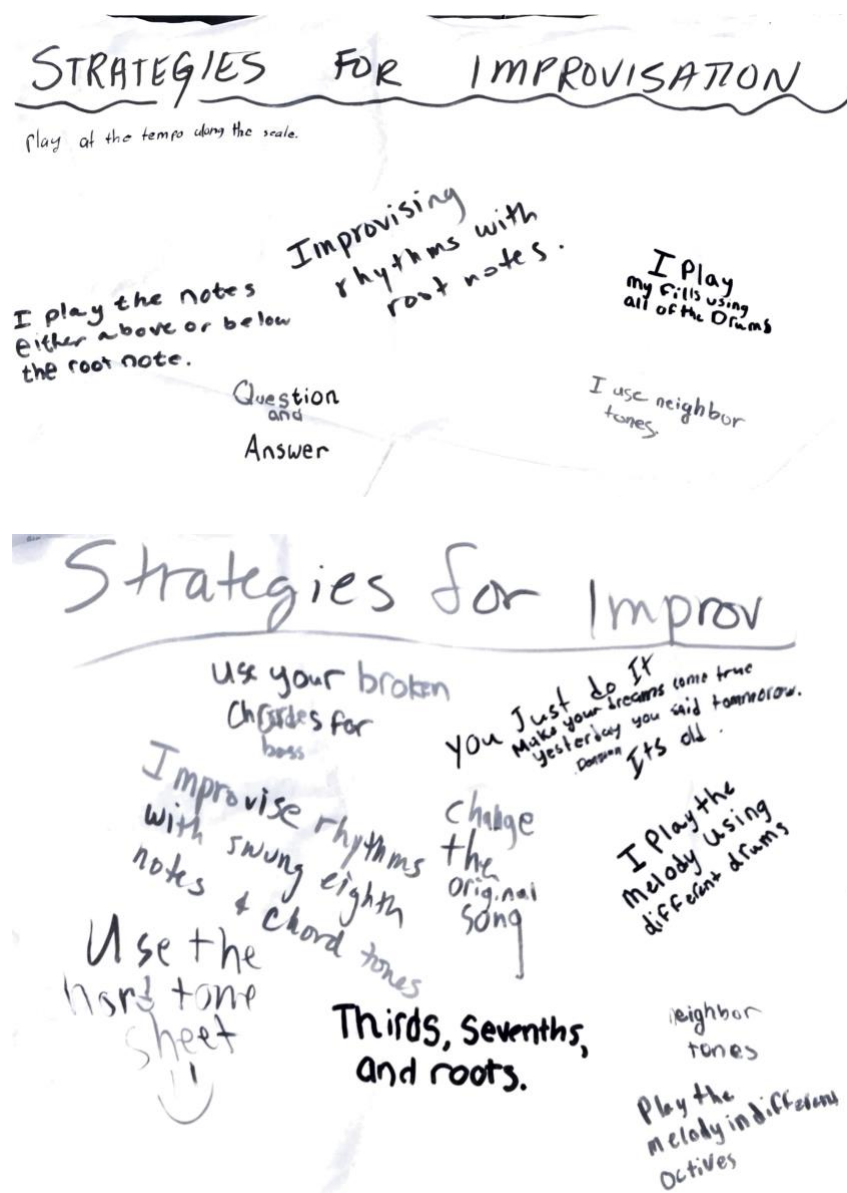


Figure 26. Red combo community improvisation strategy spaces Weeks 5 and 10.





Figure 27. Orange combo community improvisation strategy spaces Weeks 5 and 10.



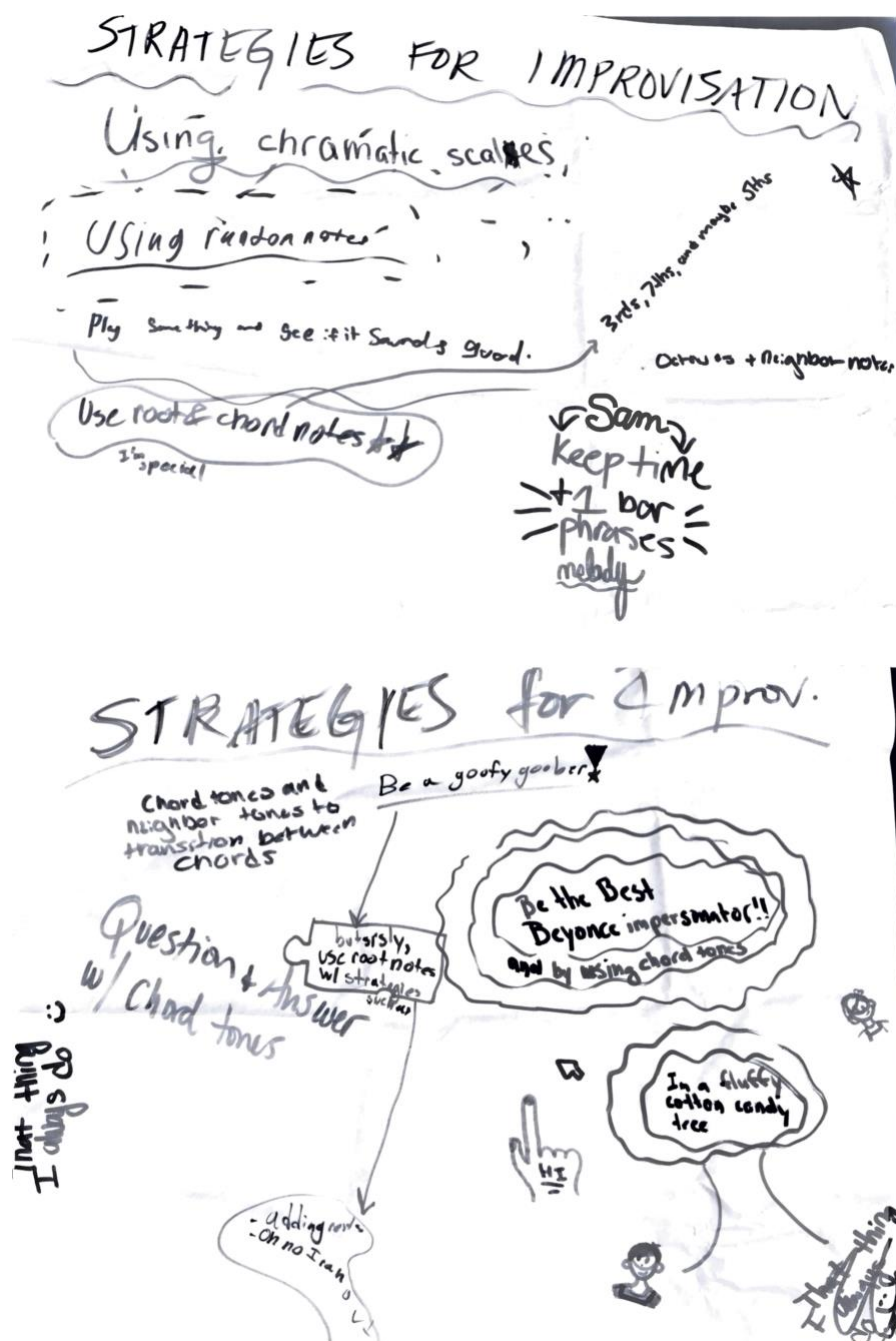


Figure 28. Yellow combo community improvisation strategy spaces Weeks 5 and 10.



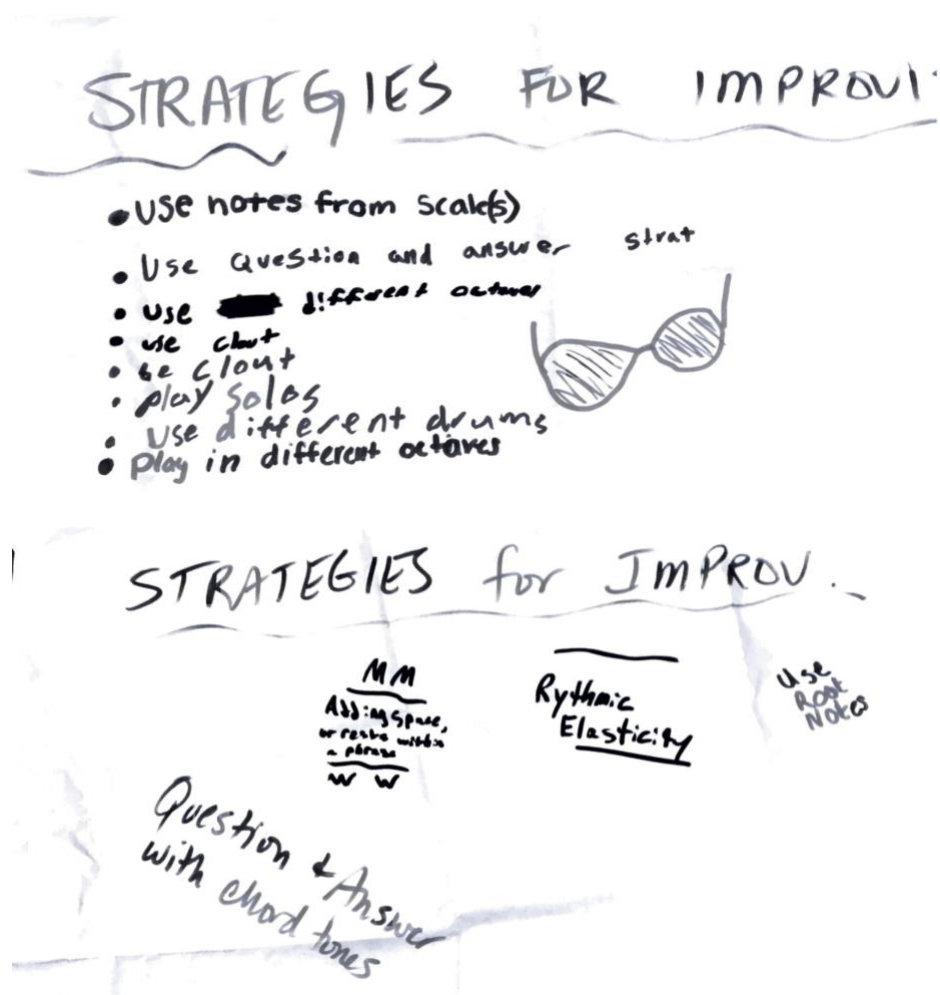


Figure 29. Green combo community improvisation strategy spaces Weeks 5 and 10.



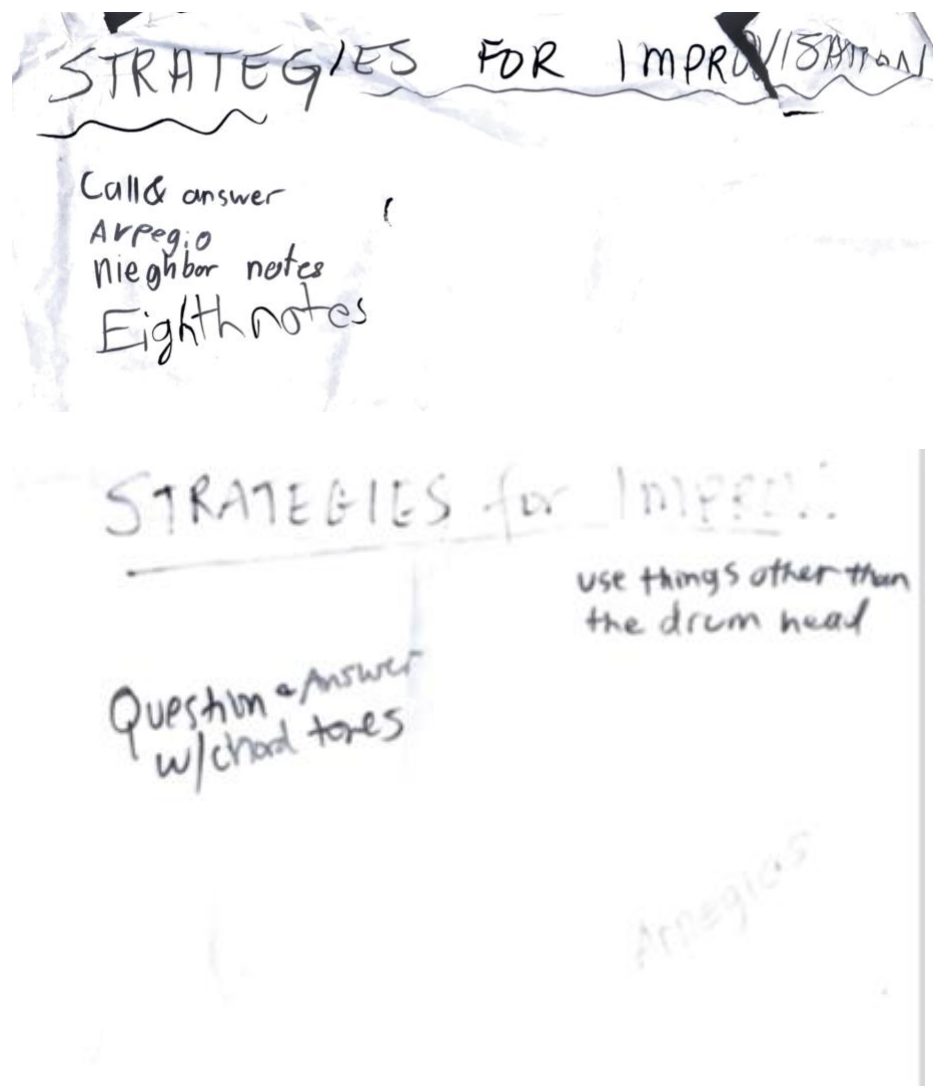


Figure 30. Blue combo community improvisation strategy spaces Weeks 5 and 10.



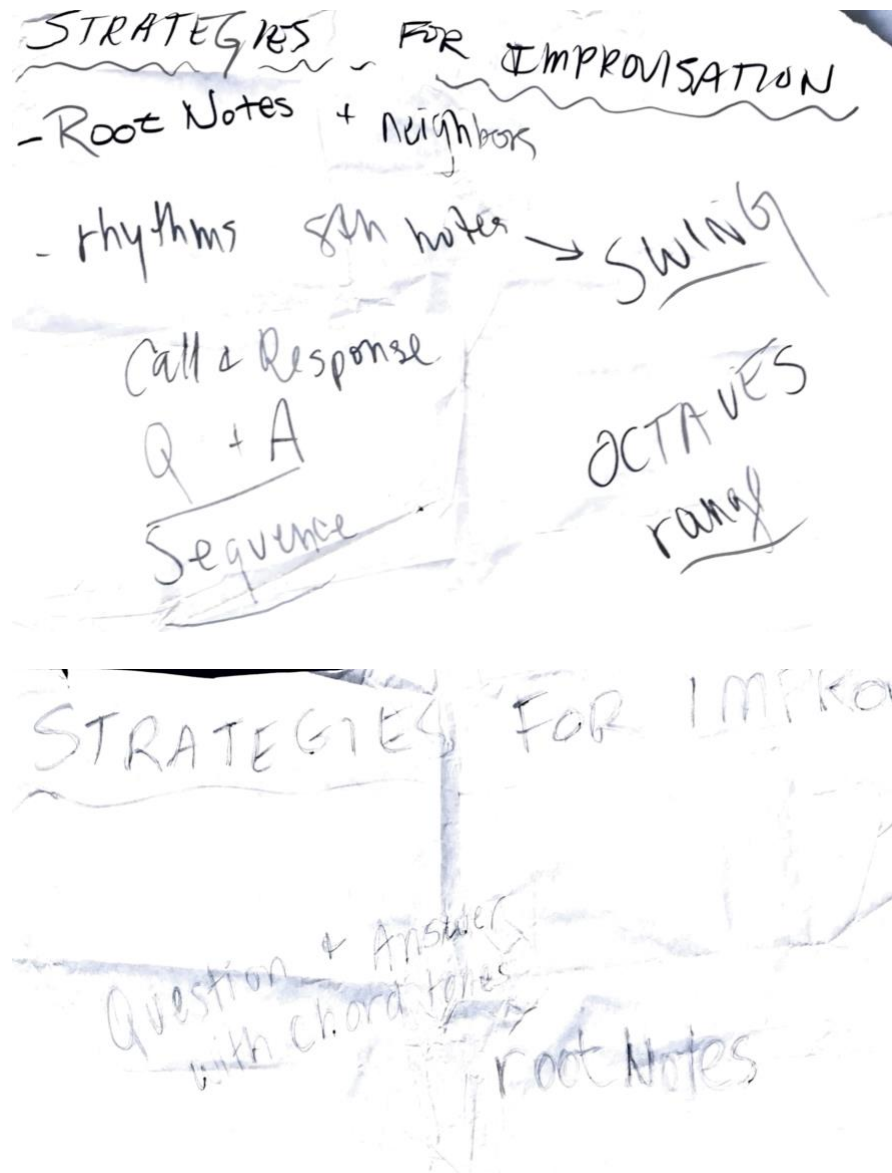


Figure 31. Purple combo community improvisation strategy spaces Weeks 5 and 10.

When I analyzed the posters, I found that participants (a) wrote strategies we learned in class as well as ones that were related, but not explicitly introduced in class, (b) cited full strategies but also parts of strategies or related concepts, and (c) overwhelmingly focused on pitch choice (Table 18). Overall, readers will notice that participants did not always use the terms that I used to introduce or talk about the strategies. For example, instead of writing “variations on the head of the tune,” they wrote “change the melody” or “change the original



song.” Although I would have liked them to use vocabulary jazz musicians use, describing a strategy in their own words suggested to me that they truly understood what the strategy meant, and were not just parroting the name of it back to me. First, “variations on the head of the tune” was an example of a strategy that I introduced in class and participants also wrote on the posters. They wrote other strategies, such as using scales and arpeggios, which were not explicitly introduced in class, but which suggested that participants were making connections between other concepts and potential improvisation strategies. I did not introduce using scales as an improvisation strategy, but we did use scales for some warm-ups, discussed their relationships to chords, and covered the concept of passing tones (a type of non-chord tones that can come from scales). I also did not introduce arpeggios as an improvisation strategy, but they are related to chord tones, and I recorded in my field notes that some participants made this connection on their own.

*Table 18. Community Improvisation Strategy Spaces.*

Poster week	Strategy or concept (week introduced)	Written statement (combo)
5	Rhythmic feel and basic rhythmic variations (Weeks 1 and 2)	1. Use different rhythms in each measure (Orange) 2. Eighth notes (Blue) 3. Rhythms (Purple) 4. 8 <sup>th</sup> notes (Purple) 5. → swing (Purple, SM)
10		6. Improvise rhythms with swung eighth notes + chord tones (Red, SM) <i>cross referenced under “root note rhythms”</i> 7. Improvising swung rhythmic patterns using chord tones (Orange, SM) <i>cross referenced under “root note rhythms”</i>
5	“One bar phrases” (Week 2)	1. I play my fills using all of the drums (Red) 2. Do not keep time while playing different drums (Orange) 3. Keep time + 1 bar phrases (Yellow) 4. Use different drums (Green)
10		None



5	“Root note rhythms” and	1. Improvising rhythms with root notes (Red, SM)
10	“Chord tone rhythms” (Weeks 2 and 3)	2. Improvise rhythms with swung eighth notes + chord tones (Red, SM) <i>cross referenced under rhythmic feel</i> 3. Improvising swung rhythmic patterns using chord tones (Orange, SM) <i>cross referenced under rhythmic feel</i>
5	Root notes and other	1. Used root & chord notes → 3rds, 7ths, and maybe 5ths (Yellow)
10	chord tones (Weeks 2 and 3)	2. Root notes (Purple) 3. Use your broken chords for bass (Red) 4. Thirds, sevenths, and roots (Red) 5. Use the chord tone sheet (Red) 6. Use chord tones (Orange) 7. Chord tones and neighbor tones to transition between chords (Yellow) <i>cross referenced under neighbor tones</i> 8. Use root notes w/strategies such as adding rests (Yellow) <i>cross referenced under more advanced rhythmic variations</i> 9. Be the best Beyonce impersonator!! and by using chord tones (Yellow) <i>cross referenced under style and expression</i> 10. Use root notes (Green) 11. Root notes (Purple)
5	Neighbor tones and passing tones (Weeks 2 and 3)	1. I play the notes either above or below the root note (Red) 2. I use neighbor tones (Red) 3. Use neighboring notes (Orange) 4. Octaves + neighbor notes (Yellow) <i>cross referenced under range</i> 5. Neighbor notes (Blue)
10		6. + neighbors (Purple, SM*) 7. Neighbor tones (Red) 8. Chord tones and neighbor tones [passing tones] to transition between chords [chord tones] (Yellow) <i>cross referenced under chord tones</i>
5	Scales and arpeggios ( <i>not explicitly introduced as a strategy;</i>	1. Play at the tempo along the scale (Red) 2. Use notes from the scale (Orange) 3. Using chromatic scales (Yellow)
10	<i>related to chord tones and passing tones</i> )	4. Use notes from scale(s) (Green) 5. Arpeggio (Blue) 6. Arpeggios (Blue)



5	“Question and answer” (Week 4)	1. Question and answer (Red) 2. Use question and answer strat[egy] (Green) 3. Call & answer (Blue) 4. Call & response (Purple) 5. Q+A, sequence (Purple, SM)
10		6. Question + answer wchord tones (Yellow, SM) 7. Question + answer with chord tones (Green, SM) 8. Question + answer w/chord tones (Blue, SM) 9. Question + answer with chord tones (Purple, SM)
5	“Drum set melody” (Week 4)	<i>None</i> 1. I play the melody using different drums (Red)
5	Variations on the head of the tune (Week 8)	<i>None</i> 1. Change the original song (Red) 2. Change the melody (Orange)
5	More advanced rhythmic variations (Week 8)	<i>None</i> 1. Adding space, or rests within a phrase (Green) 2. Rhythmic elasticity (Green) 3. Use root notes w/strategies such as adding rests (Yellow) <i>cross referenced under root notes</i>
5	Range ( <i>not explicitly introduced; related to style and expression</i> )	1. Octaves + neighbor notes (Yellow) <i>cross referenced under neighbor tones</i> 2. Use different octaves (Green) 3. Play in different octaves (Green) 4. Octaves (Purple) 5. Range (Purple, SM)
10		6. Play the melody in different octaves (Red)
5	Style/ expression (related to “storyline” strategy in Week 9)	1. Use clout [a joke that combo’s participants used to describe an attitude of performing with authority] (Green) 2. Use things other than the drum head (Blue) 3. Be the best Beyoncé impersonator!! and by using chord tones (Yellow) <i>cross reference with chord tones</i>



5	Other	1. Using random notes play something and see if it sounds good (Yellow)
		2. Play solos (Green)
10		3. You just do it, make your dreams come true (Red)
		4. Use different notes (Orange)
		5. That thing I always do (Yellow)

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Second, participants wrote full strategies on the posters, such as “question and answer,” but also partial strategies, such as the separate rhythm and pitch elements of “root note rhythms” and “chord tone rhythms”. For example, the strategy “root note rhythms” is meant to create rhythm patterns using root notes, but participants wrote “root notes” or “use different rhythms in each measure.” As the teacher, I was the only person to write the full “root note rhythms” and “chord tone rhythms” strategies on a poster, and I did not do this until Week 10. I considered writing a full strategy on the Week 5 posters, as a model, but decided against it for two reasons: the posters were intended as a student space and student-made scaffold, and I was also interested in knowing about participants’ thinking. I discuss this phenomenon of separating melodic strategies into separate components (rhythm and pitch) in more detail below, under the heading “articulating elements and strategies.”

The third and final finding regarding the posters was that participants overwhelmingly focused their strategies on pitch choice. Week 5 posters contained a total of 32 student-written strategies (min = 4, max = 7), with an average of 5.3 strategies per poster. Week 10 posters contained a total of 22 strategies (min = 1, max = 8), with an average of 3.6 strategies per poster. Overall, there were 54 total student-written strategies written on all of the posters (min = 1, max = 8), with an average of 4.5 strategies per poster. First, out of this 54 strategy total, participants wrote 1 to 4 examples each of strategies like “drum set melody,” “question and answer,” and “variations on the head of the tune.” Second, participants wrote 11 total examples of strategies related to rhythm, which were 20.4% of the total strategies. I organized rhythmic strategies into



three categories: (a) rhythmic feel and basic rhythmic variations; (b) more advanced rhythmic variations; and (c) “one bar phrases.” Third, participants wrote 23 examples, or 42.6% of the total, of pitch-related strategies. Like the rhythmic strategies, I organized tonal strategies into three categories: (a) root notes and other chord tones; (b) neighbor tones and passing tones (non-chord tones); and (c) scales and arpeggios. These totals show that participants were focused on pitch (42.6%) over rhythm (20.4%), but does not necessarily reveal why. The available evidence does not suggest whether their focus stemmed from interest (perhaps they considered pitch-related concepts more engaging as compared to other concepts) or need (perhaps they considered pitch-related concepts more useful improvising tools than other ideas). It is important to note that the printed scaffolds I provided were very pitch-heavy, primarily because interpreting chord symbols and following the harmonic form were concepts with which participants had the least experience and existing knowledge.

*Scaffolding motivation.* Aside from the cognitive scaffolds described at length above, participants had access to two kinds of motivational supports in class that were likely sources of motivation and achievement. One, “choice,” was not a scaffold itself, but an element of the learning environment that I scaffolded for participants. The second, “group singing,” was a motivational scaffold I enacted in response to participant behavior in class. Choice is inherent in improvisation because it is a creative, spontaneous act of composition. To take advantage of the motivational aspect of choice, but avoid the potential of overwhelming participants with too much choice, I presented opportunities for limited individual choice early in the instructional period. For example, when we practiced “root note rhythms” in Week 2, participants had to use root notes but could choose their own rhythmic ideas. In Week 3 I offered them melodic choices, and by Week 4 they were able to choose their own improvisation strategies. In the



second half of the instructional period, Weeks 7-12, I offered opportunities for group choice. Starting in Week 7 participants made their own lead sheet arrangements, choosing when and how to perform background figures and arranging special endings to their performances. These two activities are explained in more detail above, under the section titled “Design feature 1: Forming jazz combos.” Finally, I encouraged a collection of group singing and counting activities starting in Week 3. Per my field notes, I noticed that, before I formally introduced background figures in Week 7, horn players sometimes seemed unengaged when they were not improvising (rhythm section players were already always playing). As a response, I sometimes suggested that horn players sing root notes, play them quietly, or count measures in the form out loud during other participants’ improvised solos. I anticipated that this would motivate them to stay engaged as well as give them extra practice following the form. In my field notes I reported that I used this “sparingly,” because I wanted to keep horn players engaged but not distract soloists. On one occasion in Week 5, this scaffold appeared to motivate a participant in an unexpected way; instead of distracting this soloist, it seemed to motivate her to persist in the face of difficulty. The support of her peers singing and counting appeared to help her through her performance. This event is described in more detail in the section titled “A case study in self-efficacy and achievement: Sam.”

***Coaching.*** Coaching was a design feature sub-element, an activity associated with achievement and self-efficacy outcomes in which I interacted with individual participants to assist them in performing a variety of musical tasks. Some musical tasks included performing ensemble roles: I coached (a) horn players with rhythms, rhythmic feels, and pitches in the heads of tunes; (b) piano players with hand positions, fingerings, and transitions between chord voicings, as well as comping patterns; (c) bass players with performing bass lines, establishing



the pulse, and staying together with the drummer, and (d) drummers with performing a swung rhythmic feel. Other musical tasks included implementing improvisation strategies. Coaching involved both talking and playing; when I coached drum set and piano players we often switched seats like we might in a private lesson. Coaching events were brief; they had a narrow focus on either (a) a task a participant could achieve quickly (e.g., a horn player more accurately performing a melodic phrase) or (b) a concept or skill for which a participant could increase understanding or performance, enough so to continue working independently towards mastering that concept or skill (e.g., a drummer performing a swung rhythmic pattern on a cymbal). After I coached a participant, I typically left that player to continue working independently while I coached another participant. Other times we transitioned back to playing as a group again so that participants could practice applying coaching ideas. When I was coaching an individual participant during class, the majority of other participants would work on their own, but sometimes another participant or participants would observe the coaching.

When I reviewed instances in which I initiated coaching or a participant sought coaching, I found that these instances decreased over time. I observed in the Yellow and Orange Combo videos that they decreased by half from Week 2 to Week 5 (18 to 9 instances), decreased by more than half from Week 5 to Week 8 (9 to 4 instances), and remained at that level from Week 8 to Week 11. The majority of coaching that I initiated or that students sought was for assistance with performing ensemble roles and musical elements characteristic of jazz (e.g., piano comping, drum set swung rhythmic feel, horn melodic and rhythmic content in the head of the tune, swinging 8<sup>th</sup> notes). The decrease in coaching over time suggests that participants were achieving at higher levels and with more independence, and that they possessed higher self-efficacy to perform musical tasks associated with improvising.



*Participant engagement with strategies.* The evidence below, associated with achievement and self-efficacy outcomes, illustrates two findings: (a) that participants' understanding and performance of musical elements characteristic of jazz and jazz improvisation strategies increased almost immediately, and (b) participants continued to engage with musical elements characteristic of jazz and jazz improvisation strategies throughout the 12-week instruction period. In the paragraphs below I provide evidence of participants performing mediating processes from my embodied conjecture that were connected to the design feature of revealing "hidden" practices, specifically, the sub-elements of that feature in which the teacher makes elements and strategies explicit, guides students through identifying and exploring them, and models strategy articulation. The sections are organized by the three mediating processes in which I predicted that participants would engage: (a) experimenting with musical elements and strategies presented in class; (b) articulating musical elements and improvisation strategies they intended to employ, had employed, or were trying to employ; and (c) identifying strategies they heard other improvisers employ. An extension of each mediating process was exhibiting the same behaviors, but with strategies not presented in class.

Participants began the study with little to no conceptual understanding of improvisation, but in the first few weeks of the instructional period they began developing an understanding of key musical concepts and engaging with improvisation strategies. The rapid pace with which this growth occurred matches the quantitative results of the study, which involved significant gains for all outcomes in the first 6 weeks of the 12-week instructional period. Considered in the context of the modeling, scaffolding, and coaching described above, this body of evidence further substantiates the finding that the second design feature supported study outcomes.



*Experimenting with elements and strategies.* I found that participants: (a) began successfully performing the mediating process of experimenting with improvisation strategies as early as Week 2; and (b) continued to experiment with strategies throughout the 12-week instructional period, but focused on those introduced in Weeks 1-6. The mediating process of experimenting with improvisation strategies was associated with the design feature sub-elements of making strategies explicit and guiding participants through exploring strategies.

Participants began experimenting with improvisation strategies as soon as I introduced them. In my field notes for Week 2 at School X I recorded that “for the most part, everyone seems to get the idea about the first strategy [‘root note rhythms’]” and that “for most of the drummers, all of this seems very new, but the ‘one bar phrases’ is helpful. A student I know to be sometimes paralyzed at the thought of soloing said she actually had ‘fun.’” In the same week at School Y, I wrote that “Most of the musicians are using the given strategies [of ‘root note rhythms’ and ‘one bar phrases’], making their own choices, building on them, etc.” In Week 3 I recorded my impressions that two 5<sup>th</sup> grade trombone players at School X, who had no jazz or jazz improvisation experience, were “doing well with the strategies [of ‘root note rhythms’ and ‘chord tone rhythms’] as well as adding stylistic ideas characteristic to their instruments” and that “overall, all the younger players seem to understand the strategies [of ‘root note rhythms,’ ‘one bar phrases,’ and ‘chord tone rhythms’].” It was only Week 3, but at School Y, two participants were already experimenting with strategies of their own. Two saxophone players conspired to use parts of a “Wii” theme song for their improvised solo, which they quickly realized did not fit the harmonic form or the rhythmic feel of the tune we were studying. One of them quickly came up with a more musically appropriate idea, drawing melodic content from arpeggios, an idea that came up in several other combos as well. I wrote that the other



saxophone player “reports that he has no strategy or that he plans to play random notes, but when pressed, is using given strategies.” As a teacher, I was impressed that in Week 3 participants were both employing given improvisation strategies as well as experimenting with their own.

Participants successfully experimented with improvisation strategies, as described above, despite entering the study with little understanding of jazz improvisation as a concept, and little to no strategies for how to perform jazz improvisation. I therefore attribute their quick progress to my efforts to make “hidden” practices visible. The following excerpts from the Yellow and Orange Combos establish that participants generally lacked understanding of improvisation before taking this class and before I introduced the first improvisation strategies, “root note rhythms” and “one bar phrases,” in Week 2. The excerpts serve as a point of comparison for participants’ increased understanding and mid-instruction achievement gains. These Week 2 conversations stemmed from my desire to know how participants had approached making their pre-instruction recordings, so that I could meet them where they were in their conceptual understanding. The conversations also served as a segue to presenting the first jazz improvisation strategies: “root note rhythms” for most participants, and “one bar phrases” for drummers. They highlight participants’ varying understanding of improvisation in Week 2, with some participants showing a complete lack of conceptual understanding and others an incomplete but insightful concept (e.g., “Making something up,” “Expressing your feelings through music,” and “Making your own melody.”). Some participants reported having no strategy when at their pre-instruction recording; others reported that they played “random notes,” “took notes from the scale,” “use[d] notes from the song,” “stuck to the basic rhythm,” or “match[ed] the beat of what the recording was.” Except for playing “random notes,”



participants' ideas showed good musical instincts with potential to develop into strategies. The first excerpt is from the Yellow Combo in Week 2:

*SM: "I need to ask you a question first. To you, what is improvising jazz?"*

*Sam: "Making something up."*

*Seamus: "Oooo...making something up based on whatever you play."*

*Noah: "Expressing your feelings through music."*

*SM: "I like that."*

*Tomas: "Making your own multiple choice question through music." Tomas giggles.*

*SM: "That's an analogy there, Tomas. I haven't heard that one before!"*

*Sam and Seamus applaud.*

*Sam: "Using your notes as your words."*

*SM: "Okay – gosh!"*

*Ruby: "Using your own, creating your own melodies or harmonies based off of what you see and to elaborate upon it."*

*Sam: "We're all citing different variations of the same thing."*

*SM: "Yeah, but that's actually kind of like you're improvising!"*

*Seamus: "I have another one! Doing something random and you don't know if it's right or wrong!"*

*Everyone laughs or smiles.*

*SM: "That gets to the heart of, I think, how sometimes we feel when we're improvising. When you went into your recording with me the first time, what were your strategies to improvise?"*

*Seamus: "Play random notes and see if it sounds right." Seamus laughs.*



*Multiple people smile around the room.*

*Noah: "Looking at the bottom lines and basically playing the notes multiple times."*

*SM: "So you took notes from the melody?"*

*Noah: "Yeah."*

*Seamus: "Repeating the same thing over and over and expecting it to sound good."*

*Tomas: "I tried to, like, I stuck to the basic rhythm."*

*Sam: "I actually didn't even improvise. I just played!"*

*SM tries to recap: "You made up a bunch of notes, you did notes from the melody, you did that too but you also did random notes, you said? Seamus said something important.*

*He said, playing random notes, but then listening to see if it sounds good."*

*Sam: "I didn't play, which is the wrong thing to do! Make sure you improvise, kids!"*

*SM: "You kept time."*

*Sam: "I kept time. I did my one fill." Sam demonstrates.*

The second excerpt is from the Orange Combo in Week 2, and reveals a similar conversation to the one in the Yellow Combo in the same week:

*SM: "My first question to you is, what is your impression of what improvising jazz is?"*

*Wyatt and Richie raise their hands.*

*Wyatt: "It's like using the scale to play whatever note you can with the melody."*

*SM: "Okay, I like that you're using the word melody, because you are going to create your own melody when you improvise."*

*Michael: "You're using the notes from the song, and then, like you said before, making your own melody."*

*SM nods.*



*Susanna is playing while everyone is talking.*

*Michael: "But all the other instruments would be playing softer, so..." Michael pauses and gestures to the rest of the combo.*

*SM: "That's true, because it's a solo, so you come out above, and other things are supporting you."*

*SM: "Both of you mentioned places to get notes from. You mentioned the scale, you mentioned the melody, the original, the head of the tune, those are good things."*

*SM: "Did any of you have a strategy when you went into your first recording?"*

*Michael: "I took notes off of the scale."*

*Wyatt: "Me too."*

*SM: "Did anyone else have a strategy?"*

*Richie and Joseph shaking their heads*

*SM: "Christopher has a totally different job. What was your strategy?" SM looks at Christopher.*

*Christopher: "I just tried to match the beat of what the recording was, and then make some other moves in time."*

*SM: "I think matching is a good word, because whenever we're improvising there's always something we want to match. For example, if this is a swing tune, do you want to improvise in a rock style?"*

*Several people murmur, "No."*

*SM: "No, because you want to match, you want to play swung 8<sup>th</sup> notes and you want to match the rhythmic feel of the tune."*



Overall, these conversations establish a baseline for what participants understood about improvisation and which tools they possessed for improvisation when they entered the class. They suggest that an important source of participants' achievement gains was the second design feature of "revealing 'hidden' jazz improvisation practices."

As the weeks went on, participants experimented with improvisation strategies presented in class as well as their own strategies, but primarily focused on strategies introduced in Weeks 1-6. In my field notes and in the Yellow and Orange Combo transcripts of Weeks 5, 8, and 11, I primarily recorded evidence of participants: (a) continuing to use strategies from Weeks 2 and 3 ("root note rhythms," "chord tone rhythms," and "one bar phrases") and (b) engaging with Week 4's "question and answer" and "drum set melody" strategies. Participants did not show much interest in creating variations on the head of the tune, which I introduced it in Week 8; I presented it as an option but did not insist that they try it, and no one did that week. I recorded one instance of Marcello trying variations on the melody in Week 11, which he reported "didn't work" because he "picked the wrong notes." I showed him the melodic motive I had chosen to employ that strategy, and suggested he choose one of his own and try again. In the Yellow and Orange transcripts I only recorded two participants, Ruby and Noah, actively experimenting with the more advanced "storyline" strategy after its initial Week 9 introduction (Yellow, Week 11). Overall, in my field notes and in transcripts I recorded that most participants tried new strategies in Weeks 6-12 but ultimately went back to experimenting with previous strategies from Weeks 1-6, usually "question and answer" or one of the variations of "root note rhythms" and "chord tone rhythms." Some participants simply stuck to one or two strategies the entire 12 weeks; one notable participant who did this was Susanna, a bass player, who is profiled later in this chapter. She primarily experimented with "root note rhythms" and its neighbor tones variation. The



Orange Combo drum set player, Christopher, stuck to two strategies, too, likely because I introduced two strategies that were specifically for drummers (“one bar phrases” and “drum set melody”). The Yellow Combo drummer, Sam, who is profiled later in this chapter, experimented with combining the two drum set strategies or combining one drum set strategy with a general strategy (e.g., “[My strategy is] one bar phrases with question and answer, and maybe some melody if I run out of ideas,” Sam, Yellow Combo, Week 5). Finally, I also recorded evidence of participants trying their own strategies, such as using scales (Richie and Wyatt, Orange, Week 5), getting rhythmic ideas from the theme to the school musical (Tomas, Yellow, Week 5) and from the head of a different tune (Christopher, Orange, Week 5), basing an improvisation off of an original motive (Marcello, Orange, Week 8), and embellishing another strategy with a trill, which is a stylistic element characteristic of a woodwind instrument (Noah, Yellow, Week 8; Joseph, Orange, Week 11). One participant, Seamus, who is profiled later in this chapter, almost exclusively experimented with his own strategies.

Ultimately, participants’ primarily experimenting with the improvisation strategies presented in the first half of the instructional period suggests that these strategies were also the likely source of their achievement gains. Because they were afforded the choice of which strategies to use, their choice showed that they were most motivated to employ the Weeks 1-6 strategies, and that they likely felt most self-efficacious when working with those strategies. It also suggests that perhaps there is a “limit” to how many strategies a teacher can effectively introduce in a 12 week period. In a future iteration of this learning environment I would consider either limiting the number of strategies I introduced, or focusing on a more limited number overall but presenting more advanced strategies to individuals, based on interest and readiness.



*Articulating elements and strategies.* The findings for this mediating process suggest that although participants did not engage in strategy articulation exactly as anticipated, the way in which they did articulate strategies was effective. This mediating process was associated with the design feature sub-element of modeling strategy articulation and encouraging participants to do the same. During the same time period as the excerpts above, in which participants experimented with improvisation strategies, most participants did not fully articulate their improvisation strategies. The excerpts below show that most participants articulated a part of a strategy, either the part concerning which pitches they planned to play or which rhythms. Rhythm is a component of improvisation achievement, but to fully realize strategies, participants needed to create melodies. Melodies are composed of both pitch and rhythm. The following paragraphs (a) show how participants partially articulated strategies, which remained consistent throughout the 12-week instructional period and (b) reflect on the possible relationship between participants' performance of this mediating process and achievement outcomes.

I first observed examples of participants partially articulating improvisation strategies—focusing on either rhythm or pitch—in Week 2. I paired up participants and encouraged them to “turn and talk” to each other to share their improvisation strategies. My intent was to establish a comfortable environment in which participants could practice articulating strategies without yet having to speak in front of the entire combo. In the first excerpt, from the Yellow Combo, participants named notes (“root notes and octaves,” “root notes”) and asked about “switch[ing] up the notes.” As the teacher, I was the only one to mention rhythm out loud:

*SM matches people up with partners for improvising “turn and talk.”*

*SM: “Please tell your partner what you’re going to do.”*

*Noah to turns to Hudson: “Root notes and octaves.”*



*Ruby and Sam turn to each other and talk (inaudible).*

*Seamus stands up and says to Tomas, “The same strategy that I always use! Do something random! Figure out if it sounds right!”*

*SM to Seamus: “Wait a second! What strategy are we trying to use this time?”*

*Seamus: “Root notes.”*

*SM: “That’s right.”*

*Seamus starts playing on his own.*

*SM addresses Seamus, Camden, and Noah.*

*SM: “You’re gonna use 8<sup>th</sup> notes?”*

*Seamus continues playing on his own and Hudson does not respond.*

*Noah points to his music: “Wait—for that many measures?”*

*SM: “Yes!”*

*Noah: “And you can’t, like, switch up the note?”*

*SM: “Not this time.”*

*Noah: “Okay.”*

*Seamus plays on his own, experimenting with chords and rhythms.*

Also in Week 2, the Orange Combo participants partially articulated improvisation strategies.

Unlike the Yellow Combo participants, though, who focused on pitch choice, the Orange Combo participants emphasized rhythmic choices. Participants sang rhythm examples to each other, played them to each other, asked questions about note value (the length of notes), and inquired about using rests. They used pitch when they experimented, but when they articulated they focused on rhythm:



*SM: "Tell your partner what you're going to do, even though it's pretty obvious because we only know one strategy."*

*Susanna: "I don't know what I'm going to do."*

*The two pairs of horns briefly talk to each other (inaudible), then begin playing examples to each other.*

*Christopher plays an example to Susanna.*

*Susanna: "I don't know what I'm going to do."*

*Marcello sings a rhythm pattern to Richie. It includes quarter notes and 8<sup>th</sup> notes but has a straight rhythmic feel.*

*Richie plays a rhythm to Marcello. It has a swung rhythmic feel.*

*Marcello sings another rhythm to Richie that has more variety (quarters, 8ths, and 16ths), but is still not swung.*

*Wyatt and SM, who are partners, talk.*

*Marcello repeats his rhythm twice, encouraging Richie to try it.*

*Richie plays it and swings it.*

*Susanna still hasn't said or played anything. SM goes over and coaches her through playing some rhythmic patterns using root notes.*

*Marcello asks Richie what rhythm he's doing. Richie begins to play it.*

*Marcello: "No, just tell me!"*

*Richie sings the rhythm to Marcello and Marcello sings it back to him.*

*Wyatt, Joseph, and Susanna are playing on their own.*

*SM conferences briefly with Christopher.*

*Marcello: "This doesn't sound good."*



*Marcello and Richie continue to disagree about whether to explain their plans with singing the rhythm or playing it.*

*Michael and Joseph seem done planning; they're not playing or talking.*

*Susanna to SM: "Is that too long?"*

*SM: "How long is too long?"*

*Susanna replies (inaudible).*

*SM: "Ohhh...it's up to you, because they're your rhythms."*

*Joseph: "Are we allowed to rest? Instead of playing notes?"*

*SM: "Yes, you are allowed to rest. There's a word for that in jazz; it's called 'space'."*

*Michael: "Space!" Michael gestures dramatically with his hand.*

Both of the preceding excerpts exemplify how participants articulated strategies throughout the instructional period. They primarily articulated pitch or rhythm components of a strategy, but rarely both. In the Weeks 5, 8, and 11 transcripts, when participants did not cite a strategy with a name, like "question and answer," they primarily articulated ideas like "I just did the chord tones" (Susanna, Orange, Week 11). This phenomenon mirrors the strategies participants articulated on the posters discussed earlier, on which participants wrote strategies about which pitches to choose over two times as often any other strategy.

In the end, I anticipated that participants would articulate strategies that reflected both the pitch and rhythmic aspects of melody, but participants responded to the learning environment in a different way, and still benefitted. Although I expected participants would make their thinking visible in the same way that I made mine visible when I "revealed" hidden jazz improvisation practices, they did not. Instead, they partially verbalized their thinking, and more fully realized their strategies in their performances. According to the quantitative results, participants' partial



strategy articulation did not get in the way of their achievement. Therefore, this mediating process was either effective even in an abbreviated form, or would have supported even higher achievement in its complete form. For example, perhaps participants would have achieved more had they articulated a strategy of “creating swung rhythm patterns with root notes and neighbor tones” instead of simply, “root notes and neighbor tones.” Such a possibility suggests that modifying the learning environment in the future might change participant behavior to fit my expectations, or that I might instead consider modifying my expectations in consideration of participant behavior. An example of a modification of the environment would be to consistently probe participants should they only articulate a partial strategy (e.g., if a participant articulates a strategy of “root notes,” ask the participant to elaborate, or ask “What will you do with the root notes?”). Another modification, as mentioned earlier, would be to consistently use names that completely describe strategies. For example, calling a strategy “root note rhythms” would address the tonal and rhythm elements of creating a new melody. Conversely, an example of modifying my expectations might be to observe participant performance, and only probe participants if, as the teacher, I observed that partial strategy articulation was leading to partial improvisation performance.

*Identifying elements and strategies.* Finally, when I analyzed the transcripts for the mediating process of identifying elements and strategies, I found that: (a) even in the early stages of instruction, participants were able to identify musical elements and improvisation strategies that others employed; and (b) participants were more successful performing this mediating process under specific conditions. These findings suggest that the design feature sub-element of guiding participants through identifying strategies was effective, and that identifying strategies through listening was a likely source of achievement.



In Week 2 I guided participants through identifying strategies when I introduced the first improvisation strategy, “root note rhythms.” In this particular instance, I asked participants to listen to me improvise and identify my strategy, which they were able to do, as evidenced in the transcript excerpts below. This was one of the techniques I used to make “hidden” practices visible. In the Week 2 excerpts below, participants from both combos were able identify my improvisation strategy through listening. First, three participants from the Yellow Combo identified various reasons why it was important to apply the strategy as well as a specific musical element characteristic of jazz, swung 8<sup>th</sup> notes, which was evidence of this mediating process’ connection to achievement:

*SM: “I’m using the root notes, but what else am I doing?”*

*SM counts off and the rhythm section begins to play.*

*SM improvises swung rhythmic patterns using the root notes. The rhythm section plays, and the horns appear to listen as they look on. Tomas and Noah intermittently move to the beat. The chorus ends.*

*SM: “What happened? What did I do?”*

*Tomas: “You split up the whole notes. And you changed the rhythm.”*

*SM: “Yes. And I tried to pop up the octave in the first A section, I don’t know if you noticed that.”*

*Ruby: “Yeah.”*

*SM: “Why was I trying to include a lot of 8<sup>th</sup> notes or syncopation?”*

*Tomas: “Because it’s funky.”*

*Hudson: “You’re making it not sound boring.”*



*SM: “Yeah, it was more interesting. And also, what else? Something else really important, too. Why would you want to use 8<sup>th</sup> notes in your solo?”*

*Ruby: “So people know that it’s swung.”*

*SM: “Yeah, yeah. Because I want to match the swing rhythmic feel that Sam is doing and that the whole song is going along to.”*

Two participants from the Orange Combo displayed excitement at their ability to identify my strategy, suggesting that for some participants this mediating process may have also been associated with motivation:

*SM: “When I’m done, you tell me what I did with the root notes.”*

*SM counts off the rhythm section and they begin to play. SM starts to improvise and all the other horns try to play along.*

*SM cuts off the band and explain that it’s her solo so she’s going to play by herself with the rhythm section.*

*Richie makes a sad sound.*

*SM: “Don’t be sad! You’re going to have a turn!”*

*SM: “Tell me what I’m doing. I told you part of my strategy, see if you can figure out the rest of it.”*

*SM counts off the rhythm section again.*

*SM improvises swung rhythm patterns using the root notes.*

*Joseph whispers to Michael. Michael nods.*

*As SM finishes, Joseph and Michael quickly raise their hands, followed by Richie.*

*SM: “Oh, two hands shot up right away.”*

*Joseph: “I noticed, I noticed what you did!”*



*SM: "Joseph, what did I do?"*

*Joseph: "You used the notes on each line to make different rhythms."*

*SM: "Exactly."*

*SM to Michael: "Was that what you were going to say?"*

*Joseph: "I told him that!"*

*Michael: "But I knew that!"*

*Joseph looks at Michael.*

*Michael to Joseph: "Yes!"*

*Richie: "I knew."*

*SM to Richie and Marcello: "Did you notice what I did?" They both nod.*

*Richie and Marcello: "Yeah."*

*SM: "I made up my own rhythm with the root notes. I gotta be a little more specific than that; I had a goal going in, that I wanted to use a lot of swung 8<sup>th</sup> notes, because I wanted to match the swing feel of the tune."*

In the same week, participants from both combos showed that they could not only identify improvisation strategies, but also one of the musical elements characteristic of jazz, a swung rhythmic feel. Like with the improvisation strategy, they performed this mediating process when I prompted them to do so. Some participants showed that they were already confident that they could identify a swung rhythmic feel, and others showed that they could do so when guided through it. The first example involves two members of the Orange Combo in Week 2:

*SM: "So what's Wyatt doing with his 8<sup>th</sup> notes?"*

*Richie: "He's doing the note, and then the note again." Richie gestures with his hand.*



*SM: "Yeah. And is he doing du-de du-de du-de du-de or du-di du-di-du-di du-di?" [du-de is a duple based rhythm syllable pattern that sounds even and du-di is a triple based rhythm syllable pattern that emphasizes the first syllable, as in a swung rhythmic feel]*

*Wyatt raises his hand.*

*Richie: "Option 2."*

*SM: "Yes, option 2, he's swinging his 8<sup>th</sup> notes."*

The second excerpt follows a similar Week 2 conversation, but this time involving three members of the Yellow Combo:

*SM to Tomas: "You don't know if you were swinging 8<sup>th</sup> notes or not?"*

*Tomas: "I don't know what a swing beat is."*

*Sam: "I'll play a swing beat!"*

*Tomas: "Is it like..."*

*Tomas sings an example that is not swung.*

*Seamus: "It's like long-short-long-short."*

*Sam plays an example on the cymbal.*

*SM plays two examples.*

*SM: "Is that swung?"*

*Tomas: "No"*

*SM: "Is that swung?"*

*Tomas: "Yes. Elongate it."*

*SM sings "du-de, du" then "du-di, du" to show the comparison.*

*SM: "Try it. Du-di, du; du-di, du."*

*Tomas echoes the pattern.*



*Tomas: "Should I tongue it?"*

*SM: "You should."*

The preceding conversations show that because I prompted participants to listen and identify a musical element characteristic of jazz or a jazz improvisation strategy, they successfully engaged in the mediating process of identifying elements and strategies. This positive result indicates that guiding participants through identifying strategies was effective in supporting participant behavior and outcomes, even as early as Week 2.

Other examples of participants identifying strategies revealed that they were more successful under certain conditions. Specifically, participants were most successful in contexts like the Week 2 example above, when they were prompted to listen ahead of time. In a contrasting situation in Week 8, participants in both groups were taking turns improvising a chorus, and when it was my turn, I played a variation on the head of the tune. I had not told any Yellow Combo member I was going to employ this strategy, and in the Orange Combo I only told my "turn and talk" partner, Wyatt. Afterwards, when I asked participants if they had noticed my strategy, only Ruby identified it in the Yellow Combo, and no one did in the Orange Combo. In this unsuccessful example of identifying a strategy, unlike the successful example in Week 2, participants were not prompted to listen ahead of time. It was not that they were "worse" at listening in Week 8 than in Week 2, but that the conditions had changed.

In the same week as the example above, participants showed that they were motivated to listen to their peers, and that when doing so they could identify elements of music characteristic of jazz and jazz improvisation strategies others employed. For example, the Yellow Combo's bass player, Ruby, noticed a "chord thing" that Seamus employed during trading 4s, a type of conversational improvisation performed with a partner. She liked a stylistic piano effect he



played, and asked him to help her name it in piano terms. Seamus volunteered that during trading he had changed his comping approach in response to Noah's improvised solo. Michael sang a melodic motive to Marcello to show him what he had liked about his improvised solo, and Marcello wanted to move closer to the piano so he and Wyatt could listen to each other when trading. When Wyatt was my trading partner later, he showed that he could identify what I was playing, and Susanna, who was not partnered with either of us, volunteered that she had listened and identified what we had played:

*SM: "Wyatt, I tried to follow what you were doing better. Did you notice that?"*

*Wyatt: "Yeah."*

*Susanna: "I noticed."*

*SM: "You did?"*

*Wyatt: "And I tried to follow you more."*

*SM: "I copied your rhythm in my first trade."*

*Wyatt: "And I did yours on my third and fourth."*

*SM: "And I noticed you ended on something up higher, so I started mine on something up higher, to connect it more."*

These Week 8 examples were successful instances of participants listening and identifying musical elements and improvisation strategies. They met the first condition of the successful Week 2 examples, in which participants performed the mediating process of identifying elements and strategies when they knew ahead of time to listen. In this case, participants were prompted to listen because they were paired up for a musical "conversation."

The evidence above suggests that the design feature sub-element of guiding participants through identifying musical elements and improvisation strategies enabled participants to



perform the intended mediating process, which was likely a source of achievement. Participants were most successful identifying elements and strategies under specific conditions, specifically, when participants were prompted to listen ahead of time. In the first successful examples, the teacher prompted participants to listen as she modeled a “mystery” improvisation strategy, and in the second ones, she paired participants with classmates to trade 4s. The trading 4s examples also indicate that participants were ready to listen to their peers, and therefore engage in peer feedback, one of the mediating processes associated with the next design element, “promoting specific feedback.”

**Design feature 3: Promoting specific feedback.** This section provides evidence to support the finding that promoting specific feedback supported achievement and self-assessment. In this learning environment, promoting specific feedback meant that the teacher modeled accurate, specific self-assessment, as well as guided participants through self-assessing and giving peer feedback. The intent was for participants to accurately self-assess and give peer feedback related to musical elements characteristic of jazz and jazz improvisation strategies, and to use these evaluations to inform subsequent iterations. When I reviewed the video recordings of class and the transcripts of the videos, I looked for examples of participants responding to my requests to engage in feedback as well as spontaneously qualifying their performances and the performances of others. Sources of self-assessment were likely my modeling and encouragement. Per my lessons plans and the video recordings of class, I modeled self-assessment and giving feedback to others throughout, as well as prompted participants to self-assess and provide feedback to others.

The nature of participants’ self-assessments and peer feedback exchanges varied over time. The video evidence did not necessarily mirror the statistical results, which showed a



significant effect on self-assessment over time. Instead, a more nuanced evolution emerged, characterized by a shift towards more positive self-assessment in Week 5, then a shift towards more insightful self-assessment in Weeks 8 and 11. Throughout the 12 weeks, many participants' self-assessments and peer feedback featured general, musically non-specific statements (e.g., qualifying an improvised solo as "okay" or "terrible"). In the videos, I observed a mix of negative and positive self-assessment throughout, although Week 5 was more heavily positive than other weeks, and peer feedback was almost exclusively positive for all weeks. Increasingly, participants embedded self-assessment in articulating musical elements characteristic of jazz and jazz improvisation strategies. This articulation was a mediating process associated with the second design feature, "revealing 'hidden' jazz improvisation practices," and supports the claim that promoting specific feedback supported achievement outcomes. As in all the qualitative analyses, the following paragraphs draw from the Weeks 2, 5, 8, and 11 transcripts. Importantly, these weeks were in close proximity to when participants reported self-assessment ratings by survey in the quantitative data collection phase (prior to Week 1, after Week 6, and after Week 12), which suggests that sources of self-assessment revealed below may be related to statistical results.

Week 2 self-assessments and peer feedback were general overall, and a mix of positive and negative. They lacked specificity, showed minimal specificity, or consisted of simple affirmative or negative responses to my questioning (Table 19), which was consistent with other weeks in the instructional period. For example, participants made negative general statements like, "This doesn't sound good" (Marcello, woodwind/Orange), reported that an improvisation strategy "went okay" (Sam, rhythm/Yellow), or that one went "terribly" (Seamus, rhythm/Orange). Positive self-assessments and peer feedback included a participant who



assessed his improvised solo with a thumbs-up (Noah, woodwind/Yellow) and a participant who told a peer that “his solo was really good” (Michael, brass/Orange). On one occasion a participant sought my assessment before assessing himself, asking “Was my solo good?” (Michael, brass/Orange). On multiple occasions students did not self-assess out loud even when encouraged to do so. I am involved in most of the exchanges, which suggests that my promotion of feedback was a source of most of the participants’ feedback behaviors. In the dialogue examples below, and throughout, I am the teacher, identified by my initials, “SM.”

*Table 19. Week 2 Self-Assessment and Peer Feedback Examples.*

<b>Individual/ensemble role</b>	<b>Combo</b>	<b>Self-assessment(s)</b>
Marcello/woodwind	Orange	Marcello: “This doesn’t sound good,” reacting to his own experimentation with an improvisation strategy.
Joseph/woodwind	Orange	Joseph: “Anything is good!” on Michael’s improvised solo.
Richie/brass Marcello/woodwind	Orange	Richie: “I played too much of the same note,” reflecting on his improvised solo to Marcello. Marcello: “I ended up doing just the same thing,” reflecting on his improvised solo to Richie.
Michael/brass	Orange	Michael: “Was my solo good?” SM*: “What do you think?” Michael: “I don’t know. I thought it was kind of like...” Michael shrugs. SM: “Be specific. You tell me what you thought.” Michael: “I don’t know.”
Michael/brass	Orange	Michael: “I said to Joe that his solo was really good, I would just suggest next time, like I tried to do, use a couple more rhythms,” on Joseph’s improvised solo.
Susanna/bass Christopher/drum set Wyatt/piano Michael/brass Joseph/woodwind Marcello/woodwind Richie/brass	Orange	SM: “Tell your partner how you think you performed your strategy, and be specific like Michael was before.” Susanna and Christopher don’t talk to each other. Wyatt talks to SM right away (inaudible). Michael and Joseph talk to each other (inaudible). Marcello and Richie talk to each other; they discuss whether they can use a specific pitch.



Seamus/piano Sam/drum set Hudson/brass Noah/woodwind	Yellow	SM: "Tell your partner how your strategy went." Seamus: "Terribly!" to Tomas. Sam: "It went okay," to Ruby. Hudson and Noah do not talk to each other. SM encourages Hudson to reflect; he responds by pointing out that he missed the direction to loop 8 bars.
Seamus/piano	Yellow	Seamus: "Tomas's rhythms were nice," giving feedback about Tomas's improvised solo.
Noah/woodwind	Yellow	SM: "Noah, tell us how you feel like yours went." Noah gives a thumbs up.
Sam/drum set	Yellow	SM: "Would anyone like to share how it went for you?" Sam: "It was okay," giving a thumbs-up.
Seamus/piano	Yellow	Seamus: "I started out with a happy C chord and it just didn't sound right." SM: "Right. Because in a Dminor7 chord..."
Ruby/bass guitar	Yellow	Ruby: "I don't know why, but I like the high E better than I like the lower E."
Ruby/bass guitar Sam/drum set	Yellow	SM: "It really cuts through. I like it, I can hear it." SM: "I let both of you go on longer," to Ruby and Seamus Ruby: "Yeah, I noticed that." SM: "Why did I do that?" Sam: "Cause they're good." SM: "You just sounded like you were in the middle of a thought. And I didn't want to stop your thought."

\* "SM" represents the teacher/researcher, Sara Marino.

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As evidenced above, occasionally in Week 2, self-assessment was embedded in articulating jazz musical elements or strategies. This was a mediating process associated with the second design feature, "revealing 'hidden' jazz improvisation practices," in which participants articulated musical elements characteristic of jazz and improvisation strategies they employed or tried to employ, or identified the elements and processes that others used. During Week 2, some of these examples were vague, such as "I played too much of the same note" (Richie, brass/Orange), "Tomas's rhythms were nice" (Seamus, rhythm/Yellow), and "I would



just suggest next time, like I tried to do, use a couple more rhythms” (Michael, brass/Orange).

The more musically specific examples were isolated. For example, Seamus (rhythm/Yellow) self-assessed, “I started out with a happy C chord and it just didn’t sound right,” and Ruby reflected on note choice, “I don’t know why, but I like the high E better than I like the lower E.”

Week 5 self-assessments and peer feedback were arguably even more general than Week 2, but they were also more positive, more focused on peer or group feedback, and certainly more exclamatory (Table 20). For example, participants exclaimed, “We did it!” (Tomas, woodwind/Yellow), “She did it!” (Seamus, woodwind/Yellow), “Good job!” (Sam, rhythm/Yellow), “That was coolio,” (Richie, brass/Orange), “Yay,” (Ruby, rhythm/Yellow), and applauded for each other (Orange). “We did it!” and the applause were responses to group performances and the other statements were in response to individual improvisations. This overall positivity is in alignment with quantitative results showing significant increases in mid-instruction self-assessment. Again, as listed below, there were isolated incidents of participants assessing with more specificity. These were embedded in articulating jazz musical elements or improvisation strategies. For example, Tomas (woodwind/Yellow) identified that he had to “work on the rhythm and the melody” and later reported that he didn’t “know the melody at all,” to which Sam (rhythm/Yellow) replied that she needed to “listen to the melody.” Finally, I was decidedly less involved in prompting Week 5 feedback than I was in Week 2, suggesting that participants were becoming more independent. This does not mean that the design feature of promoting feedback was not a source of self-assessment in Week 5. Instead, it suggests that my encouragement over time, even that short period of time, supported outcomes.



Table 20. Week 5 Self-Assessment and Peer Feedback Examples.

Individual/ensemble role	Combo	Self-assessment(s)
Richie/brass	Orange	“That was coolio,” regarding Christopher’s improvised solo.
N/A	Orange	Class applauds for a musician trying a new strategy.
Marcello/woodwind	Orange	“All you do is the same chord,” to Wyatt.
Seamus/piano Ruby/bass guitar	Yellow	SM*: “What were you not playing that you wanted to play?” Seamus: “I wanted, I wasn’t playing on the Db7 section, I wasn’t playing the chords.” Ruby: “Yeah, I noticed that.”
Tomas/woodwind	Yellow	“I need to work on the rhythm and the melody.”
Sam/drum set	Yellow	“Good job, fam!” to rest of rhythm section.
Ruby/bass guitar	Yellow	“Yay, togetherness.”
Sam/drum set Seamus/piano	Yellow	Sam unexpectedly sets up the return of the head** with an improvised 16th note fill*** (she has not previously set up a head and we are not working on that technique). Sam: “I’m so crazy!” while throwing her arms up. Seamus: “She did it!” SM: “That actually set us up well to go back into the head of the tune.” Sam: “It was just very quiet, and I was like ‘it’s tooo quiet’,” on why she was inspired to improvise the fill.
Tomas/woodwind Sam/drum set	Yellow	Tomas: “I don’t know the melody at all!” SM: “This is your job for next week. You need to practice the melody,” to Tomas. Sam: “I need to listen to the melody.”
Noah/woodwind Tomas/woodwind Seamus/piano	Yellow	We end the tune. Noah claps. Tomas: “We did it!” Seamus: “We did it!”

\* “SM” represents the teacher/researcher, Sara Marino.

\*\* The “head” of the tune refers to its melody, its identifying thematic material.

\*\*\* A “drum fill” is a brief rhythmic motive that “fills” a musical space (e.g., a place where the horns are resting or holding out a note)



Week 8 self-assessment and peer feedback were general overall, as well as a mix of positive and negative self-assessments (Table 21). Examples of general self-assessment and feedback included statements like “That was terrible,” (Richie, brass/Orange), “It went fine,” (Christopher, rhythm/Orange), “I think I did pretty well,” (Marcello, woodwind/Orange), “I liked it!” (Ruby, rhythm/Yellow), and “It was so cool!” (Michael, brass/Orange), and “That’s cool” (Ruby, rhythm/Yellow). Isolated, more specific and descriptive self-assessment included examples such as “I kind of messed up, because at the beginning I tried to do a G but it came out as a C,” (Richie, brass/Orange) and “It was suspenseful,” (Wyatt, rhythm/Orange). Two participants, on two separate occasions, identified an improvised musical motive a peer employed to offer positive support (Michael, woodwind/Orange, and Ruby, rhythm/Yellow). None of Week 5’s self-assessment referenced jazz improvisation strategies.

*Table 21. Week 8 Self-Assessment and Peer Feedback Examples.*

<b>Individual/ensemble role</b>	<b>Combo</b>	<b>Self-assessment(s)</b>
Richie/brass	Orange	Richie: “That was terrible,” on a run of the head of the tune**
Christopher/drum set	Orange	Marcello: “Wait, you already finished?” SM*: “I don’t think we’re all at the same tempo.” “It went fine.”
Richie/brass Michael/brass	Orange	Richie: “I kind of messed up, because at the beginning I tried to do a G but it came out as a C.” SM: “That happens sometimes, doesn’t it. And then you have to save it.” Michael: “Yeah, I accidentally did an Ab instead of an Eb. And I was like ‘oops’. But it kind of sounded like it went.”
Wyatt/piano Marcello/woodwind Richie/brass	Orange	SM: “That was a different rhythm for you; I liked it,” to Christopher. Wyatt: “I liked it. It was suspenseful.” Richie: “Yeah, I liked it!” Marcello: “It was good.”



Richie/brass	Orange	<p>Richie: "I messed up on every single one."</p> <p>SM: "What did you mess up?"</p> <p>Richie: "Again, I kept on playing notes lower."</p> <p>SM: "Than you wanted to?"</p> <p>Richie: "Yeah."</p>
Marcello/woodwind Michael/brass	Orange	<p>Marcello: "I think I did pretty well."</p> <p>Michael: "I liked in your solo. You went 'doodle-y-doo'," sings and mimes the lick Marcello played.</p> <p>Marcello: "I was gonna say, I didn't mean to do that," (laughs)</p> <p>Michael: "You didn't mean to do that? It was so cool!"</p>
Ruby/bass guitar Seamus/piano	Yellow	<p>Ruby says that she liked something Seamus played.</p> <p>Ruby: "It was on the second line, where he was coming down and doing this chord thing, I don't know what it's called because I don't play the piano."</p> <p>SM asks Seamus if he knows what it is.</p> <p>Seamus demonstrates a diatonic line descending in octaves.</p> <p>Next he plays a sequence of chromatic, descending tone clusters.</p> <p>Ruby: "Yes, it was that one!"</p>
Ruby/bass guitar	Yellow	<p>SM: "The first time I tried to be conversational with Hudson, which I think was better. The second time I did a variation on the melody. I liked my solo, but I felt disconnected from my trading*** partner."</p> <p>Ruby: "Yeah, I noticed that and I thought, 'that's cool'."</p>
Sam/drum set Ruby/bass guitar	Yellow	<p>SM: "How was drum and piano trading?"</p> <p>Sam: "I don't really know what my solo was."</p> <p>Ruby: "I liked it!"</p>

\* "SM" represents the teacher/researcher, Sara Marino.

\*\* The "head" of the tune refers to its melody, its identifying thematic material.

\*\*\* "Trading" is a conversational form of improvisation performed with a partner

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Week 11 self-assessment and peer feedback were a mix of negative and positive comments and were almost exclusively embedded in articulating musical elements characteristic of jazz and jazz improvisation strategies (Table 22), which suggests that it was associated with both self-assessment and achievement outcomes. Such articulation was a mediating process



associated with the second design feature—“revealing ‘hidden’ jazz improvisation practices”—in which participants articulated musical elements characteristic of jazz and improvisation strategies they employed or tried to employ, or identified the same elements and processes that others used. Strategies participants cited included rhythmic improvisations using chord tones, variations on the melody, and telling a musical story. Participants reported that a strategy “did not work” (Marcello, woodwind/Orange), “didn’t go that well” (Michael, brass/Orange), “sounded terrible” (Richie, brass/Orange), or that their attempt amounted to “a crescendo of worseness” (Noah, woodwind/Yellow). Alternately, they engaged in positive self-assessment or peer feedback, such as “That one was really good” (Marcello, woodwind/Orange), “Your solo sounded really good today” (Sam, rhythm/Yellow), “I thought my solo sounded better than last time” (Michael, brass/Orange), or “I think the head of the tune was a lot better” (Richie, brass/Orange).

*Table 22. Week 11 Self-Assessment and Peer Feedback Examples.*

<b>Individual/ensemble role</b>	<b>Combo</b>	<b>Self-assessment(s)</b>
Marcello/woodwind	Orange	Marcello: “I tried to do it off the piece but that did not work.” SM*: “Oh, a variation on the melody?” Marcello nods. SM: “What didn’t work about it?” Marcello: “I picked the wrong notes.”
Michael/brass	Orange	“I tried to do the storyline as well. It didn’t go that well.”
Richie/brass	Orange	“I was playing high and low notes and it sounded terrible.”



Marcello/woodwind Michael/brass	Orange	<p>Marcello: "That one was really good."</p> <p>SM: "What did you think was so good about it, Marcello?"</p> <p>Marcello: "The ending."</p> <p>Michael: "I thought my solo sounded better than it did last time."</p> <p>SM: "Why do you think?"</p> <p>Michael: "I don't know. I kind of had more of a plan going in, and I played the notes I wanted to."</p> <p>SM: "Like the notes you had in your head were the ones that came out of your horn."</p> <p>Michael: "Yeah."</p>
Richie/brass	Orange	<p>SM: "Richie, when we restarted, I felt your solo got off to a better start. Did you?"</p> <p>Richie: "Yeah."</p> <p>SM: "What were you doing?"</p> <p>Richie: "Well, not just doing random notes."</p> <p>Richie: "Kind of following along with the head of the tune**."</p> <p>SM: "Yeah, I noticed that. You were using little pieces of it but making it your own. I think that worked well for you."</p>
Richie/brass	Orange	<p>Richie: "I think the head of the tune was a lot better."</p> <p>SM: "We were more together. I agree with you."</p>
Marcello/woodwind	Orange	<p>Marcello: "That was really bad."</p> <p>SM: "It wasn't terrible. What do you think was bad?"</p> <p>Marcello: "Staying together."</p>
Sam/drum set Seamus/piano	Yellow	<p>Sam: "Your solo sounded really good today actually," to Seamus.</p> <p>SM: "It did. I noticed you were using more chord tones than usual."</p> <p>Seamus, "That's another thing I noticed. And I went like this," (plays a musical example)</p>
Noah/woodwind	Yellow	<p>Noah: "I started, and it was so bad, and it kept getting worse! It's like a crescendo of worseness!" (laughs)</p>

\* "SM" represents the teacher/researcher, Sara Marino.

\*\* The "head" of the tune refers to its melody, its identifying thematic material.

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As evidenced above, my role was perhaps more involved than in Weeks 5 and 8, and had evolved from Week 2. Instead of simply prompting participants to engage in specific feedback, in Week 11 I encouraged them to be more specific in their assessments and I probed them to reflect more deeply on their successful and failed improvisation attempts. Coupled with the passage of time, during which participants were able to practice self-assessing and providing feedback to peers, it is likely that the evolution in my own promotion of specific feedback was a source of participants' self-assessment and achievement outcomes.

**Design feature 4: Implementing harmonic form sequencing.** Through investigating the qualitative evidence related to design feature 4 I was able to further answer Research Question 5. Because implementing harmonic form sequencing was a design element as well as part of a comparative case study, though, findings offered additional insight into the quantitative results for Research Questions 2 and 3 regarding the potential effects of (a) the two conditions (Groups A and B) and (b) other key elements (in this case, different assessed improvisation tasks) on outcomes. In this learning environment, implementing harmonic form sequencing as a design element meant that the teacher chose improvisation tasks according to a developmentally appropriate sequence of jazz harmonic forms. Developmentally appropriate in this context meant selecting tunes with achievable melodies (with respect to rhythmic content, range, and tonality) and harmonic forms (with respect to harmonic rhythm). For comparative purposes, this study employed two potentially appropriate sequences, one with Group A participants and one with Group B. The purpose of the instructional content and sequences was for participants to perform two mediating processes: (a) applying their jazz knowledge and improvisation skills to improvising over the harmonic forms and (b) following the form in multiple contexts.



To remind the reader of the similarities and differences between the instructional sequences, or conditions, participants in Groups A and B studied the same musical elements and improvisation strategies in the same order, but applied them to harmonic forms in a different order. Group A was introduced to and applied the elements and strategies to practicing modal harmonic forms in Weeks 1-6 (“Impressions” and “Cantaloupe Island”), and studied 12-bar blues harmonic forms in Weeks 7-12 (“Sonnymoon for Two” and “Blues in the Closet”). Group B was introduced to and applied the same elements and strategies, in the same order, but first to the 12-bar blues and then to the modal tunes. All participants, regardless of group/condition, were assessed on both the “Impressions” and “Sonnymoon for Two” improvisation task at pre-, mid-, and post-instruction, which is how I found that at mid- and post-instruction quantitative data collection, both Groups A and B performed significantly better on the “Sonnymoon for Two” improvisation task than the “Impressions” improvisation task. Because Group A had not studied the “Sonnymoon for Two” improvisation task until after mid-instruction data collection, those participants’ mid-instruction performances were evidence that when they made their mid-instruction recordings they performed one of the mediating sub-processes in the embodied conjecture: they applied their knowledge and skills to harmonic forms not studied in class. Readers may refer back to Figure 21 in this chapter for further clarification of how the harmonic form instructional sequence, data collection method, and achievement results came together to suggest this quantitative finding.

There were two qualitative findings associated with the design feature of implementing harmonic form instructional sequencing: (a) participants in both Groups A and B performed mediating processes that were likely sources of outcomes (applying musical elements and strategies to harmonic forms and following the form); and (b) there were differences between



how participants interacted with different tasks, both assessed tasks and those related to them. It was important to examine the video recordings, transcripts, and my field notes for evidence of the latter, because although the quantitative results showed that participants performed one task (improvising over the harmonic form of “Sonnymoon for Two”) significantly better than another (improvising over the harmonic form of “Impressions”), they gave no indication why.

After reviewing the video recordings of the Yellow and Orange Combos and my field notes, I noticed some subtle differences between how participants interacted with the different assessed improvisation tasks, differences which may have been associated with achievement, self-efficacy, and motivation outcomes. These included differences in musical content, rehearsal strategies, harmonic form awareness, and task preference. First, because the melody to “Impressions” was more musically sophisticated than “Sonnymoon for Two” (greater rhythmic variety, larger range, more unfamiliar key signature), the more inexperienced instrumentalists did not learn the melody of the head 100% accurately (primarily 5<sup>th</sup> graders). Therefore, no matter how well these participants learned the harmonic form or chord tones, they may have been disconnected from the original melodic material, which could have affected achievement. Second, when participants were studying “Sonnymoon for Two,” we almost exclusively practiced improvising over the entire 12-bar form at every class, but when studying “Impressions,” a 32-bar, AABA form, we practiced improvising over the entire form and also over its 8-bar sections. We looped these sections to practice the melody of the head and improvisation strategies. My reasoning behind this was twofold: (a) it broke a large task into manageable chunks, and (b) it ensured participants had multiple opportunities to articulate strategies, improvise, and reflect during each class. This meant that participants had similar numbers of turns to improvise in class, regardless of which tune they practiced, which was likely



linked to positive achievement outcomes. It also meant, though, that they played through the entire 32-bar form of “Impressions” fewer times in class than the entire 12-bar blues form of “Sonnymoon for Two.” This difference may have been linked to negative achievement outcomes. I observed evidence of lower achievement outcomes associated with the 32-bar form in Week 4 at School Y, where the combos were larger than at School X, so it took even longer to get through an entire combo of 32-bar solos. I recorded in my field notes, “9 people in a combo compounded the problem of taking 32-bar solos, and there was some confusion about whether taking an entire chorus meant to improvise or play the melody to the head.”

Third, as I recorded in my field notes and observed in the video recordings, participants seemed less aware of the harmonic form in “Impressions,” which may have also affected achievement outcomes. Participants got lost in the form while practicing both tunes, but those practicing “Impressions” seemed less aware that they were lost. For example, participants practicing “Sonnymoon for Two” showed an ability to hear the changes, including the II-V-I turnaround at the end of the form. Evidence of this ability included participants declaring that they were lost, looking at me for guidance in the middle of a chorus, and reporting, afterwards, that had played one change too long, gone through the changes too quickly, etc. Participants practicing “Impressions” also reported that they were lost in the form or did not know when to switch chords. They frequently, however, failed to switch to the new chord in the B section and appeared not to notice. They would often continue to improvise over the “old” chord in the new section, evidence which suggested that they did not hear the change. I observed this phenomenon on the video tapes, and recorded it in my field notes after making mid- and post-instruction improvisation recordings. The excerpt below shows that in Week 5, a week before mid-instruction data collection, four out of six members of the Yellow Combo either did not



know the meaning of the vocabulary word, “chorus,” or still did not know how many measures were in the form:

*SM: “How long is your solo if you take one chorus?”*

*Sam: “28 bars.”*

*Seamus: “12.”*

*Ruby holds up three fingers on one hand and two fingers on the other.*

*“32.” Carl*

*Sam: “16.”*

*Noah: “Wait, we only do one chord?”*

*Hudson says nothing.*

Contrast their confusion with the Orange Combo’s confident response to the same question in Week 5, regarding “Sonnymoon for Two.” Two participants quickly offer the correct answer and no one gives an incorrect answer, which enables three members to go on to make a connection between the harmonic forms.

*SM: “If you’re going to take one chorus for your solo, how many measures is that?”*

*Joseph: “12.”*

*Michael: “12.”*

*SM: “Yes, why?”*

*Joseph: “Because that’s how many measures are in the song.”*

*SM asks the combo to compare “Sonnymoon for Two” and “Blues in the Closet” for number of measures.*

*Marcello: “Same.”*

*Michael: “Same.”*



*SM asks them to compare the chords.*

*Michael: "Different."*

*Wyatt "Same!"*

*SM: "They are different chords, but what's the same about them, Wyatt?"*

*Wyatt struggles to articulate it. SM waits, then eventually interjects.*

*SM: "It's the same pattern of chords but in a different key signature. The whole first line is the same chord, the second line changes halfway through..."*

*Wyatt: "And the last line changes every measure."*

This last part of the conversation, in which the Orange Combo compares the harmonic content of "Sonnymoon for Two" and "Blues in the Closet", is important because the number of measures is only one element of the harmonic form. The Yellow Combo did not even get to this part of the conversation because they were still struggling with the number of measures.

Fourth, and finally, participants showed a preference for other forms over "Impressions," which may have been evidence of their higher self-efficacy and motivation for other tasks, assessed and otherwise. There were significant positive effects on self-efficacy and motivation regardless of condition, and participants did not specifically express a dislike for "Impressions," but they did express a preference for other improvisation tasks. In Week 11 when participants discussed which tunes to perform for their families at the end of the last class in Week 12, only one combo chose to perform "Impressions" (Table 23). Three other combos chose a different modal improvisation task, "Cantaloupe Island." This tune has a contrasting rhythmic feel to "Sonnymoon for Two" and "Impressions," and a less musically sophisticated melody but more unfamiliar key than "Impressions." "Cantaloupe Island" is still a modal tune, but its harmonic rhythm is faster than "Impressions" (4 bars per change instead of 8). Any of those elements may



have been responsible for participants' preference for the modal tune "Cantaloupe Island" over "Impressions." All six combos chose to perform a 12-bar blues; the Red Combo chose two 12-bar blues, and after selecting a 12-bar blues the Blue Combo decided to forgo a second tune altogether. In the end, this preponderance of evidence regarding task preference, combined with the evidence above regarding musical content, rehearsal strategies, and harmonic form awareness, suggests that participants' interactions with tasks may have affected outcomes related to assessed tasks.

*Table 23. Performance Choices by Combo and Type.*

<b>Combo</b>	<b>Tune choice 1</b>	<b>Form type 1 (key)</b>	<b>Rhythmic feel 1</b>	<b>Tune choice 2</b>	<b>Form type 2 (key)</b>	<b>Rhythmic feel 2</b>
Red	Sonnymoon for Two	12-bar blues (Bb)	Swing	Blues in the Closet	12-bar blues (F)	Swing
Orange	Blues in the Closet	12-bar blues (F)	Swing	Cantaloupe Island	16-bar modal (Fmin)	Straight
Yellow	Blues in the Closet	12-bar blues (F)	Swing	Cantaloupe Island	16-bar modal (Fmin)	Straight
Green	Sonnymoon for Two	12-bar blues (Bb)	Swing	Impressions	32-bar modal (Dmin)	Swing
Blue	Sonnymoon for Two	12-bar blues (Bb)	Swing	N/A	N/A	N/A
Purple	Sonnymoon for Two	12-bar blues (Bb)	Swing	Cantaloupe Island	16-bar modal (Fmin)	Straight

### **A Case Study in Self-Efficacy and Achievement: Sam**

The story of self-efficacy in this study's context is probably best told through the drum set player from the Yellow Combo, Sam, because more than any participant in either the Orange or Yellow Combos, she frequently articulated evidence of her self-efficacy out loud. On the one hand, this difference suggests that Sam may not represent other participants. On the other hand, because Sam and other participants made similar quantitative gains in self-efficacy, perhaps Sam was dissimilar in how vocal she was, but similar in thinking to others. In the end, Sam's



tendency to make her thinking around self-efficacy visible presented an opportunity to study her case and gain insight from it.

Sam's case study showed that: (a) elements of this study's learning environment could increase self-efficacy almost immediately and (b) forming mixed-ability jazz combos and guiding students through improvisation strategies with coaching and scaffolds may have been particularly important to self-efficacy; but that (c) reinforcement over time was essential for a participant like Sam to maintain higher self-efficacy. During the instructional period, Sam showed growth in self-efficacy as she became increasingly confident that she had the tools to improvise jazz in the learning environment, increasingly took on challenging tasks, and persisted in the face of difficulty. Her emotional well-being appeared healthy, which she described in Week 5. By the end of the study, Week 11, Sam was able to form expectations for success, which she vocalized as we prepared for an informal performance. Sam's progress and her reported sources of self-efficacy suggested to me that this study's learning environment directly influenced Sam's outcomes.

Sam's self-reported self-efficacy for jazz improvisation was similar to the study means throughout (Table 24 and 25), showing significant increases from pre- to mid-and pre- to post-instruction. The table below presents a comparison between Sam's scores and ratings and the study means. Sam started the study with slightly higher achievement than the pre-instruction mean, but showed similar achievement at mid-and post-instruction. Her self-assessment ratings were higher than average throughout the study. Sam's self-reported motivation was within the standard deviation for pre-, mid, and post-instruction, but was lower than the study means and did not significantly change over time like the study means did.



*Table 24. Sam's Achievement Scores and Self-Assessment Ratings Compared to Study Means.*

	<b>Combined composite achievement, two tasks one score (min=48, max=336)</b>			<b>Combined self-assessment, two tasks one rating (min=2, max=14)</b>		
	<b>Pre</b>	<b>Mid</b>	<b>Post</b>	<b>Pre</b>	<b>Mid</b>	<b>Post</b>
Sam	156	164.34	206.33	4	9	13
Study Means	102.36	162.93	182.94	7.77	9.95	11.3
<i>SD</i>	<i>30.90</i>	<i>40.86</i>	<i>38.90</i>	<i>2.56</i>	<i>1.83</i>	<i>1.64</i>

*Table 25. Sam's Self-Efficacy and Motivation Ratings Compared to Study Means.*

	<b>Self-efficacy (min=12, max=60)</b>			<b>Motivation (min=21, max=105)</b>		
	<b>Pre</b>	<b>Mid</b>	<b>Post</b>	<b>Pre</b>	<b>Mid</b>	<b>Post</b>
Sam	38	49	54	67	71	70
Study Means	37.88	50.47	52.2	75.86	81.63	86.21
<i>SD</i>	<i>6.91</i>	<i>5.26</i>	<i>7.10</i>	<i>11.60</i>	<i>11.16</i>	<i>12.64</i>

Sam's changing self-efficacy is described below, and is contextualized with evidence of her achievement. This pairing shows that Sam displayed low self-efficacy at first, even as she performed mediating processes associated with achievement, and ability to perform tasks. Later, her self-efficacy, or belief that she had the tools to perform jazz improvisation tasks in this context, rose to better meet her actual possession of these tools and demonstrated achievement. Sam's case begins below a week after she took her first self-efficacy survey and recorded her first improvised solo (Week 2), follows her progress to a week before her second survey (Week 5), and concludes a week before her final survey and recording (Week 11).

**Week 2.** At the beginning of Week 2 Sam showed low self-efficacy for both ensemble roles and improvisation tasks, but even in one 45-minute lesson displayed higher self-efficacy during specific situations. During that class, Sam's self-efficacy appeared higher when she had to only perform part of a task required for improvising or when she had a scaffold and coaching



for performing the entire task. Even at the end of the class, though, Sam seemed to possess low self-efficacy for improvising to the entire form. Following the entire form was integral to performing the assessed improvisation tasks that all participants executed when they recorded their improvised solos pre-, mid, and post-instruction. As evidenced in the examples that follow, at the same time Sam that exhibited low self-efficacy, she performed mediating processes associated with achievement and showed ability to perform tasks in general.

When class began Week 2, Sam announced her low self-efficacy, “I don’t know how to do any of it. That’s my problem. I can’t do any of it!” While the horns played the root notes to “Impressions,” I asked Sam to play a swung rhythmic feel and to fill every 4 bars. She reported that she could perform the task, but then performed a slightly different task, and seemed discouraged. I validated her variation on the task, which was intended to bolster her self-efficacy:

*Sam: “Are we just playing the A section?”*

*SM: “No, we’re playing the whole thing. So can you give us a fill every 4, like we talked about?”*

*Sam: “Yeah.”*

*Everyone plays roots and Sam does a fill every 8 bars.*

*SM calls out the repeat and the B section.*

*SM cuts off and everyone begins talking to each other immediately.*

*Sam: “I filled every 8 bars,” sounding disappointed.*

*SM: “But you still matched the form.”*



This excerpt and the events surrounding it showed that Sam performed mediating processes of performing an ensemble role, experimenting with musical elements and improvisation strategies, and following the form.

Next, Sam showed higher self-efficacy when I asked her to perform only a portion of an improvisation task. When I asked the class to listen to my improvised solo (to see if they could identify what jazz improvisation strategy I was using), I requested that the rhythm section perform ensemble roles to support me. This meant that Sam also had to follow the harmonic form, which is a skill necessary to improvise. In this case, however, she only had to keep time while following the form, and did not have to improvise. She reacted positively, which indicated that she believed she could perform this portion of a task:

*SM: “You play the bass line, you play the chords again, you play a swing,” gesturing to individual rhythm section members.*

*Sam: “I have a purpose!”*

Following this conversation, Sam was able to perform her ensemble role while I modeled an improvisation strategy. Therefore, in this example Sam’s self-efficacy seemed to match her ability, which was not the case in the previous example.

Later in Week 2, Sam’s self-efficacy subtly shifted in response to an improvisation strategy scaffold and coaching. While everyone was experimenting with jazz improvisation strategies on their own, and I was circulating and coaching, Sam chose a one-bar phrase from the John Riley (1994) book that the drum set player participants used during the study. This book provided drum set specific scaffolds, such as suggested rhythmic “one-bar phrases”, examples of how to orchestrate these patterns around the kit, how to link phrases together into longer musical phrases, and exercises to encourage students to make musical choices on their own. I coached



Sam through orchestrating the one-bar phrase she chose on her drum set. She expressed some frustration (exhaling/sighing), but persisted. After I move on to coach another musician, Sam continued to work on her own, even after telling a classmate that she was “not good” with a particular aspect of orchestration, using the cymbal as part of an improvised phrase. Her behavior—persisting at the task independently—indicated to me that either the cognitive scaffold, the coaching, or both were responsible:

*SM: “Yep, play again. 1-2-ready, and,” to Sam*

*Sam plays again.*

*SM: “Yes, so could you do that 4 times?”*

*Sam plays the pattern 4 times, choosing her own drums to orchestrate the phrase. By now the rest of the combo is watching and listening. Noah moves to the beat.*

*SM: “Yes. Now, could you do the same pattern, but on different drums?”*

*Sam: “Oh, is that what you were asking?”*

*SM: “Yeah. That’s exactly what you were – 4 times one way, 4 times another. How would you do it if you had to do it again, but re-orchestrate it?”*

*Sam appears to be thinking. She looks at the one-bar phrase page. She exhales/sighs.*

*SM: “Instead of these two, could you do snare and this tom?”*

*Sam plays the pattern on new drums, not the ones SM suggested.*

*Sam: “But that’s not the right thing.”*

*SM: “But it’s your solo, so it could be.”*

*Sam: “I was thinking I could also do,” playing a musical example of what she was thinking.*

*Ruby: “Yeah!”*



*SM: "Yeah, I like that."*

*SM moves on to coach another musician.*

*Ruby: "What about the cymbal?" to Sam.*

*Sam: "I'm not good with cymbals, so, uh..."*

*Sam tries a pattern with the cymbal.*

*Sam: "I could do," playing another musical idea.*

*Sam continues to work on her own as Ruby listens.*

In the above excerpt, Sam had moments of doubt about her ability to perform a task, but also persisted in the face of challenge. She exhibited these behaviors associated with self-efficacy while responding to scaffolding, coaching, and peer feedback, and performing the mediating process of experimenting with jazz improvisation strategies, which were all associated with achievement. This was a second instance in which Sam's self-efficacy for improvisation showed signs of potentially matching her actual achievement.

A bit later in Week 2, Sam again demonstrated that her self-efficacy was higher for performing a portion of a task, as opposed to an entire task. Earlier she had found the task of following the entire harmonic form manageable if she only needed to perform her ensemble role, rather than improvise. In this instance, although she was going to improvise, she expressed doubt that she could do so over the entire harmonic form (32 measures). She indirectly indicated that she believed she could execute a more manageable task, an 8-bar solo:

*Sam: "Is our solo 4 bars or 8 bars?"*

*SM: "It's 32."*

*Sam: "Why?!" in a whiny tone of voice.*

*SM: "We can just do 8 for now," looking around for reactions of the other musicians.*



*SM: "Okay let's do 8. Let's do 8 measures of the A section for solos."*

*Sam: "I'm sorry, I can't do 32 measures right now."*

The excerpt above reveals that while Sam was showing low self-efficacy for performing an improvisation task, she was also showing understanding of a key concept and mediating process associated with achievement: following the form. After improvising, Sam suggested that a scaffold, in this case, the one-bar phrases page from the John Riley book, helped her execute the 8-bar improvisation task:

*Sam: "Besides my slip up in the 7th measure, I actually enjoyed that."*

*SM: "That's great, that you actually had fun doing it, because I know – "*

*Sam: "Yeah, I've always struggled to do solos, and I was like," air drumming with a smile on her face.*

*SM: "I want you to have fun when you do it. It should be fun."*

*Sam: "Everything's just easier when you have a paper in front of you and you're not trying to think of it off the top of your mind."*

*SM: "But some of it you did do off the top of your mind," referencing how Sam had selected a one-bar rhythmic phrase from the book but orchestrated it herself.*

*Sam: "Right, that slip up!"*

*SM: "What made you feel like it was a slip up?"*

*Sam: "Cause I forgot how beats worked and I sort of played off beat."*

*Seamus: "She didn't do what she wanted," simultaneously.*

*SM: "Did it have something to do with what Seamus said, it wasn't what you wanted to come out?"*

*Sam: "Yeah, exactly."*



*SM: "I think that's all true. When you're improvising you should have something in your head, like 'oh, this is what I want to come out', but if it doesn't, that's okay. It's cool that you're planning it in your head a little before it comes out."*

*Sam: "It probably didn't sound terrible."*

*SM: "It didn't."*

*Ruby: "It was good."*

In this exchange, it is clear that Sam successfully performed two mediating processes associated with achievement, applying improvisation strategies to the form and self-assessment. She cited a scaffold as a source of achievement, indicating that despite some of her self-deprecating assessments, she also believed the scaffold could act as a cognitive tool.

Finally, at the end of Week 2, Sam suggested that she still did not possess self-efficacy for improvising to the entire 32-bar form. As a class we were going through a slide presentation about harmonic form, in which we explored what the form meant to each participant as an ensemble member and an improviser. We got to the slide about harmonic form and the drum set player. The piano player joked that the harmonic form would make a drummer "scared," and Sam appeared to suggest that Seamus's joke held some truth:

*SM: "What does this mean to the drummer?" referring to the harmonic form.*

*Seamus: "It means 'I'm scared, get me out of here'," joking.*

*Sam: "That is what it means. Congratulations, you guess right!" laughing.*

Sam's reaction, although couched in humor, suggested to me that although she had experienced moments of higher self-efficacy in Week 2 (connected to performing part of a task or an entire task with a scaffold and coaching), that she would need additional mastery experiences in subsequent weeks to reinforce feelings of increased self-efficacy.



**Week 5.** Three weeks later, a week before Sam took the mid-instruction self-efficacy survey, Sam showed higher self-efficacy for jazz improvisation, including improvising to the entire form. Sam indicated that she did not have as high self-efficacy for a new improvisation task, but then she performed as if she did have higher self-efficacy. Because this was 3 weeks later, perhaps Sam was simply more self-efficacious because she had had multiple positive experiences with improvising in the interim. As in Week 2, however, Sam appeared to possess higher self-efficacy when she had the support of a scaffold, this time one that involved the other members of the combo. This suggested to me that the source of Sam's higher self-efficacy was either the cognitive or motivational support of the scaffold.

In this example, Sam approached an improvisation task reluctantly, but ultimately persisted when performing the challenging task. The Yellow Combo was practicing a new modal tune, "Cantaloupe Island," a 16-bar tune. As in every other combo in Week 5, I asked Sam to try a new improvisation strategy just for drummers (orchestrating the melody of the head on their kit). Before Sam knew what the strategy was, when I announced that she would be the only one improvising to the new tune at this point, she asked "Why?" with both a whine and a smile. After introducing the strategy, she struggled to begin improvising. Seemingly supported by scaffolds, though, Sam persisted. She also ended her improvisation with an improvised fill that set up the return of the head. This was not a task she was expected to perform, and it was outside of the strategy we were practicing. It therefore required Sam to possess a higher self-efficacy to choose to attempt it. What's more, in this example Sam performs mediating processes associated with achievement: experimenting with improvisation strategies and applying strategies to following the form:



*SM cues Sam and starts singing the melody of the head.*

*Sam: "I don't even know what the melody is," laughing and not improvising.*

*The horns join in, singing the head of the tune.*

*Sam begins to improvise, generally orchestrating the melody.*

*Noah counts the rests at the end of the form out loud.*

*Sam sets up the return of the head with an improvised 16th note fill.*

The scaffolds in the example above were different than the one-bar phrases that Sam used in Week 2. In this situation, one scaffold included members of the ensemble singing the head of the tune as a guide, and another included a member counting out loud to keep time. These were activities I encouraged when participants either showed a tendency to get lost in the form or expressed a concern ahead of time that they would get lost. In this case, either the cognitive or motivational aspect of the group singing and counting scaffold, or both, appeared to encourage Sam to persist at the challenging task.

Later in Week 5, Sam shared some insight into her self-efficacy, unprompted, and cited several design features as sources. In the excerpt below, she referenced "the other song," a 32-bar tune she was playing in her jazz ensemble at school (not in the research study), comparing it to "Impressions." Sam was one of three Yellow Combo members with jazz ensemble experience (Orange also had three), and one of two with prior jazz improvisation experience (Orange had one). Sam's explanation of her higher self-efficacy included references to three design features: (a) forming jazz combos, (b) revealing "hidden" jazz improvisation practices, and (c) implementing harmonic form sequencing. Sam cited the context, a mixed-experience jazz combo environment in which others were not "judging" her and there was no "pressure" to perform. She reported knowing "what to do," indicating she believed she had the tools to



perform the improvisation task. Sam's "what" likely included the strategies I had presented in class and coached her through using (for drummers, one strategy was based on orchestrating one-bar phrases and another was based on orchestrating the tune's melody). Finally, Sam compared her self-efficacy for improvising to "Impressions," a tune in the study, to "Perdido," a tune she was playing in her school jazz band. She reported that it was higher for "Impressions." This suggested to me that the source of her preference was either the improvisation task itself, performing the task in the context of the study's learning environment, or both:

*"I have a thing that I have to say. I think I know why I prefer soloing on 'Impressions' versus the other song [Perdido]. First, I know what to do. Second, I know I'm not going to have to perform this [onstage for an audience], so I don't have to make anything final. I don't have to be like 'This is what I have to do! This is what people are judging me on!' I can just be like, 'You know, there are people in this room, they're younger than me, and they can just listen to me do whatever I want.' Less pressure," (gives a thumbs-up)*

It is significant that Sam reported such high self-efficacy in Week 5, because quantitative results showed significant self-efficacy gains even in the first 6 weeks of the 12-week instructional period. The evidence above lends credence to the claim that the learning environment supported the significant gains.

Finally, at the end of Week 5, Sam again cited one of the scaffolds as a source of her self-efficacy, as well as shared insight into her emotional well-being. First, she requested assurance that she could use the one-bar phrases page from the John Riley book when making her mid-instruction improvisation recording:

*SM reminds everyone that they're going to be making another solo recording after next week's class.*



*Noah: “Oh, I’m going to be so much better!”*

*Sam: “Can I bring the one bar phrases sheet, even if I’m not going to use it? Half the time I don’t even look at it anymore, but if I’m lost, I’m like, ‘there it is!’”*

Shortly afterwards, as we were cleaning up, Sam articulated her requirements for maintaining her emotional well-being when improvising, suggesting they were being met in the learning environment. Emotional well-being is, theoretically, connected to self-efficacy (Bandura, 1977). Unprompted, Sam told me, “Miss Marino, you’re doing a good job teaching, and I appreciate you organizing this class for us.” I appreciated her kind words, but I also wanted her to know that she was playing as large a role, or larger, than I was in her experience. I told her that I had noticed how willing she had been to approach challenging tasks during class, even when that choice might make her “uncomfortable,” and that her learning behaviors showed that she was “trying to get better” and to “learn and grow.” Sam explained that she welcomed “constructive criticism” as long as it was in a supportive environment: “Give me as hard constructive criticism as you want, just don’t be mean. I will break.”

**Week 11.** In Week 11, Sam’s self-efficacy remained high and she showed a new indication of self-efficacy, an ability to form expectations for success. This was a week before the combos held informal performances for their families at the end of the last class (separately, in their respective band rooms), and week before participants reported their self-efficacy by survey for the final time. Sam also performed mediating processes associated with achievement and showed evidence of achievement in Week 11.

Sam revealed in Week 11 that she believed she possessed the ability to perform a 12-bar blues improvisation task because she had a strategy, which was both a shift from her previous reliance on a scaffold, as well as connected to the second design feature, “revealing ‘hidden’



improvisation practices.” Sam had sounded confident when performing an improvised solo during class that day, and I asked her if she felt that way. She laughed, perhaps at the idea of her sounding or feeling confident when she played, then explained how she was approaching improvising. In the excerpt I referenced a “seed idea,” one of the creative writing techniques used at school:

*Sam: “I have my tactic of play the thing, the song, the drum form, and then just build off and add onto that. What’s our vocab word?” turning to Ruby.*

*SM: “Is that when you have a seed idea?”*

*Sam: “Yeah, and I build off of that.”*

Later in Week 11, Sam showed more willingness to take on challenge, and revealed an ability to form expectations for success. Her behavior, combined with the late point in the instructional sequence, suggested to me that the source of her self-efficacy was likely the amount of time she had spent in the learning environment., interacting with the design features. As in every combo in Week 11, I asked the Yellow Combo which pieces they wanted to perform for their families at the end of the next, and last class. Sam reported that even though she found one of the modal tasks more challenging, she was willing to approach the challenge and believed she could perform the improvisation task. In the excerpt I asked her about the difficulty of improvising over a straight versus a swung rhythmic feel, an issue she had previously referenced herself:

*Seamus plays the vamp from “Cantaloupe Island.”*

*Sam: “I do not want to play that one.”*

*Ruby: “Yes, I like that one.”*

*Sam: “I really don’t want to do that one.”*



*Noah: "Oh yeah, that one's fun."*

*Sam: "Cantaloupe Island's the hardest one for me to solo."*

*SM: "Why's that one the hardest for you?"*

*Sam: "'Cause I didn't practice it a lot. I wasn't there that one week."*

*SM: "It's not swung, does that make a difference to you?"*

*Sam: "Yeah, that too."*

*We reestablish that most of the jazz Sam has practiced has had a swung rhythmic feel.*

*SM proposes a bargain with Sam, that since we will pick two pieces, she can solo for the one that is not "Cantaloupe Island."*

*Sam: "I could hypothetically solo. Like it would just be uncomfortable. It's fine."*

*Sam requests that the second tune be "Impressions" (modal) or "Blues in the Closet" (12-bar blues) "because those are my two favorites."*

Before and after the preceding conversation, Liz successfully improvised over full choruses several times, as recorded in my descriptions of her improvised solos in the Week 11 transcripts. She performed the mediating process of applying strategies to the form and showed an ability to improvise according to criteria used to evaluate improvised solos in this study (elements of rhythm, melody, harmony, and style/expression):

Sam "goes for it". She shows no hesitation, and improvises rhythmic sequences that make sense. She slows down a little at the end but is in time when she returns to keeping time for the next soloist.

...

Sam solos, and again creates solid rhythmic ideas and musical sequences (she does slow down a little).



...

Sam performs a “joke” fill (she’s laughing), but it’s good. It fits the rhythmic feel of the tune and it really sets up the contrasting section.

Moments later, Sam’s “joke” fill inspired her to suggest how it could actually set up a potential rhythm section introduction to a performance of the entire tune. It was the catalyst for the entire combo performing the mediating process of collaborating to create an arrangement of the tune.

The final excerpts above illustrate two final and important steps in Sam’s self-efficacy. First, when offered the chance to avoid a challenging task, Sam instead chose it, and then articulated her expectation that she could in fact accomplish the task. This suggested to me that the brief moments of higher self-efficacy that Sam had shown in Week 2 might now have become more permanent beliefs about her abilities. Second, in Week 11 Sam’s higher self-efficacy for jazz improvisation appeared to more consistently match her actual jazz improvisation ability, or achievement. Considering that in Week 2 Sam showed low self-efficacy, unstable moments of higher self-efficacy, and an imbalance between her beliefs about her abilities and her actual performance, this positive ending was a meaningful and welcome departure where she began her self-efficacy journey.

### **A Collection of Case Studies Around Achievement**

When I watched the videos of classes and reviewed the transcripts, I found that (a) the story of how achievement emerged in this study was not limited to the participants who behaved exactly as I predicted in the learning environment, but that there were alternate paths that individuals took on their ways to reaching significant jazz improvisation achievement gains, and (b) the coaching element of revealing “hidden” jazz improvisation practices was a key source of mediating processes associated with achievement and achievement outcomes. Earlier in this



chapter, under the sections that described the four critical features of this study's learning environment, I reported how I implemented the design features, and participants performed the associated mediating processes. I connected these ideas to outcomes. Unsurprisingly, much of my findings relied on Yellow and Orange Combo participants making their thinking visible. Not all participants in those combos made their thinking visible, though. In particular, two Orange Combo participants were infrequently vocal in class, and one Yellow Combo member talked a lot but showed a disconnect between what he said and what he did (e.g., he would report playing "random notes" but sound as if he was playing with purpose). Per my field notes, these three participants were representative of participants in other combos in the study who made significant progress but, in similar fashion, did not make their thinking visible. Therefore, below I examine how three Yellow and Orange Combo members, Seamus, Susanna, and Christopher, behaved in the learning environment, and how these behaviors were linked to achievement. Specifically, I looked for ways that they interacted with design features and performed mediating processes, whether they did so in the way I "expected" them to or not.

To put individual gains in the context of the study's overall achievement outcomes, the table below compares Seamus, Susanna, and Christopher's individual achievement scores to study means (Table 26). The table shows that all three participants began the study with below average pre-instruction scores but finished with above average post-instruction scores. Their significant growth suggests that their case studies could provide insight into how the learning environment proved effective both for learners who did not make their thinking as visible as others, as well as those who entered the learning environment with below-average readiness levels. Below the table I present Susanna and Christopher's cases first, and together, because



they exhibited similar behaviors, were members of the same combo, and, as bass and drum set players, otherwise functioned as a “team.” Seamus’ case follows.

*Table 26. Yellow and Orange Combos, Achievement Comparison by Participant.*

<b>Participant</b>		<b>Pre- instruction combined composite achievement, two tasks one score (min=48, max=336)</b>	<b>Mid- instruction combined composite achievement, two tasks one score (min=48, max=336)</b>	<b>Post- instruction combined composite achievement, two tasks one score (min=48, max=336)</b>	<b>Gains (pre-inst. to post- inst. change)</b>
Study Means		<b>102.36</b>	<b>162.93</b>	<b>182.94</b>	<b>80.59</b>
<i>SD</i>		<i>30.90</i>	<i>40.86</i>	<i>38.90</i>	<i>48.89</i>
Yellow	Seamus	82.34	155.33	212.66	130.32
Orange	Susanna	65.66	128.07	197.67	132.01
	Christopher	94.33	139.67	214.66	120.33

**Susanna and Christopher.** Susanna and Christopher’s case study suggests how important it was that this study’s learning environment (a) provided space for students to engage musically without always engaging verbally and (b) allowed and encouraged participants to interact individually with the teacher, especially in the first 6 weeks. The cognitive apprenticeship elements of this learning environment laid the groundwork for the latter, encouraging the design feature sub-element of coaching as an integral part of the relationship between teacher and student. For Susanna and Christopher, mediating processes of performing ensemble roles, experimenting with improvisation strategies, and self-assessing were other likely sources of achievement. Finally, their decreased reliance on coaching, over time, suggests that it may have been a source of self-efficacy.

Susanna and Christopher’s cases prompted investigation because, like many participants overall, they actively participated in class and achieved significant achievement gains over the course of the instructional period, but unlike some other participants in the Yellow and Orange



Combos, they rarely perform mediating processes through volunteering to speak in front of the combo. They therefore potentially represented participants from outside the Yellow and Orange Combos who behaved similarly in the learning environment. Susanna and Christopher were two seventh graders in the Orange Combo with average music aptitude. Both had experience in a school jazz ensemble on different but related instruments (Susanna on guitar, instead of the bass guitar she played in the study, and Christopher on auxiliary percussion, instead of the drum set he played in the study). In the Weeks 2, 5, 8, and 11 transcripts neither Susanna nor Christopher ever volunteered to improvise first; Susanna infrequently volunteered to answer questions about musical elements or improvisation strategies posed to the whole class, and Christopher never did. In Week 2, I started participants off early in the instructional period working with partners to lower any potential anxiety of sharing ideas in front of the whole class. Susanna and Christopher were partners, and the only Orange Combo participants who did not talk to each other. To an outside observer at our class, these behaviors might have suggested a lack of motivation or self-efficacy and a lack of engagement with elements designed to support Susanna and Christopher's achievement. Susanna and Christopher both, however, reported motivation and self-efficacy close to the study means, and otherwise engaged with elements of the learning environment designed to support achievement. I outline below how they performed a variety of non-verbal, musical mediating processes that were sources of achievement, and regularly communicated with me, the teacher, through seeking out, participating in, and responding to coaching.

***Musical mediating processes.*** This first collection of Susanna and Christopher's behaviors suggests that providing space for students to engage musically without always engaging verbally can support achievement. The mediating processes associated with achievement outcomes that Susanna and Christopher performed in the examples below (Table



27) were: (a) initiating and performing ensemble roles (design feature 1: forming jazz combos); (b) experimenting with and articulating musical elements characteristic of jazz and jazz improvisation strategies (design feature 2: revealing “hidden” jazz improvisation practices); (c) applying skills to the harmonic form and following the form (design feature 4: implementing harmonic form sequencing). Susanna and Christopher were able to musically engage in these processes without any expectation of speaking in front of the class, and I was able to observe and record evidence of their behavior. It is entirely possible that they thought through other mediating processes associated with achievement, such as identifying musical elements and improvisation strategies that other participants used, or self-assessing and assessing peers’ performances. There was no outward evidence of them performing these behaviors on their own, though, without coaching.

*Table 27. Susanna and Christopher Engage Musically in Mediating Processes Associated with Achievement.*

<b>Week*</b>	<b>Mediating process (design feature)</b>	<b>Transcript excerpt</b>
2	Applying skills to/following the form (df4)	Christopher improvises. It doesn’t follow the form as clearly as when he was playing time and filling every four bars, but it is primarily triplet-based, which shows he understands the rhythmic feel.
2	Performing Ensemble Roles (df1)	Susanna improvises. Even though her instrument is out of tune, it sounds like she is following the form. She’s mostly using a Charleston rhythm**. When her solo ends she has trouble getting back to playing the bass line under Christopher’s solo.
2	Experimenting with elements and strategies(df2)	Christopher and Susanna play independently while SM conferences with others.
2	Experimenting (df2)	Susanna plays independently.
2	Articulating elements and strategies (df2)	Christopher plays an example to Susanna.



2	Experimenting (df2)	Christopher and Susanna are playing on their own.
2	Perf. ens. roles (df1)	Susanna practices the suggested bass line independently (not just the root notes).
5	Articulating (df2)	Christopher writes “to not keep time while playing on different drums” on the community improvisation space poster.
8	Applying skills /following form (df4)	Susanna and Christopher trade 4s; Susanna goes first. Christopher imitates her rhythm in his, then appears to make up one of his own (not from the one bar phrases).
8	Experimenting (df2)	On his own, Christopher is trying the drum example on the rhythmic variations slide.
8	Applying skills /following form (df4)	SM counts off. Christopher and Susanna play and I don’t have to cue them as much as last time.
8	Experimenting (df2)	Christopher experiments with a triangle he decided to attached to his stand.
8	Experimenting (df2)	Susanna and Christopher are playing independently.
8	Perf. ens. roles (df1)	Susanna reviews the bass line on her own.
11	Applying skills /following form (df4)	Christopher improvises. It starts off in 4-bar phrases, adding more tones as he goes. At that point it gets a little busy and out of time, and doesn’t end very seamlessly.
11	Applying skills /following form (df4)	Susanna improvises; she follows the form.
11	Applying skills /following form (df4)	Christopher improvises. He uses some syncopated patterns and really develops one rhythmic idea.
11	Applying skills /following form (df4)	Susanna improvises. She makes logical tonal choices, and her rhythm contrasts with the written bass line, although she could still use more variety.
11	Perf. ens. roles (df1)	Susanna works on the repeating bass figure on her own.
11	Perf. ens. roles (df1)	Christopher brings his dynamic level up (he was playing under the soloists).

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*\* There are no Week 5 examples for Susanna because she was ill and did not attend class.*



Christopher found small ways to articulate improvisation strategies without doing so verbally, either writing them down or playing a musical example to a partner. In Week 5 Christopher articulated an improvisation strategy on the paper poster we used as a community improvisation space; he wrote that his strategy was “to not keep time while playing on different drums.” He may not have responded on occasions when I verbally addressed the group as a whole, but he did when I addressed the group in a poster. He took the initiative to write on the poster, which made his thinking visible in a community space. His written description of his strategy used the phrase “playing different drums” as a description of orchestrating rhythm patterns around the drum kit, as well as showed that he was separating the concept of improvisation from another one of his roles as a drum set player, “keeping time” (when Christopher used the term “keeping time” he was referring to a specific task that drummers perform in which they establish the rhythmic feel and the tempo, and was likely not suggesting that a drummer stop maintaining the tempo while improvising). In the end, though, this was only one of two examples of Christopher independently performing the mediating process of articulating improvisation strategies (in other instances he articulated strategies at my encouragement; those are detailed under “coaching”). A future iteration of this learning environment might provide additional opportunities, like the community poster, for participants to articulate improvisation strategies without doing so verbally.

Overall, the excerpts above show that Susanna and Christopher performed mediating processes associated with achievement, and suggest that even participants who infrequently made their thinking visible could engage in the learning environment and make gains. Many of the examples captured these two participants independently working on ensemble roles and experimenting with improvisation strategies when I was coaching other members of the combo.



They both used scaffolds when they worked on their own; Susanna used suggested bass lines and her chord tone sheet, and Christopher used his one-bar phrases page from the John Riley (1994) book. Their use of class time in between coaching and group work was likely key to their progress. These were times when they were working out ideas from the coaching exchanges and when they were experimenting with musical elements and improvisation strategies on their own. Other moments found Christopher showing understanding of ensemble sensitivity and balance, Susanna and Christopher needing less cueing when trading 4s, and achieving success when applying their skills to improvise over the entire form. Additional examples of their improvisation performances appear directly below, because those occurred in the context of coaching.

***Coaching.*** This second collection of behaviors suggests the importance of the design feature sub-element of coaching as a source of achievement and self-efficacy. This study's learning environment allowed and encouraged participants to interact individually with the teacher through coaching (associated with the second design feature, "revealing 'hidden' jazz improvisation practices"), which for Susanna and Christopher was especially essential in the first 6 weeks of the study. Coaching supported both of them as they developed their improvisation skills, as well their abilities to perform their ensemble roles, which relied on understanding and applying elements of music characteristic to jazz (e.g., the concept of swing). As evidenced in the transcripts, over time they sought out less coaching and, as the teacher, I initiated coaching less frequently.

The examples below reveal that when either Susanna or Christopher and I interacted individually, they performed mediating processes associated with achievement outcomes, including: (a) initiating and performing ensemble roles (design feature 1: forming jazz combos);



(b) experimenting with and articulating musical elements characteristic of jazz and jazz improvisation strategies (design feature 2: revealing “hidden” jazz improvisation practices; (c) self-assessing and giving peer feedback (design feature 3: promoting specific feedback); (d) applying skills to the harmonic form and following the form (design feature 4: implementing harmonic form sequencing). The examples are presented in tables for Week 2 (Table 28), Week 5 (Table 29), Week 8 (Table 30) and Week 11 (Table 31). I did not initiate all of the individual interactions that appear in the tables; Susanna sought out coaching during class on a regular basis and approached me with questions after class in Week 2. Christopher rarely sought out my assistance, but was open to it when I initiated interactions. For example, when our paths crossed during Week 5 clean-up, he and I engaged in a post-class discussion about improvisation strategies and ensemble roles. Both Susanna and Christopher participated in and responded to coaching when I initiated it. I coached both participants through improving their ensemble role performances and improvisation strategy implementation. Coaching included times when I worked one-on-one with each of them, while other participants worked on their own, as I had intended coaching to function in the learning environment. It also included times when I coached Susanna and Christopher individually but with the entire group observing. These were perhaps some of the most meaningful moments in terms of outcomes; their performances improved and their peers gave them feedback that likely supported self-efficacy and motivation (e.g., positive verbal feedback, applause). A change in frequency of coaching is highlighted below the tables.



*Table 28. Week 2 Susanna and Christopher Seek Out, Participate in, and Respond to Coaching.*

<b>Week</b>	<b>Context</b>	<b>Mediating process (design feature)</b>	<b>Transcript excerpt</b>
2	Teacher initiated	Articulating elements and strategies (df2)	SM: "Christopher has a totally different job. What was your strategy?" SM looks at Christopher. Christopher: "I just tried to match the beat of what the recording was, and then make some other moves in time."
2	Teacher initiated	Articulating (df2)	SM to the group: "How does being aware of the harmonic form help the drummer?" SM to Christopher: "You're not playing notes. What do you think?" Christopher: "I mean, drummers don't really do the harmonic form, they keep the beat, they keep things aligned."
2	Teacher initiated	Self-assessing (df3)	SM: "What do you guys think? What's happening there?" Susanna: "I went a little bit fast."
2	Teacher initiated	Experimenting with elements and strategies (df2)	SM switches seats with Christopher. She and Christopher pick a one-bar phrase from the John Riley (1994) book together. SM shows him how to use the selected phrase as a fill while following the form. SM: "Every fourth bar, throw it in. Does that make sense?" They switch seats so Christopher can perform the same task.
2	Teacher initiated	(df2 - coaching)	SM goes over to conference briefly with Christopher (inaudible).
2	Teacher initiated	Experimenting (df2)	SM: "Christopher, I have something else that I think you should do." SM and Christopher go over how to use the one bar phrases sheet, practicing 4 bars of time and 4 fills in a row. SM: "When you do 4 fills in a row, they're not really fills anymore, they're four one bar phrases. That way you start chaining them together, and it creates a solo effect as opposed to a fill effect"



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| 2 | Teacher initiated | Performing ensemble roles (df1)<br><br>Following the form (df4) | <p>SM: "I think maybe Christopher needs to go a little bit slower."<br/> SM starts singing the bass line while clapping the swung rhythmic feel and Christopher plays cymbal along with her.<br/> SM to the group: "We can sing our melody along with them."<br/> Susanna and Christopher play while everyone else sings. It starts off together then separates.<br/> SM: "It's like the more measures we go the farther apart you are, but you started off together that time."<br/> Susanna: "I sped up that time."<br/> SM: "Susanna, can you play just the root notes? Just to key into the tempo?"<br/> Susanna: "Yeah"<br/> SM sings an example of four bass root notes per measure instead of the walking bass line.<br/> Susanna and Christopher play while SM sings and clap the swung rhythmic feel. They stay together. Christopher's swing beat makes sense and Susanna is in time.<br/> SM: "That's more together. I think you should do that this time."<br/> "Yeah" Susanna<br/> SM: "Everyone else do your normal job, and Susanna's going to try that."<br/> SM to Susanna: "Just to key into the tempo, not because you can't play the other notes, because you can."</p> |
| 2 | Teacher initiated | Experimenting with elements and strategies (df2)                | SM goes over and coaches Susanna through playing some rhythm patterns with root notes.  |
| 2 | Teacher initiated | Perf. ens. roles (df1)  | SM goes over with Susanna to help her stay in time.   |
| 2 | Teacher initiated | Experimenting (df2)   | <p>Susanna hasn't played anything on her own.<br/> SM goes over and coaches her through playing some patterns with root notes.</p>  |
| 2 | Teacher initiated | Perf. ens. roles (df1)  | SM to Christopher: "How's your swing beat going?" (brief conference, inaudible)   |
| 2 | Teacher initiated | Experimenting (df2)   | <p>Wyatt plays the scale in swung 8<sup>th</sup> notes.<br/> SM: "Yeah – cool. Can you play it with Christopher?"<br/> SM counts off. Wyatt and Christopher play together.</p>  |
| 2 | Student initiated | Self-assessing (df3)  | <p>Susanna to SM: "I get ahead at one part and then I finish like a measure early."<br/> SM: "You do? Well, let's stop after 12 measure and see where you are."</p>   |



2	Teacher initiated	Perf. ens. roles (df1)  Self-assessing (df3)  Following the form (df4)	SM to Susanna: "Were you at the end of the 12?" Susanna: "A little bit ahead." SM to Susanna: "Let's hear you and Christopher together, because you're a team." Susanna and Christopher play together, but are not in time.
2	Teacher initiated	Self-assessing (df3)  Following the form (df4)	SM cuts off. SM to Susanna: "Was that 12 measures for you?" Susanna: "Yeah."
2	Student initiated	Performing ensemble roles (df1)	Susanna asks about what she should play for the bass line. SM: "You could even do what you did before, 4 quarter notes."
2	Teacher initiated	Experimenting (df2)	Susanna still hasn't said or played anything. SM goes over and coaches her through playing some rhythmic patterns using root notes.
2	Student initiated	Experimenting (df2)	Susanna to SM: "Is that [rhythm] too long?" SM: "How long is too long?" Susanna replies (inaudible). SM: "Ohhh...it's up to you, because they're your rhythms."
2	Student initiated	Performing ensemble roles (df1)	Susanna approaches SM after class. Susanna: "So by next week do you want like, solos, but not just playing like the root notes?" SM: "Well, no, you could just do ones with the root notes at this point. For your solo." Susanna: "Yay." SM: "I think you could practice the bass line with more than root notes." Susanna: "Yeah." SM: "But when you did root notes as the bass line, you and Christopher were just a better team." Susanna: "Yeah, I'm going to practice both."

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*Table 29. Week 5 Susanna and Christopher Seek Out, Participate in, and Respond to Coaching.*

<b>Week*</b>	<b>Context</b>	<b>Mediating process (design feature)</b>	<b>Transcript excerpt</b>
5	Performing ensemble roles (df1)	Performing ensemble roles (df1)	They're playing more together than last time, but Wyatt is changing chords at the wrong time (he's going double time) and Christopher has returned to his previous rhythmic issue on the cymbal (this time on the hi-hat).
	Experimenting with elements and strategies (df2)	Experimenting with elements and strategies (df2)	Wyatt raises his hand. Wyatt: "Either I went really slow or I went really fast. I think I went fast." SM: "Yes, good ear." SM has just Christopher and Wyatt play. SM: "It would help if we had a bass player keeping quarter notes, but it's okay." It's together but Christopher is still pseudo-shuffling. SM: "Christopher, you're doubling it up again, you're playing more of a shuffle." SM sings the swing pattern again. Christopher plays the cymbal and it's correct. Christopher and Wyatt play together again and it's correct. SM sings the head while they play. Richie goes where Susanna usually sits and pretends to play the bass while dancing to the beat.
5	Performing ensemble roles (df1)	Performing ensemble roles (df1)	Christopher asks if he plays the swing beat when it's not his solo.



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| 5 | Experimenting with elements and strategies (df2)<br><br>Applying skills to/<br>Following the form (df4)<br><br>Articulating elements and strategies (df2) | SM introduces the new strategy to Christopher in which he will orchestrate the melody of the tune on the drum kit.<br>The horns play the melody for the rhythm section.<br>Everyone sings the melody, even the rhythm section.<br>Richie asks what Christopher's highest sound is on his drum kit.<br>SM suggests listening to how many different tones/colors Christopher has on his drum set and he plays them for everyone.<br>Michael volunteers that the lowest is the bass drum and Richie agrees<br>SM invites Christopher to try the strategy again.<br>SM sings the first line; Christopher chooses to play it on the ride cymbal.<br>SM sings the second line; Christopher chooses to play it on a rack tom.<br>SM suggests that with that strategy he could then pick a third tone/drum for the third line OR use multiple tones.<br>Christopher: "Can I play different drums?"<br>SM: "Yes, you can go around the drum set." |
| 5 | Applying skills to/<br>Following the form (df4)   | SM counts off.<br>Richie and Marcello stand up to sing.<br>Christopher improvises while the horns sing melody.<br>Everyone spontaneously applauds for Christopher at the end.  |
| 5 | Articulating elements and strategies (df2)  | The combo is about to improvise to "Sonny's Mood for Two."<br>SM: "Christopher, what's your strategy?"<br>Christopher brings up the new strategy where the drummer orchestrates the melody of the tune on the drum kit.<br>Christopher: "Can I try the thing we did today [for 'Blues in the Closet']?"<br>SM: "Yeah, you could. That could transfer to any tune you're doing."  |
| 5 | Experimenting with elements and strategies (df2)  | Everyone plays on their own while SM conferences with Christopher.<br>SM sings and plays the rhythm she hears him playing on the cymbal, then contrasts it with singing and playing the correct rhythm on the cymbal.<br>Christopher performs it himself.  |



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| 5 | Applying skills to/<br>Following the form (df4)<br><br>Experimenting with elements and strategies (df2) | Christopher improvises, then everyone stops playing.<br>SM: "I like that you added extra notes at the end, where we [the horns] have a long note."<br>SM: "What if you just had the snare and the two toms? How would you do that?"<br><br>Christopher plays something more melodic than he had before, starting with the snare, then moving to the rack and floor toms.<br>SM: "I like that."<br>Wyatt: "Do that!"<br>Richie: "That was Coolio."  |
| 5 | Articulating elements and strategies (df2)  | SM and Christopher cross paths during clean-up.<br>"Christopher, I felt like you had a new solo breakthrough today."<br>Christopher: "I like the new improvisation strategy [of orchestrating the melody of the tune on the drum kit] better."<br>SM: "You do? Okay, cool. Even though you do like it better, you ended up making up some of your own stuff anyway. Even though that wasn't part of your original plan."<br>SM and Christopher briefly discuss how important a "solid" swing beat is.<br>Christopher nods. SM suggests he listen to swing beats on the recordings. |

*\* There are no Week 5 examples for Susanna because she was ill and did not attend class.*

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*Table 30. Week 8 Susanna and Christopher Seek Out, Participate in, and Respond to Coaching.*

<b>Week</b>	<b>Context</b>	<b>Mediating process (design feature)</b>	<b>Transcript excerpt</b>
8	Student initiated	Performing ensemble roles (df1)	The class is going to work on the melody in the B section of "Impressions." SM clarifies that Christopher is still playing a swing, Susanna the bass line, and Wyatt the chords. SM models the comping pattern on the piano and then Wyatt does it himself. Susanna: "Can I do just the root notes?" SM: "Yeah, you can."
8	Student initiated	Following the form (df4)	Susanna: "Are we doing the repeat? We're just doing the A section?" SM: "We're doing the whole thing. AABA."
8	Student initiated	(df2 - coaching)	The group prepares to do one more round of solos. Susanna asks SM a question (inaudible) and SM sits with her for a moment.
8	Teacher initiated	Experimenting with elements and strategies (df2)	SM to Christopher: "That was a different rhythm for you. I liked it." Wyatt: "I liked it. It was suspenseful." SM: "Where did it come from?" Christopher smiles and shrugs. SM: "Your own mind?" Wyatt: "His heart and soul." SM: "Well, I liked the variety. The double drums."

*Table 31. Week 11 Susanna and Christopher Seek Out, Participate in, and Respond to Coaching.*

<b>Week</b>	<b>Context</b>	<b>Mediating process (design feature)</b>	<b>Transcript excerpt</b>
11	Teacher initiated	Performing ensemble roles (df1)  (df3 – modeling feedback)	SM gives Susanna feedback about her bass line. SM: "That's really supporting the whole piece, and it sounds great." Susanna: "Thank you."
11	Teacher initiated	(df2 - coaching)	SM coaches Susanna (inaudible).



11	Teacher initiated	Performing ensemble roles (df1)	<p>Marcello counts off. Everyone plays the head of the tune. Christopher performs the cymbal ensemble hit too early. SM cues him to help him get back in.</p>
11	Student initiated	<p>Collaborating (df1)</p> <p>Giving peer feedback (df3)</p>	<p>Susanna raises her hand. Susanna: "Are we supposed to be doing the thing?" She explains that she wants Christopher to do the cymbal ensemble hits the last time through the head, not just at the beginning.</p>
11	Teacher initiated	Collaborating (df1)	<p>The combo is collaborating on a special ending, and Michael combines his classmate's idea with his own, suggesting "a trill and then 'bump'."</p> <p>Michael sings a stinger (a short, accented, final pitch). SM: "We should look at Christopher for when to do the 'bump'." SM gestures to the drummer. SM: "Can you end it?" SM gestures a cut-off. Marcello: "Like a 'pshhh'." Marcello imitates the sound of a cymbal choke. Christopher plays a cymbal crash. SM asks Susanna's opinion Susanna replies that she can't trill "so I'll just do this." She demonstrates a single note. SM counts off. Everyone plays the last four bars and performs the new ending plan. Christopher crashes a cymbal and Wyatt adds a glissando on the piano to end it. SM: "It's a little sloppy sounding, but it's a cool sloppy sound. We're all riffing on it. Is there anything else you want to change?" Susanna: "No, I like it."</p>

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Evidence from the transcripts show that Susanna and Christopher relied heavily on coaching in the first half of the instructional period, and less so in the second half. As time went on, both participants sought out less coaching, and I initiated less coaching. The former suggests that participants possessed the self-efficacy to perform more tasks on their own. The latter suggests that as the teacher I assessed their achievement as higher, and that they were therefore in need of less coaching. This decrease in coaching over time is evident in the fewer instances recorded in the transcripts: coaching instances decreased by an average of 76% between Week 2



(19 instances) and Weeks 8 and 11 (4 and 5 instances, respectively). It is important to note that although it appears that coaching decreased prior to the second half of instruction, from Week 2 (19 instances) to Week 5 (8 instances), one of the two participants (Susanna) was actually absent for the Week 5 class meeting.

Ultimately, the learning environment's design features encouraged Susanna and Christopher to perform mediating processes associated with achievement and self-efficacy outcomes. Their performance in class revealed growth in knowledge and skill, and their decreased need for coaching, over time, indicated both achievement and self-efficacy gains. These findings suggest that even participants who did not verbally make their thinking visible could fully engage musically with the learning environment's design elements.

**Seamus.** Seamus' case highlights how important it was in this learning environment to (a) allow and encourage participants to make their thinking visible through musical communication, not just verbal, (b) persist at encouraging reticent participants to make their thinking visible, and (c) allow and encourage participants to experiment with their own improvisation strategies and musical ideas. The cognitive apprenticeship elements of this learning environment established the foundation for the latter, emphasizing coaching and encouraging students to show understanding through articulating their thinking. Other likely sources of achievement for Seamus were mediating processes in which he experimented with improvisation strategies and assessed his performances.

Seamus' case warranted investigation because, like many participants overall, he made significant achievement gains even in the first 6 weeks, but unlike many other participants in the Yellow and Orange Combos, he did not make his thinking visible or otherwise clearly articulate his improvisation strategies until later in the instructional period. He therefore potentially



represented participants from outside the Yellow and Orange Combos who displayed similar behaviors. Seamus was a 6<sup>th</sup> grade piano player with high music aptitude, and no previous jazz ensemble or jazz improvisation experience. He followed a similar achievement trajectory to Susanna and Christopher, beginning below the study mean but making higher than average gains. As recorded in the transcripts, though, he interacted with the learning environment differently than they did. Seamus spoke in front of the entire class frequently, often volunteered to improvise first, sought and needed very little coaching on ensemble roles in order to perform them, and used scaffolds infrequently. Perhaps the only scaffold Seamus used was suggested chord voicings. Unlike Susanna and Christopher, who focused their efforts on limited improvisation strategies, Seamus experimented liberally with multiple strategies, primarily ones he created on his own. On the occasions when Seamus did articulate a strategy that he intended to employ, he primarily articulated it musically (literally playing an example of what he was thinking). The excerpts below describe: (a) the disconnect in the first half of the instructional period between what Seamus reported he was playing and what he actually played, often alongside his teacher's efforts to get him to make his thinking more visible; (b) the subtle shift in the second half of the instructional period in which he made some connections to class improvisation strategies and communicated musically to articulate his own strategies more clearly; and (c) a motivational interpretation of evidence that suggests Seamus' desire for musical and personal expression.

***The first half of the instruction period.*** In the Weeks 2 and 5 transcripts, Seamus struggled to articulate his improvisation strategies, but performed as if he did have some understanding of some of the “hidden” practices we were attempting to reveal in class, and regularly experimented with his own strategies. In this same time period during which he



described his improvisation strategies as “play random notes” and “keep being awesome,” his achievement scores showed that he made significant achievement gains. When, as his teacher, I questioned him, Seamus acknowledged his awareness that we were using root notes and chord tones in class, and that he might even be using them, too. It all began in Week 2 when Seamus reported using an improvisation strategy to “play random notes” at his pre-instruction recording. He also reported listening to “see if it sounds right,” which suggests that regardless of his inability to clearly articulate his pre-instruction strategy, he already understood the concept of experimenting with musical ideas and reflecting on his performance:

*SM: “When you went into your recording with me the first time, what were your strategies to improvise?”*

*Seamus: “Play random notes and see if it sounds right!” laughing.*

A bit later Seamus was supposed articulate his intention to use a “root note rhythms” strategy to his partner, a strategy in which we were creating swung and syncopated rhythms using root notes. Instead, he stuck to his pre-instruction, “random” strategy. When pressed, he conceded the root note element of the strategy; it is unclear whether he understood the strategy and intended to use it or was simply repeating a phrase used in class:

*SM: “Please tell your partner what you’re going to do.”*

*Seamus stands up and says to Tomas, “The same strategy that I always use! Do something random! Figure out if it sounds right!”*

*SM: “Wait a second! What strategy are we trying to use this time?”*

*Seamus: “Root notes.”*

By the end of Week 2, Seamus was still holding on to his “random” strategy claim. As in the previous example, below it is unclear whether Seamus was simply being agreeable or actually



agreeing. This excerpt shows the first time Seamus communicated an improvisation idea through playing a musical example, even if he did not intend it that way. He played a short motive, or a “lick” in the context of the conversation, perhaps for his own benefit, and not for anyone else (the Week 2, 5, 8, and 11 transcripts show a dozen examples of Seamus playing while I talked to him or while he talked to other people). As the teacher, though, I used his “lick” as an opportunity to engage him in a conversation about elements of strategy:

*SM: “I feel like you want to say you’re playing random notes, but I feel like that last time you weren’t just playing random notes,” to Seamus.*

*Seamus: “I didn’t know, I was just playing random! I was!”*

*Noah: “But based around?”*

*SM: “Well then maybe we need to just help you figure out what it is that you’re playing.”*

*Seamus plays a lick.*

*SM: “Look, what you just played was three notes in the chord.”*

*SM goes over to the piano and plays Seamus’ lick back to him.*

*SM: “Do you notice that?”*

*Seamus: “I do notice that.”*

*SM: “I just want you to know that you’re making more musical choices than maybe you think you are.”*

*Seamus keeps playing on his own.*

When Seamus improvised that week, he was already experimenting with his own strategies. I recorded twice in Week 2 that Seamus’ improvisations were “a mix of chords and melodic content,” as well as “little scalar riffs,” even though the lesson plan was to experiment with our first strategy, focusing on swung 8<sup>th</sup> notes and root notes. These observations lend credence to



the claim that there was a disconnect between Seamus' reported strategy and his actual performance.

Three weeks later, in Week 5, Seamus was still not independently articulating a clear improvisation strategy, and was continuing to experiment with his own strategies. To put the examples below in the context of Seamus' recorded achievement, Week 5 was a week before Seamus recorded mid-instruction improvised solos that totaled more than 70 points higher than his pre-instruction scores. Class began with participants writing improvisation strategies on the community improvisation strategy poster spaces. At this point in instruction, I had presented three strategies that a piano player like Seamus could employ ("root note rhythms," "chord tone rhythms," and "question and answer", described under "Design feature 2"). Participants focused primarily on note choice on the poster, with the exception of the drummer, who referenced melody as a concept composed of both rhythmic and tonal elements:

"Using chromatic scales"

"Use root & chord notes" with an arrow to "3rds, 7ths, and maybe 5ths"

"Octaves and neighbor notes"

"Keep time + 1 bar phrases melody"

In contrast, Seamus wrote:

"Using random notes"

"Play something and see if it sounds good"

As in Week 2, Seamus did not articulate a strategy on the Week 5 poster, but he did express an intent to experiment with musical ideas and reflect on them. Similarly, the transcripts also showed that not much had changed since Week 2. When prompted to articulate an improvisation strategy, Seamus announced his intention to "keep being awesome." The exchange ended the



same way as those in Week 2, with the teacher attempting to coach Seamus through articulating a strategy, and Seamus responding with what sounded like agreement but did not clearly indicate intent:

*SM asks Seamus and Noah what they're going to do when they improvise.*

*Noah: "Chord tones."*

*Seamus: "I'm going to keep being awesome."*

*SM: "What's your actual plan?"*

*Seamus: "Keep being awesome."*

*SM: "Can you involve some chord tones in that?"*

*Seamus: "Yes."*

I recorded that in Seamus' subsequent improvisation he played "a bunch of pretty chromatic stuff. It's very creative and does have a great musical shape to it, but doesn't seem to have to do with the chords very much. Some of it at the end does."

***The second half of the instruction period.*** For Seamus, Week 8 marked a subtle shift towards more clearly articulating improvisation strategies, and supported the idea that, as the teacher, it was effective to persist in getting him to do so. In the Week 8 transcript, for the first time, he did not describe his strategy as random. He also purposely used a musical statement to articulate his strategy in a musical statement:

*Seamus: "I want to try doing this," playing a twinkly little motive high up on the keys.*

*SM: "Where are you getting that from?"*

*Seamus: "I don't know, that just really sounds good to me."*

Seamus was more responsive to probing that week, too, and at the end of Week 8 he finally revealed a little more about his thinking. It is unclear whether he did so because of increased



self-awareness, increased motivation, or both. The conversation started because his classmate, Ruby, had commented that she liked something he played in his improvisation, but did not know what to call it. After Seamus played a few examples for Ruby, it turned out that what she liked was something I described in the transcript as a “sequence of chromatic, descending tone clusters.” This was my best effort to record Seamus’ musical idea in writing. The conversation continued when, as the teacher, I tried to uncover Seamus’ musical choices or inspiration for that performance:

*SM: “Before you started, what was your plan? It wasn’t a very formed plan.”*

*Seamus: “Oh, you know, root notes. Go with the flow.”*

*SM: “Are you just playing what sounds good to you at the time?”*

*Seamus: “Yes,” playing while he and SM talk.*

*SM: “Right before it comes out, do you know what’s going to come out?”*

*Seamus: “I know it’s going to be something around that one note. So, if I’m going to play the Bb7 chord on the first line, I know I’m going to have to play something around the Bb. Like in a range of a few notes.”*

*SM: “So you have more of a plan than I think you’re saying. Like you’re saying ‘I have no plan, it’s just going to be amazing.’ But you’re using notes in the chord. You’re being creative with the chord.”*

*Seamus nods while playing.*

Transcripts of Seamus’ achievement in Week 8 show that he performed two other full choruses, both with musical expression, and one with more musical relevance to the harmonic form than the other. He also volunteered an idea about ensemble sensitivity and balance that, as



compared to his improvisation, showed greater musical intent and clearer strategy articulation. I recorded evidence of those as follows in the transcript:

*Seamus really combines melodic and chordal improv, scalar licks, tone clusters that work, and uses the range of the piano.*

...

*Seamus raises his hand to point out that during Noah's solo he comped [played chords] in a higher range of the piano and played more softly. SM suggests that his comping style helped bring out Noah's solo and compliment it.*

...

*Seamus' solo has nothing to do with the chord tones at first, or is maybe too chromatic to tell, but then it fits the chords.*

In Week 11 Seamus played a musical example to articulate his improvisation strategy, and in a separate event, showed his first real interest in a strategy that I presented in class. This class took place a week before he recorded two improvised solos that totaled almost 30 points higher than the study's post-instruction mean. I recorded in the transcript for that week that when he improvised he “follow[ed] the form, use[d] some question and answer, and also employ[ed] musical and expressive devices (melodic ideas contrasting with more chordal ideas, chromatic scalar ideas, glissandi, etc.).” Seamus did not articulate most of those strategies in the excerpt below, but he did offer one musical example of his own musical ideas (albeit while poking a little fun at the idea of articulating strategies):

*SM: “Did anyone else have a strategy they used and how did it go?”*

*Seamus: “I didn't use my strategy. My strategy was going to be this, but I ended up not using it.” Jokingly, Seamus turns on the piano's built in metronome to suggest that his*



*strategy was going to be a steady clicking sound.*

*Sam: "Your solo sounded really good today actually."*

*SM: "It did. I noticed you were using more chord tones than usual."*

*Seamus: "That's another thing I noticed. And I went like this," playing a musical example.*

A bit later the same class, Seamus expressed, for the first time, what appeared to be honest interest in a class improvisation strategy, the last of seven strategies for a piano player like himself. Instead of playing on his own while I coached a classmate, as he usually did, Seamus looked and listened closely as Ruby worked through her attempt at the "storyline" strategy. He chimed in at the end with his interest in the strategy. The exchange below includes a reference to a "chorus," which in a jazz context is one complete run-through of the harmonic form, usually for the purpose of improvising (as opposed to playing the head of the tune):

*Ruby: "I had a strategy for my first solo. For my second solo I kind of forgot what I was doing. My first solo I tried to incorporate chord tones, but I also tried to do more of that because that's not something I've typically done," gesturing to storyline graphic on the board.*

*Ruby: "It didn't really work."*

*SM: "Do you think it could work, though, if you tried again?"*

*Ruby: "Maybe. I don't know."*

*SM: "Sometimes I feel like I need more time to make that work, maybe two choruses?"*

*Ruby: "I don't know," adding that she gets frustrated that her dynamic range does not have as much contrast as other instruments.*

*SM: "Well, maybe your climax wouldn't be in dynamics, in volume, maybe it would be*



*density of notes. Maybe you want to play faster, more compacted rhythms.”*

*SM sings an example.*

*SM: “Maybe it gets busier at the climax instead.”*

*Ruby: “Alright,” nodding.*

*Seamus: “I can do that, too.”*

Seamus’ reaction to Ruby’s and my conversation suggests that he either finally responded to weeks of persistent encouragement to experiment with a class strategy, or finally found a strategy that piqued his interest. Because the “storyline” was the most expressive strategy that I presented in class, and therefore the most characteristic of Seamus’ improvisation style, the latter is the most likely. I further discuss this idea next, in the final section.

***Musical and personal expression.*** As a final reflection on Seamus’ 12-week long journey towards more clearly articulating his improvisation strategies, I considered an interpretation of Seamus’ behaviors that brought motivation to the fore over achievement. I contemplated the possibility at the same time Seamus was not articulating improvisation strategies in the first half of the instructional period, he was also communicating what motivated him. Coupled with his other behaviors, perhaps Seamus was indicating that he was more interested in the musically expressive side of improvisation than he was the strategic side. Consider a small, but potentially meaningful example from Week 10. In Week 10 Seamus posted on the Yellow Combo community improvisation strategy space, writing, “Be the best Beyoncé impersonator!!”, then below it, “and by using chord tones.” On the surface, this appears half “silliness” and half improvisation strategy. The “silly” part, though, was genuine personal expression and was characteristic of Seamus’ musical performance overall. Starting right away in Week 2, the transcripts showed Seamus using various expressive devices (e.g.,



glissandi) in his improvisations, using the full range of the piano, and playing with expression. These ideas directly corresponded to items in the “style/expression” subscale of the JIPAM achievement measure. Seamus revealed that he understood his own desire to personally and musically express himself in an excerpt from the Week 5 Yellow Combo transcript. I facilitated a group discussion in each combo that week about why musicians are motivated to improvise jazz. During the Yellow Combo conversation, Seamus shared insight into his motivations for improvising (along with some misconceptions about the composer Mozart):

*SM asks why musicians improvise jazz in general.*

*Noah: “Because it’s original. And creative.”*

*Tomas: “Because it’s fun!”*

*Seamus: “Because it sounds good. And we want to do what we want!”*

*Sam: “To see how you want to express yourself.”*

*Seamus: “Because no one likes classical music; it’s too straight and annoying.”*

*Ruby: “To add personal expression and make every performance of a piece unique.”*

*SM: “When we improvise jazz we’re playing something no one’s ever heard before.*

*There’re so many possibilities for you to say your own musical ideas.”*

*Seamus: “I’m here because I don’t want to be Mozart and follow everything and I want to be myself!”*

*A brief discussion follows about how much improvising was in Baroque and Classical music in those eras.*

*SM: “In jazz it’s the centerpiece of what you do. It’s at the heart of what jazz is, to improvise. You’re becoming part of a community of people who do this all over the world.”*



All the participants in the excerpt above showed understanding of what might motivate them or others to improvise jazz, and how personal expression plays a part in improvisation. Seamus was the only one, however, who consistently and relentlessly improvised as if he was driven by musical and personal expression.

### **Conclusion**

This chapter has presented quantitative and qualitative evidence to support findings for each of this study's five research questions. To summarize all of the findings: (a) the learning environment was effective in supporting outcomes (achievement, self-assessment, self-efficacy, and motivation) and (b) evidence showed that the design features were sources of positive outcomes as well as how. Findings were divided into quantitative and qualitative results, of which the qualitative were more numerous and detailed. I review and summarize each below.

### **Quantitative Findings Summary**

Quantitative findings answered Research Questions 1-4. The primary finding for Research Question 1, regarding the effects of the learning environment on outcomes, was that there was a significant effect on all measured outcomes over time, not only for the 12-week duration of the instructional period, but even in the first 6 weeks. Investigation of Research Question 2, regarding the effects of this study's two harmonic form sequencing conditions, found that (a) there were no significant differences between conditions and (b) both conditions were sources of positive outcomes. Inquiry into Research Question 3, regarding potential interaction between other key variables and outcomes, revealed that (a) there was a significant interaction between assessed task and achievement and (b) participants made significantly higher gains improvising to the harmonic form of "Sonnymoon for Two," a 12-bar blues, than "Impressions," a 32-bar modal tune, regardless of condition. The single finding for Research Question 4,



regarding potential relationships among outcomes, was that there were minimal significant relationships among outcomes. Together, these findings revealed that the learning environment was effective in supporting outcomes for participants, regardless of combo or condition.

### **Qualitative Findings Summary**

The qualitative findings emanated from a thorough investigation into Research Question 5 (“Are the critical features of this learning environment sources of positive outcomes, and if so, how do the critical features promote mediating processes to produce positive outcomes ?”), which (a) revealed overall how participants interacted with the learning environment and (b) integrated those findings with the quantitative results. They confirmed, first and foremost, that the critical features of the learning environment were the sources of the positive outcomes in the quantitative findings. Evidence showed when and how participants successfully performed mediating processes, which I connected back to design features and forward to outcomes. This inquiry revealed changes in participants’ needs regarding specific design features and their sub-elements, including their related performances of mediating processes and learning outcomes. Findings for all individual design features confirmed the quantitative finding that both instructional sequences were sources of positive outcomes: participants in both conditions performed mediating processes associated with outcomes. Findings for design feature 4 (implementing harmonic form sequencing) offered insight into an additional quantitative finding, that there was a significant interaction between assessed task and achievement outcomes.

**Design feature 1 (forming jazz combos).** The findings for design feature 1 (forming jazz combos) were: (a) the mediating process of collaboration contributed to outcomes throughout instruction, with one kind of collaboration supporting outcomes in the first 6 weeks and another in the second; (b) participants’ ensemble roles understanding and performance



improved over time, which was connected to achievement; and (c) participants performed a unexpected mediating process: developing entitativity, which may have been associated with motivation outcomes. Collaboration was associated with participants' efforts to improve ensemble cohesiveness in the first half of the instructional period (e.g., performing with consistent tempo and style across ensemble members), and with creating arrangements of tunes in the second half (e.g., adding background figures, creating introductions and endings to tunes). Positive change in performing ensemble roles was associated with the former.

**Design feature 2 (revealing “hidden” jazz improvisation practices).** Design feature 2 (revealing “hidden” jazz improvisation practices) drove a large portion of the instructional content and mediating processes, and therefore provided myriad evidence of how participants behaved in the learning environment and how that was connected to outcomes. First, I found that the implementation of the learning environment was consistent for all participants, regardless of combo or condition. Some findings revolved around how participants performed mediating processes and interacted with design features: (a) participants successfully performed the mediating processes of experimenting with and identifying musical elements characteristic of jazz and jazz improvisation strategies as early as Week 2, as well as showed increased understanding and performance of these musical elements and improvisation strategies; (b) participants experimented with improvisation strategies throughout the 12-week instructional period but focused primarily on those strategies introduced in Weeks 1-6; (c) participants were more successful identifying musical elements characteristic of jazz and jazz improvisation strategies when prompted to listen ahead of time; (d) participants tended to articulate either rhythmic or pitch related parts of jazz improvisation strategies that they employed or intended to employ, rather than articulating both rhythm and pitch, even though most strategies presented in



class did combine these ideas; (e) participants benefitted from the freedom to pursue their own improvisation strategies; and (f) participants benefitted from options to make their thinking visible through musical and other non-verbal forms of communication. Other findings showed changes over time in participants' performances of mediating processes or need for design elements: (a) participants' need for modeling of musical elements characteristic of jazz decreased over time, which was evidence of achievement; (b) aside from cueing, which decreased over time, there was no evidence of a change in participants' needs for cognitive scaffolds; (c) participants' wants and needs for coaching, a source of achievement and self-efficacy, decreased over time. Evidence to support these findings emerged from analyses of video transcripts of instruction, written evidence of student work (including improvisation strategy posters), and my field notes.

**Design feature 3 (promoting specific feedback).** Findings for design feature 3 (promoting specific feedback) included: (a) there was a significant positive affect on self-assessment over time; (b) promoting specific feedback (self-assessment and peer feedback) supported achievement and self-assessment; and (c) over time, the type of self-assessment in which participants engaged changed. Evidence showed that participants moved towards more positive self-assessment from Week 2 to Week 5. Later, in Weeks 8 and 11, participants engaged in more insightful self-assessment.

**Design feature 4 (implementing harmonic form sequencing).** Findings for design feature 4 (implementing harmonic form sequencing) were that: (a) participants in both Groups A and B performed mediating processes that were likely sources of outcomes (applying musical elements and strategies to harmonic forms and following the form); and (b) there were differences between how participants interacted with different tasks, both assessed tasks and



those related to them. These differences included (a) musical content (less experienced instrumentalists were less likely to have learned the head of the tune, or original melodic material to “Impressions”); (b) rehearsal strategies (because “Impressions” was a 32-bar, AABA tune, participants rehearsed it in 8-bar chunks as well as 32-bar choruses, as opposed to “Sonnymoon for Two,” which they primarily rehearsed in full choruses); (c) participants seemed less aware of the harmonic form in “Impressions” (e.g., they got “lost” more often); and (d) participants showed a preference for harmonic forms other than that of “Impressions.” Evidence for the latter showed that when participants planned their final performances, only one combo chose “Impressions” as one of two tunes to perform for their families. All other choices were an unassessed modal tune (“Cantaloupe Island”), or one of two 12-bar blues, one assessed (“Sonnymoon for Two”) and one unassessed (“Blues in the Closet”).

Discussions in the next and final chapter summarize what has been learned through this study’s investigation and interpret the findings above. The implications of this study’s integrated quantitative and qualitative findings are discussed. Recommendations for future research and limitations for this study accompany that discussion.



## Chapter 5

This chapter summarizes and interprets the results and findings from the previous chapter and discusses their implications. The primary implication is that because this study's learning environment supported participants' achievement, self-assessment, self-efficacy, and motivation, that it is likely suitable for jazz educators and their 5<sup>th</sup>-8<sup>th</sup> grade instrumental beginning improvisers. A secondary implication is that, in similar contexts, educators likely have options for developmentally appropriate harmonic form sequencing (either beginning with modal tunes or 12-bar blues), but that they might consider potential achievement, self-efficacy, and motivational benefits of beginning with 12-bar blues forms.

The sections below summarize findings and highlight evidence that support these implications. They are organized by the study's quantitative and qualitative research findings (with respect to their corresponding research questions). The first of four sections of findings and implications discusses the finding for Research Question 1 regarding the effects of the learning environment on outcomes. The second section interprets findings related to Research Questions 2 and 3 regarding the effects of the two conditions as well as other key variables. The third section discusses a finding for Research Question 4 regarding potential relationships among outcomes. The fourth section examines multiple qualitative findings for Research Question 5 regarding how design features were connected to mediating processes and outcomes. This section reflects on how qualitative findings confirmed and illuminated quantitative results, and how this amalgamation informs implications. Recommendations for future research that are relevant to each finding are integrated into each of these four sections. A fifth section reviews study limitations before the sixth and final section, which brings the entire study to a close.



### **Findings for Research Question 1: A Significant Positive Effect on All Measured Outcomes Over Time**

Research Question 1 asked: “Does this beginning jazz improvisation learning environment (forming jazz combos, revealing “hidden” jazz improvisation practices, promoting specific feedback, and implementing harmonic form instructional sequencing) support middle school instrumentalists’ jazz improvisation achievement, jazz improvisation self-assessment, self-efficacy for jazz improvisation, and motivation towards jazz improvisation?” I found that there was a significant effect on all measured outcomes over time, not only for the 12-week duration of the instructional period, but even in the first 6 weeks. Statistical tests revealed the significant positive effect on achievement, self-assessment, self-efficacy, and motivation. Notably, participants made significant gains in the first half of the instructional period, which was composed of six 45-minute classes for each combo (and participant). The significant achievement and self-efficacy gains that this study’s participants made, over a relatively brief period of time, were consistent with the small body of existing jazz improvisation pedagogy research. Existing studies have shown that, even in a short time period, instruction can improve jazz improvisation achievement (e.g., Bash, 1983; Burnsed, 1978; Coy, 1989; Watson, 2010) and self-efficacy for improvisation (e.g., Davison, 2006; Watson, 2010).

The primary implication of findings for Research Question 1, as well as of the study overall, is that this learning environment is likely suitable for beginning jazz improvisation students in other elementary and middle school instrumental programs. Because this study’s findings have this potential to generalize to similar contexts, further research might seek to replicate results. Future studies may also investigate whether this learning environment is



effective in high school or college settings where musicians have more instrumental experience but little to no jazz improvisation experience.

**Findings for Research Questions 2 and 3: No Significant Effect for Conditions and a Significant Interaction Between Assessed Task and Achievement**

Findings for Research Questions 2 and 3 were related, and are therefore discussed together in this section. Research Question 2 was “ Does one harmonic form instructional sequence better support one or more outcomes?” My findings were that: (a) there were no significant differences between conditions (different harmonic form instructional sequences for Groups A and B) and that (b) both conditions were sources of positive outcomes. Research Question 3 asked “ Are there any interactions between other key variables and outcomes?” I found that there was a significant interaction between assessed task and achievement. All participants made significantly higher gains performing one of the study’s two assessed tasks, improvising over the harmonic form of “Sonny’s Blues,” than the other, improvising over the form of “Impressions.” The assessed tasks were based on harmonic forms, and therefore related to the two conditions investigated for Research Question 2 (different harmonic form instructional sequences), as well as design feature 4 (implementing harmonic form sequencing). Findings for design feature 4 are discussed under the section for Research Question 5 further below. The paragraphs immediately below interpret the findings for Research Questions 2 and 3, as well as suggest potential future research.

The findings for Research Question 2 suggest that teaching beginning jazz improvisers either modal or 12-bar blues harmonic forms first is likely to support all outcomes, including achievement, as it did in this study. Participants in both conditions achieved significant gains in all outcomes in the first 6 weeks of the study as well as over the entire 12 weeks, including in



achievement. Statistical tests did not reveal a difference between conditions for any outcome. These findings suggest that both instructional sequences were effective, and therefore both suitable for beginning improvisers. Even though the Group A participants made significantly higher mid-instruction achievement gains improvising over a harmonic form they had not yet studied (a 12-bar blues), the implication is not necessarily that they should have studied that harmonic form first. The implication, instead, is that they were able to transfer what they had learned about improvising jazz in their instructional condition/sequence (studying jazz improvisation using modal harmonic form tasks first) to a different, but related task (improvising over a 12-bar blues harmonic form). Educators of varied experience levels improvising and teaching improvisation may find this finding reassuring; it suggests that they may choose to start beginners with a harmonic form of their choice, perhaps one with which the teachers themselves are more experienced.

Although both instructional sequences were found to be effective, educators may consider the finding for Research Question 3—that participants performed significantly better on the 12-bar blues improvisation task—and draw two conclusions: (a) 12-bar blues harmonic forms are developmentally appropriate for beginners and (b) starting beginning improvisers with 12-bar blues may be preferable. Because these implications are related to those for design feature 4, under Research Question 5 further below, readers may refer to that section for an integrated discussion of implications and future research.

#### **Findings for Research Question 4: Minimal Significant Relationships Among Achievement, Self-Assessment, Self-Efficacy, and Motivation**

Results for Research Question 4, regarding potential relationships among outcomes, found only two relationships, both of which were specific to an instructional phase and task: (a) a



significant relationship between pre-instruction self-efficacy and achievement for “Impressions” and (b) a significant relationship between post-instruction motivation and self-assessment for “Sonnymoon for Two.” The lack of significant relationships among achievement, self-assessment, self-efficacy, and motivation suggests that, in this context, outcomes operated independently from each other. This result could be disappointing if the hope was for participants to make similar gains in all areas. Alternately, it could be encouraging because, in a study where there were significant positive gains in all outcomes, no single outcome’s gains were dependent on any other. Therefore, it was not necessary for a participant to excel in one area to excel in another. The two paragraphs below first discuss this finding as it relates to existing research, and then detail implications and recommendations for future research.

It is problematic to compare this study’s lack of relationships among outcomes to relationships in other jazz improvisation studies, primarily because the studies were so different. Three studies have found self-assessment to be the best predictors of jazz improvisation achievement (Ciorba, 2006; Ciorba, 2009; May, 2003). One of those studies found self-efficacy for jazz improvisation to have a large direct effect on self-assessment and a large indirect effect on jazz improvisation achievement (Ciorba, 2009). These studies’ participants were high school and college jazz ensemble members, though, and the studies were not instructional in nature; their goals were to determine which factors best predicted jazz improvisation achievement. The study that was the most similar to this study was an instructional study conducted with inexperienced jazz improvisers at the collegiate level (Watson, 2010). Both Watson’s (2010) study and this study featured relatively small samples (N=62 and N=43, respectively). Watson’s (2010) study collected evidence of achievement and self-efficacy, and like this study, found no relationship between the two.



If students' progress in jazz improvisation may not run parallel for all outcomes, then the implication for educators in similar contexts is that students may benefit from tracking progress in multiple areas, as opposed to just one (e.g., achievement). For example, consider a student who makes lower achievement gains relative to self-efficacy gains. Instead of focusing on achievement alone, an educator may take a two pronged approach: (a) provide cognitive support, but also (b) consider that the student's self-efficacy resources may encourage their continued work at improvisation, which may lead to future achievement. Educators therefore may continue to monitor students as individuals so that they can provide what they need, whether that is more or different scaffolds, modeling, or coaching, or simply more time. Future research might examine which elements of this study's learning environment best supported each outcome. This might provide guidance for educators hoping to support individual students make gains in a specific outcome.

#### **Findings for Research Question 5: Design Features as Sources of Outcomes**

Findings for Research Question 1 established the positive effects of the learning environment, and findings for Research Question 5 revealed how the critical features of that learning environment worked to promote positive outcomes. Because of the qualitative nature of Research Question 5 ("Are the critical features of this learning environment sources of positive outcomes, and if so, how do the critical features promote mediating processes to produce positive outcomes?"), many detailed findings emerged. The finding for the first half of Research Question 5 was that the critical features were sources of positive outcomes. The findings for the second half of the question can be sorted into two categories: (a) findings of when and how participants successfully performed mediating processes, which were connected back to design features and forward to outcomes; and (b) findings of changes in participants' needs regarding



design features and their sub-elements, including their related performances of mediating processes, which suggested learning.

The distinction between this study's inquiry and that of previous instruction-based studies was partly its investigation of self-assessment and motivation outcomes, but largely its qualitative investigation of the critical features of a learning environment. As stated under findings for Research Question 1, the significant achievement and self-efficacy gains that this study's participants made, in a short time, were consistent with the small collection of existing jazz improvisation pedagogy studies (e.g., Bash, 1983; Burnsed, 1978; Coy, 1989; Davison, 2006; Watson, 2010). In this study, however, analyzing video recordings, transcripts, and field notes from the instructional period offered a window into how participants interacted with and behaved in the learning environment. It showed evidence of predicted mediating processes, suggesting that the design features likely precipitated these behaviors and therefore promoted the outcomes. This design-based mixed methods approach lent credibility to quantitative findings for Research Question 1 and to the claim that the learning environment was effective.

I review detailed findings for Research Question 5, as well as implications and recommendations for future research, in the subsequent five sections. The discussion is first divided into four sections specific to each critical feature of the learning environment. The fifth and final section outlines overall implications and potential for future research.

### **Findings and Implications for Design Feature 1: Forming Jazz Combos**

The findings for design feature 1 (forming jazz combos) were: (a) the mediating process of collaboration contributed to outcomes throughout instruction, with one kind of collaboration supporting outcomes in the first 6 weeks and another in the second 6 weeks; (b) participants' ensemble roles understanding and performance improved over time, which was connected to



achievement; and (c) participants performed an unexpected mediating process: developing entitativity, which may have been associated with motivation outcomes. Entitativity is a type of group perception in which group members view their group as a cohesive whole and possess a sense of belonging related to that perception, their relationships to others in the group, and goals they share with those members. These findings were supported by evidence from video transcripts and field notes. For example, transcript analysis revealed that in Weeks 2 and 5 (the first half of the instructional period), participants primarily worked together towards improving ensemble cohesiveness, and in Weeks 8 and 11 (the second half of the instructional period), participants collaborated in their jazz combos to create arrangements. Positive change in performing ensemble roles was overwhelmingly associated with participants assessing and seeking ensemble cohesiveness.

The implication of these findings is that jazz educators might consider teaching jazz improvisation in a jazz combo context, as opposed to a like-instrument small group or a large ensemble like a big band. Future research might compare mediating processes and outcomes associated with teaching jazz improvisation in jazz combos to teaching it in the aforementioned groups. Inquiry into this area might reveal differences in each setting's effectiveness, as well as reasons for those potential differences.

### **Findings and Implications for Design Feature 2: Revealing “Hidden” Jazz Improvisation Practices**

There were ten findings for design feature 2 (revealing “hidden” jazz improvisation practices), the first of which showed that the implementation of the environment was consistent for all participants, regardless of combo or condition. I divided the remaining nine findings into the earlier categories of overall findings: (a) those that showed when and how participants



successfully performed mediating processes, which were connected back to design features and forward to outcomes; and (b) those that identified changes in participants' needs regarding design features and their sub-elements, including their related performances of mediating processes, which suggested learning. Findings for how participants performed mediating processes and interacted with design features included: (a) participants successfully performed the mediating processes of experimenting with and identifying musical elements characteristic of jazz and jazz improvisation strategies as early as Week 2, as well as showed increased understanding and performance of these musical elements and improvisation strategies; (b) participants experimented with improvisation strategies throughout the 12-week instructional period but focused primarily on those strategies introduced in Weeks 1-6; (c) participants were more successful identifying musical elements characteristic of jazz and jazz improvisation strategies when prompted to listen ahead of time; (d) participants tended to articulate either rhythmic or pitch related parts of jazz improvisation strategies that they employed or intended to employ, rather than articulating both rhythm and pitch, even though most strategies presented in class did combine these ideas; (e) participants benefitted from the freedom to pursue their own improvisation strategies; and (f) participants benefitted from options to make their thinking visible through musical and other non-verbal forms of communication. Findings that showed changes over time included: (a) participants' need for modeling of musical elements characteristic of jazz decreased over time, which was evidence of achievement; (b) aside from cueing, which decreased over time, there was no evidence of a change in participants' needs for cognitive scaffolds; (c) participants' wants and needs for coaching, a source of achievement and self-efficacy, decreased over time. The preceding findings emerged from analyses of video



transcripts of instruction, written evidence of student work (improvisation strategy posters), and my field notes.

The implication of these findings is that jazz educators might make an effort to include the sub-elements of revealing “hidden” jazz improvisation practices in their own teaching: (a) making musical elements characteristic of jazz explicit; (b) guiding students through identifying and exploring musical elements and jazz improvisation strategies; (c) modeling articulating musical elements and improvisation strategies; and (d) coaching individual students. In this study, these sub-elements elicited mediating processes from participants that led to desirable learning outcomes, mediating processes that included experimenting with, articulating, and identifying musical elements characteristic of jazz and jazz improvisation strategies.

Potential paths for future research around this design feature are as numerous as the findings themselves. Further inquiry is needed into which particular scaffolds are most effective and what methods of coaching best support achievement and self-efficacy outcomes. Investigations into which strategies students tend to implement independently, outside of those presented in class, might suggest what interests and motivates students, or reveal more about student cognitive processes. Future studies might also investigate revisions of this design element, focusing on how participants articulate jazz improvisation strategies or how the teacher introduces them. For example, exploring efforts to get students to articulate improvisation strategies that consider both rhythm and pitch might reveal whether such articulation is necessary to maintain similar achievement outcomes to those in this study. Offering more opportunities for students to articulate strategies non-verbally, such as encouraging musical dialogue (playing examples of strategies) or providing more spaces for students to record strategies in writing, might reveal more about how students perform that mediating process and what outcomes are



associated with different forms of articulation. Finally, future iterations of this learning environment might feature different pacing for introducing strategies, such as focusing on fewer strategies over a longer period of time, or differentiating strategy introductions for individual students.

### **Findings and Implications for Design Feature 3: Promoting Specific Feedback**

Findings for design feature 3 (promoting specific feedback) included: (a) there was a significant positive affect on self-assessment over time; (b) promoting specific feedback (self-assessment and peer feedback) supported achievement and self-assessment; and (c) over time, participants' self-assessments in class first became more positive (Week 2 to 5), then more insightful (Week 5 to 8 and 11). The first finding was quantitative. The second two findings were supported by evidence from the video transcripts of instruction.

The implications for these findings are that the benefits of the sub-elements of design feature 3 may generalize to other contexts. These sub-elements included modeling specific self-assessment as well as guiding students through self-assessing and giving peer feedback. Jazz educators who do not regularly encourage their students to self-assess may consider promoting more self-assessment. Those who already encourage their students to self-assess may conclude that their efforts are likely warranted and beneficial.

Future research might investigate variations of this learning environment that include variations on this design feature. Based on the qualitative findings for design feature 2, above, which found benefits to opportunities for participants to engage musically without engaging verbally, subsequent iterations of design feature 3 might also include more non-verbal ways for participants to self-assess. For example, participants could self-assess during class on a scale, as they did during quantitative data collection, and record self-assessments in writing or online.



They could keep track of changing self-assessments and reflect on sources of change, either in the same class period or over longer periods of time. The teacher could guide participants through this process and help them analyze patterns in their self-assessment. Efforts such as these might deepen participants' connection with self-assessment and with sources of achievement, specifically, the four subscales on which their improvised solos were judged in this study (rhythm, melody, harmony, style/expression).

### **Findings and Implications for Design Feature 4: Implementing Harmonic Form**

#### **Sequencing**

As readers may remember from earlier in this chapter, implementing harmonic form sequencing was a design feature in this study as well as the basis for a comparative case study to answer Research Question 2. For the comparative case study, two groups (A and B) studied the same harmonic forms, but in opposite sequences. Quantitative results showed no significant differences between conditions and revealed that both harmonic form instructional sequences were likely sources of outcomes. The implication was that the content and sequence of both harmonic form sequences employed in this study were appropriate for students at this developmental stage and in this context.

Qualitative findings for design feature 4 (implementing harmonic form sequencing) were that: (a) participants in both Groups A and B performed mediating processes that were likely sources of outcomes (applying musical elements and strategies to harmonic forms and following the form); and (b) there were differences between how participants interacted with different tasks, both assessed tasks and those related to them. These differences included musical content, rehearsal strategies, harmonic form awareness, and task preference (both assessed improvisation tasks and related ones).



Overall implications for design feature 4 are that jazz educators: (a) may choose to start beginners with a harmonic form of their choice, but (b) may consider potential benefits to starting beginning improvisers with 12-bar blues. As mentioned earlier, the implications for design feature 4's findings, which fall under Research Question 5, are similar to those for Research Question 3 ((a) 12-bar blues harmonic forms are developmentally appropriate for beginners and (b) starting beginning improvisers with 12-bar blues may be preferable). Implications for both are therefore discussed in more detail here together.

Considered together, the ideas presented in the previous paragraphs might assist educators in parsing available jazz literature and choosing instructional materials. As discussed in detail in Chapter 2, harmonic form sequencing varies greatly in available texts and collections (e.g., Aebersold, 1992; Baker, 1988; Coker, 1964; Levine, 1995; Zisman, 2005). When reviewing these materials, jazz educators may consider potential achievement, self-efficacy, and motivational benefits to starting beginning improvisers with 12-bar blues. First, jazz educators who previously assessed modal forms as "easier," due to their relatively slower harmonic rhythm, and 12-bar blues forms as "harder," due to their relatively faster harmonic rhythm, might reevaluate their position. They may instead consider that participants in this study showed better ability to follow the 12-bar harmonic form than the modal one, in which they more frequently got "lost", as discussed in Chapter 4. Second, they may consider this study's findings in the context of self-efficacy research, and the potential to support self-efficacy with what Bandura has called "mastery experiences." As referenced in Chapters 1 and 2, Bandura (1997) has theorized that "mastery experiences," or successful learning and achievement experiences, are among four sources of self-efficacy (along with vicarious experiences, social persuasions, and emotional and physiological indexes). Studies in other domains have investigated Bandura's



(1997) four sources of self-efficacy and found mastery experiences to be the greatest source of self-efficacy for middle school students (e.g., Usher, 2009; Britner & Pajares, 2006; Usher & Pajares, 2006a). Jazz educators may therefore conclude that they prefer to begin novice improvisers with tasks that hold potential for higher early achievement gains, even if student learning overall is not affected by task selection (modal or 12-bar). Third, jazz educators may consider potential motivational benefits, and choose to start beginning improvisers with 12-bar blues improvisation tasks based on student preference. Participants in this study showed that they preferred 12-bar blues tasks when they overwhelmingly chose them to perform for their parents at the end of the study. They chose both “Sonnymoon for Two,” an assessed 12-bar blues, and “Blues in the Closet,” an unassessed 12-bar blues. Future research could investigate whether any potential future differences in task performance are rooted in the nature of the harmonic forms (e.g., harmonic rhythm) or influenced by other factors (e.g., student preference, teacher preference, or teacher experience).

Future research might further investigate task choice and harmonic form sequencing, with the intent of providing educators with additional guidance. Recommendations for research include replicating this study: (a) with a different assessed tasks; and (b) to determine whether there are differences in achievement by assessed task in other settings, such as with participants of different age levels or experience. For example, another study might compare results of a 12-bar blues and modal tune in the same key, 12-bar and modal tunes that are more melodically similar to each other, or ones of more comparable length. Perhaps the results of this study would have been different had the assessed tasks been more similar in those ways, or if the participants had recorded improvised solos over the harmonic form of the other modal tune they studied, “Cantaloupe Island” by Herbie Hancock, a tune with a straight 8ths feel which had a faster



harmonic rhythm and fewer measures than “Impressions” (but still a slower harmonic rhythm and more measures than “Sonnymoon for Two”). Ultimately, investigating the myriad questions around jazz improvisation tasks and instructional sequences will likely provide many avenues for future research.

### **Overall Design Feature Implications and Recommendations for Future Research**

The primary implication of findings for Research Question 5 is that the positive outcomes for design features of this learning environment may generalize to similar 5<sup>th</sup>-8<sup>th</sup> grade instrumental music contexts to support learning for beginning jazz improvisers. Additionally, because the critical features of this learning environment were based on a cognitive apprenticeship model (Collins, 2006), a secondary implication of the findings is that such a model is appropriate for making jazz improvisation cognitive processes visible.

A related, tertiary implication for Research Question 5’s findings is that this study’s mixed methods design is an appropriate and effective model for investigating music learning environments (in particular, jazz improvisation learning environments). Alone, findings from the quantitative or qualitative evidence would be valid and useful. Together, however, they establish a more complete picture of the study’s learning environment and bolster each other’s claims, which, in turn, allows for more meaningful interpretation. For example, it is valuable to know that (a) participants made significant gains in all measured outcomes, as well as performed mediating processes associated with positive outcomes; (b) both conditions were sources of positive statistical outcomes, and participants in both Groups A and B performed mediating processes associated with learning outcomes; and (c) there was a significant interaction between assessed task and achievement outcomes, as well as differences in how participants interacted with assessed and related tasks in the learning environment. Considered together, these findings



confirm and strengthen each other. In particular, the qualitative findings offer insight into the quantitative ones, laying a stronger foundation for the study's implications and suggested directions for future research.

Considering the findings for all four critical features of the learning environment, and in light of their relation to the quantitative findings, directions for future research might include: (a) seeking to replicate this study's results through implementing the same learning environment in similar contexts; (b) investigating how more experienced instrumentalists interact with the critical features of this learning environment, and then going on to test iterations of the learning environment adapted to potential needs of older players; and (c) exploring further iterations of this learning environment in general. Researchers may investigate changes to smaller parts of this learning environment or variations on the larger design features, such as how or which elements are implemented. Smaller parts could include cognitive supports like scaffolds; future inquiry could reveal which scaffolds are most effective and why. Research around entire design features might stem from problems of practice in other contexts. For example, researchers might consider challenges that some educators could face when trying to implement design feature 1: forming jazz combos. These challenges could include scheduling issues, instrumentation limitations, or a lack of support from other stakeholders. Educators in these circumstances might choose to implement other critical features of this learning environment, but in a like-instrument small group or large ensemble setting. Therefore, as suggested earlier, researchers might investigate the effects of this learning environment when a critical feature, such as forming jazz combos, is replaced with a different, but related, design feature. Finally, as suggested in the previous sections, additional studies are needed to explore outcomes related to future iterations of this learning environment. Iterations of particular interest to this researcher, based on this



study's results, are ones that would: (a) implement different pacing and/or a differentiated approach for introducing strategies; (b) incorporate additional forms of self-assessment, such as offering more non-verbal forms of self-assessment and helping students track and analyze their self-assessment over time; (c) introduce and assess different tasks; and (d) implement additional and various harmonic form sequences.

### **Limitations**

A number of limitations should be considered when interpreting the results of this study. First, the number of participants was small (N=43). Second, because they self-selected for this research study, participants potentially entered the study with a predisposition to work towards acquiring new knowledge and skills. This should not, however, discount their significant progress in all outcomes, especially because self-selection is typical in instrumental music and jazz learning environments in schools. Third, there are limitations to self-reporting in any study. Self-reporting was used in this study's quantitative data collection when participants self-assessed their performances, rated their self-efficacy for jazz improvisation, and rated their motivation towards improvisation. Self-assessment and self-efficacy, however, are inherently based on self-perception, which may have mitigated self-reporting limitations for those outcomes. Additionally, because this was a design-based mixed methods study, the qualitative video recorded evidence offered an additional perspective outside of self-reporting.

There were several limitations associated with the circumstances under which participants recorded their improvised solos. All solos were performed and recorded over play-along/backing tracks, even though during the instructional period participants improvised both in the context of a jazz combo (at school) and to play-along tracks (at home). Collecting evidence using the backing tracks allowed for more uniform conditions; each participant was able to



improvise over a consistently performing, reliable rhythm section. It also avoided the obvious problem of making pre-instruction recordings with novice rhythm section players who had not yet participated in any instruction, and who were therefore not prepared to perform ensemble roles to support soloists. The former and the latter benefits, though, gave way to a limitation – recording improvised solos to backing tracks eliminated one of the critical features of the learning environment: the jazz combo. Therefore, some of the organic, collaborative nature of participants' performances was sacrificed for comparative purposes. A future study might commit a period of instruction to ensemble roles and skills before beginning improvisation instruction, then record participants twice at each data collection juncture (pre-, mid-, post- or pre-, post-): (a) once playing along to backing tracks and (b) once playing with live jazz combos. This would generate two sets of recordings for evaluation and comparison.

Finally, because participants performed the same tasks at pre-, mid-, and post-instruction, it is important to acknowledge the possibility of a test-retest effect on achievement. The nature of this study's tasks, however, likely mitigated this effect. Because these were improvisation tasks, the intention was for participants to spontaneously compose a new piece of music each time they were tested. Therefore, the task was the same at pre-, mid-, and post-instruction data collection, but the expected response was different. This is unlike other musical tasks, ones which might elicit improvement simply through repetition. For example, a musician can only sight-read a notated piece of music once, say, on a pre-test. Every subsequent test of that piece might show improvement because the musician would have prior knowledge of the rhythms, melodies, and expressive elements of the piece. In this study, however, students had no such prior knowledge, because they were composing new rhythms, melodies, and expressive elements each time. Arguably, at mid- and post-instruction data collection, participants in this study had



prior knowledge of the rhythmic feels, heads (original melodies), and harmonic forms of the tested pieces, information upon which they could draw to improvise. As described in Chapter 4, though, participants entered the study not knowing what some of this information was, let alone its usefulness. If they did understand that some of it might be useful, they did not know how to apply their knowledge of it to perform an improvisation task. Therefore, although the skeletons of the tasks were repeated at pre-, mid-, and post-instruction data collection, it is likely that participant performance on the tasks changed as a result of instruction, not repetition. Combined with the improvisatory nature of the tasks, any potential retest effect was likely low.

### **Conclusion**

The primary implication of this study is that jazz educators in elementary and middle schools, and possibly those in other contexts with inexperienced jazz improvisers, might consider implementing this study's learning environment as a way to support students in jazz improvisation achievement, self-assessment in jazz improvisation, self-efficacy for jazz improvisation, and motivation towards jazz improvisation. A secondary implication is that, in similar contexts, educators likely have options for developmentally appropriate harmonic form sequencing (either beginning with modal tunes or 12-bar blues), but that they might consider potential achievement, self-efficacy, and motivational benefits of beginning with 12-bar blues forms. These contributions to the body of jazz improvisation research are important because existing jazz improvisation research is limited, including smaller categories such as pedagogical research and research with beginning improvisers.

Finally, because this study has contributed to what research tells us about how novice jazz improvisers learn, it warrants replication as well as investigations into future iterations of the learning environment. In the past, researchers have suggested that future studies should



investigate which methods are most effective (Azzara, 2002; Bowman, 1988; May, 2003) and at which stages of musical development different methods are best introduced (Azzara, 2002; Bowman, 1988; Kratus, 1995). This study has contributed to these calls for such efforts, but it is still only one study. Future research might also investigate the effects of critical features of jazz improvisation learning environments through design-based mixed methodologies. Hopefully research will continue to expand, helping jazz educators understand more about how to bring young instrumentalists into the jazz community, enrich students' experiences with this American art form, and ultimately improve outcomes for beginning jazz improvisers.



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Appendix A

School X Recruiting Fliers



# DO YOU PLAY AN INSTRUMENT?



## WOULD YOU LIKE TO BE PART OF A MUSIC STUDY?

Miss Marino, your band director here at Knollwood School, is conducting a jazz research study. The goal of the study is to find out if and how a jazz improvisation course helps young musicians like you learn to improvise jazz. Participants will be 6th-8th grade instrumentalists who have little or no jazz improvisation experience, but who are musically ready for the course. This may include some 5th graders. The course will meet weekly for 12, 45-minute sessions starting in January. For more information, including a course calendar and a consent form with details, type the link below into your browser or select the eighth note icon above.

<https://drive.google.com/drive/folders/0B-mT69eIevaqbWcwTVFQamFXN2M7nusp=sharing>



# DOES YOUR CHILD PLAY AN INSTRUMENT?



## WOULD THEY LIKE TO BE PART OF A MUSIC STUDY?

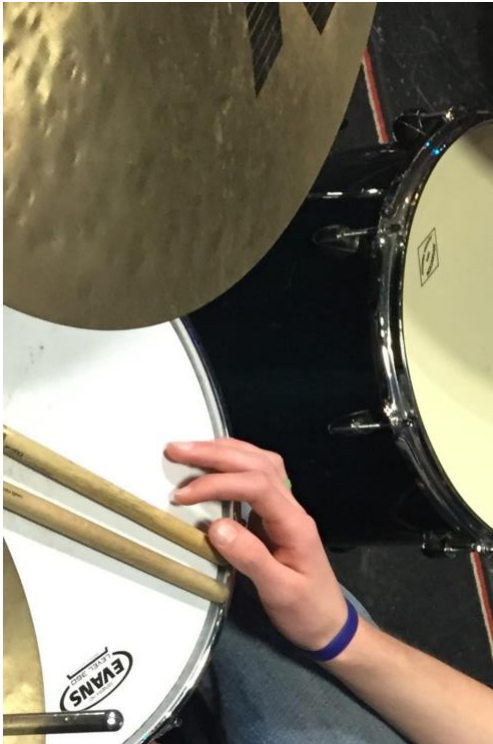
Miss Marino, your child's band director here at Knollwood School, is conducting a jazz research study. The goal of the study is to find out if and how a jazz improvisation course helps young musicians learn to improvise jazz. Participants will be 6th-8th grade instrumentalists who have little or no jazz improvisation experience, but who are musically ready for the course. This may include some 5th graders. The course will meet weekly for 12, 45-minute sessions starting in January. For more information, including a course calendar and a consent form with details, type the link below into your browser or select the eighth note icon above.

<https://drive.google.com/drive/folders/0B-mT69eIevaqbWcwTVFQamFXN2M7nusp=sharing>



Appendix B

School Y Recruiting Fliers



# DO YOU PLAY AN INSTRUMENT?

⌚

## WOULD YOU LIKE TO BE PART OF A MUSIC STUDY?

Miss Marino, the band director at Knollwood School, is conducting a jazz research study. The goal of the study is to find out if and how a jazz improvisation course helps young musicians like you learn to improvise jazz. Participants will be 6th-8th grade instrumentalists who have little or no jazz improvisation experience, but who are musically ready for the course. This may include some 5th graders. The course will meet weekly for 12, 45-minute sessions starting in January. For more information, including a course calendar and a consent form with details, type the link below into your browser or select the eighth note icon above.

<https://drive.google.com/drive/folders/0B-mT69eIevaqBwTVFQamFXN2M7usp=sharing>



# DOES YOUR CHILD PLAY AN INSTRUMENT?

⌚

## WOULD THEY LIKE TO BE PART OF A MUSIC STUDY?

Miss Marino, the band director at Knollwood School, is conducting a jazz research study. The goal of the study is to find out if and how a jazz improvisation course helps young musicians learn to improvise jazz. Participants will be 6th-8th grade instrumentalists who have little or no jazz improvisation experience, but who are musically ready for the course. This may include some 5th graders. The course will meet weekly for 12, 45-minute sessions starting in January. For more information, including a course calendar and a consent form with details, type the link below into your browser or select the eighth note icon above.

<https://drive.google.com/drive/folders/0B-mT69eIevaqBwTVFQamFXN2M7usp=sharing>



## Appendix C

## Consent and Assent Documents

Investigator: Sara E. Marino

Organization: Rutgers University

Study Title: “Jazz Improvisation Pedagogy: Evaluating the Effectiveness of a Middle School Jazz Improvisation Learning Environment Including Determining Developmentally Appropriate Harmonic Sequences for Beginning Instrumental Jazz Improvisers”

### **CONSENT FOR PARTICIPATION IN RESEARCH ACTIVITIES**

**1. Sara Marino is inviting your child to take part in her research study. Why is this study being done?**

I want to find out if and how specific aspects of a jazz improvisation course help young musicians like learn to improvise jazz. I’m interested in not only how well the course helps young musicians improvise jazz, but how the course affects their motivation and their beliefs about their jazz improvisation abilities.

**2. What will happen:**

Each musician who participates will be one of 24-48 students in this study. All students will participate in a course with the same overall design and content, but the first half will study some of the music in one sequence (Group A), and the second half will study some of the music in the opposite sequence (Group B).

Music Aptitude Assessment

First students will take a music aptitude assessment, which will tell me something about their natural musicality. When I divide the entire group of students in half, into Groups A and B, each half will have about the same mix of participant music aptitudes. Making each half about “even” will help me compare the effects of the course for students in Group A as compared to students in Group B.

It is important for students to know that their music aptitude is not the same as their musical ability. It is only one part of why or how they grow as a musical person. There are things that *they* do (for example, playing in school, playing at home, and self-assessing), and there are things that their *music teachers* do (for example, providing resources and giving specific feedback) that play important roles in the kinds of musicians they are today and the kinds of musicians they will become.

Instruction

Starting the week of January 22 students will have one 45-minute jazz improvisation lesson a week for 12 weeks (excluding winter and spring breaks), and I will be their teacher. Students will play jazz, listen to jazz, and improvise jazz. Like their regular band lessons, they will be placed in a small lesson group. Unlike their band lessons, though, which are typically like-instrument groupings, the study groups will be comprised of a variety of instruments. Each group will have 4-6 students, a combination of the following: a guitar and/or piano player, a bass player, a drum set player, and woodwind, brass, or string players.



### Surveys

Over the course of the study students will take two surveys, about their motivation and self-efficacy for jazz improvisation, three times. They will take these before the study, half way through, and at the end. The surveys are opportunities for students to share their thoughts about learning jazz improvisation and to tell me what they believe about their abilities to improvise jazz. They will help me find out whether students' thoughts and beliefs stay the same or change throughout the study. They will also help me compare Group A's thoughts and beliefs to Group B's.

### Audio Recordings

I will record students playing improvised jazz solos three times during this study, once before the study, once half way through, and once at the end. Two other teachers who are also jazz musicians will listen to them and score them on a rubric, just like they might score any work student musicians might do in school on a rubric. The recordings and scores will help me find out students' improvised jazz solos stay the same or change throughout the study. They will also help me compare Group A's improvised jazz solos to Group B's.

### Video Recordings

I will record each class, which will help me remember what the students and I do and say each week. Reviewing these recordings may help me learn more about the learning process and figure out how the classes I plan work for student musicians. The videos will also help me compare what Group A's musicians do and say to what Group B's do.

### Performance

At the end of the study we will perform for invited guests – family and friends! I will record these performances. Participation in the performance is entirely optional, so students may participate in the study without performing.

### **3. What does it cost?**

You will need to purchase one book (about \$16) and one book with digitally downloadable or CD play-along tracks (about \$20) for your students' personal use, both of which you will keep after the study is over. I will also give your musician other printed and recorded materials at no cost. Students will need to maintain their instruments at home and bring them to every class meeting. Drum set players and piano players will not have to transport their instruments from home.

If your child wants to participate in this study, but you are concerned that the cost of the materials may prevent participation, definitely let me know. Contact me in person or through email ([sara.marino@rutgers.edu](mailto:sara.marino@rutgers.edu)) and we will work out a solution!

### **4. There are few to no risks to taking part in this research.**

Your child's participation in this research will be a lot like your child's participation in band at school, including instruction, playing, and assessments.

### **5. Are there any benefits that your child or others will get out of being in this study?**

Students who participate in this study may simply enjoy the jazz improvisation course. They may also grow as a musician and a jazz improviser. When the jazz improvisation course is over



I will analyze the data I have collected and write about my findings in my doctoral dissertation. Therefore, what I learn through this study may allow me to design more effective jazz improvisation courses in the future for musicians like your child. If your child participates in the study, I will make the study results available to your family after I have successfully defended my dissertation.

**6. CONFIDENTIALITY: I will do everything I can to protect the confidentiality of student records.**

This research is confidential. The research records will include some information about your child and there will be a link between your child's personal identity and their participant ID#. Some of the information collected about your child will include their name, instrument, age, grade, parent/guardian names, email addresses, and phone numbers. Please know that I will keep this information confidential by limiting other people's access to the information and keeping it secure. For example, the educators who listen to your child's improvised jazz solo recordings will only know them by their ID#, and as much as possible I will use only their ID# when I analyze the study's results. I will keep all other personally identifying information in password-protected locations, such as on my laptop or in my Google Drive. Finally, my dissertation chair (Dr. Clark Chinn), committee members (two other Rutgers professors), and group (four fellow Rutgers doctoral students) may view survey, solo, or recorded data. They will not, however, possess data, and it is extremely unlikely that they will have reason or opportunity to link any data back to students' identifying information (e.g., last name, contact information, etc.).

**7. Do you have any questions?** If you have any questions or concerns regarding this study, or if any problems come up, you may contact me, the principal investigator:

Sara E. Marino  
6 Oak Leaf Ln.  
Tinton Falls, NJ 07712  
732-841-5173  
sara.marino@rutgers.edu.

If you have any questions about your child's rights as a research participant, you may contact the Institutional Review Board. Please contact an IRB Administrator at the Rutgers University, Arts and Sciences IRB:

Institutional Review Board  
Rutgers University, the State University of New Jersey  
Liberty Plaza / Suite 3200  
335 George Street, 3<sup>rd</sup> Floor  
New Brunswick, NJ 08901  
Phone: 732-235-2866  
Email: humansubjects@orsp.rutgers.edu

**After reading through this form and the assent form with your child, and consulting the [study calendar](#) (linked and attached) to determine your child's availability, please sign this**



**form if your child wishes to participate.** I will subsequently get in touch with you regarding any eligibility questions, about final participant selection, and about the beginning of the study. You will be given a copy of this form for your records.

**Please sign below if you consent to your child's participation in this study.**

Name of Parent/Legal Guardian (Print ) \_\_\_\_\_

Parent/Legal Guardian's Signature \_\_\_\_\_ Date \_\_\_\_\_

Principal Investigator Signature \_\_\_\_\_ Date \_\_\_\_\_

### **Audio/Visual Addendum to Consent Form**

You have already agreed for your child to participate in a research study entitled "Jazz Improvisation Pedagogy: Evaluating the Effectiveness of a Middle School Jazz Improvisation Learning Environment Including Determining Developmentally Appropriate Harmonic Sequences for Beginning Instrumental Jazz Improvisers" conducted by me, Sara E. Marino. I am asking for your permission to allow me to audio record, video record, and photograph your child as part of that research study. You do not have to agree allow me to photograph your child. Audio and video recordings, however, are essential to the study. Please read this with your child!

**Audio recordings** will contain a student's musical performance and be labeled with their ID#. Two independent adjudicators will have access to the recordings and ID#s only during scoring periods, after which they will delete electronic copies and/or return hard copies. If necessary, I will be able to link recordings back to a student's identity using information kept in password-protected locations. In the event that audio recordings are copied to other media (e.g., disc, flash drive, etc.) they will be labeled with ID#s and kept in a secure location. They will be retained indefinitely.

**Video recordings** of all jazz improvisation course sessions will include identifying information such as a student's likeness, instrument, and first name (as used during class). They will be labeled with student ID#s and stored in password-protected locations. In the event that they are copied to other media (e.g., disc, flash drive, etc.) they will be labeled with student ID#s and kept in a secure location. Videos will be used to analyze the learning process that takes place during class and will be retained indefinitely.

**Photographs** may or may not be used if the results of the study are ultimately published or presented at a professional conference. Participants and their parents//guardians would be notified in this event and have the option to assent/consent or decline at that time. Photographs will be stored in password-protected locations and stored indefinitely. In the event that they are printed or copied to other media (e.g., hard copy, disc, flash drive, etc.) prior to a student consenting to their use, they will be kept in a secure location.



Your signature on this form grants the investigator named above permission to record your child as described above during participation in the above-referenced study. The investigator will not use the recording(s) for any other reason(s) than that/those stated in the consent form without your written permission.

**Please sign below if you consent to allow the investigator, Sara E. Marino, to record your child for this study.**

Name of Parent/Legal Guardian (Print ) \_\_\_\_\_

Parent/Legal Guardian's Signature \_\_\_\_\_ Date \_\_\_\_\_

Principal Investigator Signature \_\_\_\_\_ Date \_\_\_\_\_

Investigator: Miss Sara E. Marino

Organization: Rutgers University

Study Title: "Jazz Improvisation Pedagogy: Evaluating the Effectiveness of a Middle School Jazz Improvisation Learning Environment Including Determining Developmentally Appropriate Harmonic Sequences for Beginning Instrumental Jazz Improvisers"

### **ASSENT FOR PARTICIPATION IN RESEARCH ACTIVITIES**

Please ask your parent or guardian, or Miss Marino, to explain any words or information that you do not clearly understand before signing this document.

**1. Miss Marino is inviting you to take part in her research study. Why is this study being done?**

I want to find out if and how specific aspects of a jazz improvisation course help young musicians like you learn to improvise jazz. I'm interested in not only how well the course helps young musicians improvise jazz, but how the course affects their motivation and their beliefs about their jazz improvisation abilities.

**2. What will happen:**

If you participate, you will be one of 24-48 students participating in this study. All students will take a jazz improvisation course outside of the school day, one class a week for 12 weeks.

As a participant you will play jazz, listen to jazz, and improvise jazz. Like your regular band lessons, you will be placed in a small lesson group. Unlike your band lessons, though, you will probably be the only person playing your instrument. Each group will have 4-6 students: a guitar and/or piano player, a bass player, a drum set player, and woodwind, brass, or string players. At the end of the course each group will have the opportunity to perform for an invited audience of family and friends.

Throughout the 12 weeks I will collect information about how the class is going. I will videotape our classes so that I can remember what we did and said. I will record you playing, and you will have the opportunity to tell me about your experience through surveys. This will



help me find out how well the course I designed is helping you and your classmates learn to improvise jazz. It will also help me find out whether you and your classmates' thoughts and beliefs about jazz improvisation and your abilities to improvise jazz stay the same or change throughout the study.

3. **There are few to no risks to taking part in this research.**

Your participation in this research will be a lot like your participation in band at school, including instruction, playing, and assessments.

4. **Are there any benefits that you or others will get out of being in this study?**

If you participate in this study you may simply enjoy the jazz improvisation course. You may also grow as a musician and a jazz improviser. Additionally, what I learn through this study may allow me to design more effective jazz improvisation courses in the future for musicians like you.

When the jazz improvisation course is over I will write about the results in a long paper called a *dissertation*. A group of my professors will read it and ask me questions about what I did, what I learned, and what I wrote. That will happen at a special meeting called a *dissertation defense*. If you participate in the study, I will make the study results available to you after I have successfully defended my dissertation at this meeting.

5. **CONFIDENTIALITY: I will do everything I can to protect the confidentiality of your records.**

This research is confidential. Some of the information collected about you will include your name, instrument, age, grade, parent/guardian names, email addresses, and phone numbers. Please know that I will keep this information confidential by limiting other people's access to the information and keeping it secure.

6. **Do you have any questions?** If you have any questions or worries regarding this study, or if any problems come up, you may contact me, Miss Marino at: 6 Oak Leaf Ln, Tinton Falls, NJ 07712; 732-841-5173; sara.marino@rutgers.edu.

If you have any questions about your rights as a research subject, you may contact the Institutional Review Board (a committee that reviews research studies in order to protect those who participate):

Institutional Review Board  
Rutgers University, the State University of New Jersey  
Liberty Plaza / Suite 3200  
335 George Street, 3<sup>rd</sup> Floor  
New Brunswick, NJ 08901  
Phone: 732-235-2866  
Email: [humansubjects@orsp.rutgers.edu](mailto:humansubjects@orsp.rutgers.edu)

**It's up to you!** You and your parent or guardian must agree about your participation in this study, and you should make the decision together. Your choice, however, is very important to



me – I only want you to participate if you truly wish to participate. If you choose **not** to participate in this study, I will completely understand and respect that choice. Or, if you agree to participate now but later **change your mind**, that's okay, too!

**After reading through this form together, and consulting the [study calendar](#) (linked and attached) to determine your availability, your parent or guardian should first ask you if you wish to participate in this study. If you do wish to participate, and your parent or guardian agrees, you may each sign your own forms. You and your parent or guardian will be given a copy of both forms, including this one, for your records.**

**Please sign below if you consent to participate in this study INCLUDING any photo, audio, and video recordings.**

Name of Minor Subject (Print ) \_\_\_\_\_

Minor Subject's Signature \_\_\_\_\_ Date \_\_\_\_\_

Principal Investigator Signature \_\_\_\_\_ Date \_\_\_\_\_



## Appendix D

## Advanced Measures of Music Audiation (AMMA)

There are no items to display here because Gordon's (1992) AMMA is a 20 minute test composed exclusively of audio items. The kit includes an administration manual, response sheets, and scoring masks.



## Appendix E

Jazz Improvisation Performance Achievement Measure (JIPAM) (Watson, 2010, p. 252)

***Jazz Improvisation Performance Achievement Measure***

1 (poor)	2	3	4	5	6	7 (outstanding)
<i>Rhythm</i>						
						_____
						_____
						_____
						_____
						_____
						_____
						_____
<i>Melody</i>						
						_____
						_____
						_____
						_____
						_____
						_____
						_____
<i>Harmony</i>						
						_____
						_____
						_____
						_____
						_____
<i>Style/Expression</i>						
						_____
						_____
						_____
						_____
						_____



## Appendix F

## Jazz Improvisation Self-Efficacy Scale (JISES) (Watson, 2010, p. 253)

*Jazz Improvisation Self-Efficacy Scale*

Please use the rating scale below to describe your response to the following questions.

<i>Strongly disagree</i>				<i>Strongly agree</i>
1	2	3	4	5
I have a talent for jazz improvisation.				_____
Other people think I have talent for jazz improvisation.				_____
I could become proficient at improvising in a jazz style.				_____
I enjoy the challenge of improvising in a jazz context.				_____
Other performers on my instrument improvise better than I do.				_____
I enjoy improvising on my instrument while performing.				_____
I enjoy practicing improvisation.				_____
Other people have more talent for improvisation than I do.				_____
I believe I could learn to play jazz at a professional level.				_____
I could teach someone how to improvise in a jazz context.				_____
I am confident in my ability to improvise in a jazz style on my instrument.				_____
Improvising in a jazz context is not too difficult for me.				_____

## Jazz Improvisation Self-Efficacy Measure (JISEM)

1	2	3	4	5
Strongly disagree				Strongly agree
1. I can improvise music in a jazz style on my instrument.				
5. I have the knowledge and skills to improvise jazz on my instrument.				
9. I will be able to acquire the knowledge and skills I need to reach my goals for improvising jazz on my instrument.				
2. Even when improvising jazz is challenging, I can still do it.				
6. When improvising jazz is challenging, I have strategies and resources to help me accomplish my goals.				
10. I will be able to learn strategies that will help me when I encounter challenging jazz improvisation tasks.				
3. Other people think that I can improvise jazz on my instrument.				
7. Other people think that I will reach my goals for improvising jazz on my instrument.				
11. Other people think that I can overcome jazz improvisation challenges I may encounter.				
4. I can improvise jazz over tunes/harmonic forms that I know.				
8. I will be able to improvise jazz over new tunes/harmonic forms in the future.				
12. If I keep practicing jazz improvisation I will be able to perform it at a higher level and/or perform more challenging jazz improvisation tasks.				



## Appendix G

## Jazz Improvisation Motivation Measure (JIMM)

Not True For Me 1	Sort of True For Me 234	Really True For Me 5
Intrinsic Motivation Aspect	Original Scale Item (see Lepper, Corpus, & Iyengar, 2005)	New Survey Item Jazz Improvisation Motivation Measure (JIMM)
Preference for Challenge	I like hard work because it's a challenge.	3. Some musicians like improvising jazz because it can be a challenge.
	I like to learn as much as I can in school.	8. Some musicians want to learn as much as they can about how to improvise jazz.
	I like to go on to new work that's at a more difficult level.	12. Some musicians like to go on to new music that's at a more difficult level, to improvise jazz over new, more challenging tunes/harmonic forms.
	I like those school subjects that make me think pretty hard and figure things out.	16. Some musicians like that jazz improvisation requires using cognitive skills and creativity.
	I like difficult problems because I enjoy trying to figure them out.	18. Some musicians like difficult jazz improvisation tasks because they enjoy working them out.
	I like difficult schoolwork because I find it more interesting.	20. Some musicians like difficult jazz improvisation tasks because they are more interesting.
Curiosity and Interest	I ask questions in class because I want to learn new things.	2. Some musicians ask questions in jazz improvisation class because they want to learn new things.
	I do extra projects because I can learn about things that interest me.	5. Some musicians listen to jazz improvisation recordings, watch jazz improvisation videos, and/or go to hear live jazz improvisation because they can learn about a style of music and playing that interests them.
	I read things because I am interested in the subject.	7. Some musicians practice jazz improvisation outside of school because they are interested in it.



I do my schoolwork to find out about a lot of things I've been wanting to know.	10. Some musicians work on jazz improvisation tasks to find out things they've wanted to know about how to improvise jazz.
I work really hard because I really like to learn new things.	14. Some musicians work really hard at improvising jazz because they really like to learn new things.
I work on problems to learn how to solve them.	21. Some musicians work on jazz improvisation tasks to learn strategies they can use to improvise jazz.

---

<b>Desire for Independent Mastery</b>	I like to try to figure out how to do school assignments on my own.	1. Some musicians like to try to figure out how to approach jazz improvisation tasks on their own.
		4. When some musicians seek guidance from others about how to approach jazz improvisation tasks, it is with the goal of eventually being able to figure out how to approach jazz improvisation tasks on their own.
	When I don't understand something right away I like to try to figure it out by myself.	6. When some musicians don't understand how to approach a jazz improvisation task right away they like to try to figure it out by themselves.
	When I make a mistake I like to figure out the right answer by myself.	9. When some musicians make a "mistake" in an improvised jazz solo, or are unsatisfied with their improvised jazz solo, they like to figure out how to improve their performance on the task by themselves.
		11. When some musicians make a "mistake" in an improvised jazz solo, or are unsatisfied with their improvised jazz solo, they seek out guidance and feedback from others to improve their performance on the task.
	If I get stuck on a problem I keep trying to figure out the problem on my own.	13. When some musicians get stuck while improvising jazz, or are unsatisfied with their performance on a jazz improvisation task, they keep trying to deepen their understanding and improve their performance on the task on their own.



- I like to do my schoolwork without help.
15. When some musicians get stuck while improvising jazz, or are unsatisfied with their performance on a jazz improvisation task, they seek out guidance and feedback from others to keep trying to deepen their understanding and improve their performance.
17. Some musicians like to work on jazz improvisation tasks without help.
19. When some musicians seek help from others on jazz improvisation tasks, it is with the goal of eventually being able to do the tasks without help.

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Lepper, M.R., Corpus, J.H., & Iyengar, S.S. (2005). Intrinsic and extrinsic motivational orientations in the classroom: Age differences and academic correlates. *Journal of Educational Psychology*, 97(2), 184-196.