Teaching Introductory Instrumental Jazz Improvisation with the Support of Computer Assisted Instruction

by

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B. Ed., York University, 1997
BFA, York University, 1996

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Abstract

The purpose of this project was to develop a resource for teachers who wish to use Computer Assisted Instruction (CAI) in the instrumental band classroom for supporting the instruction of introductory jazz improvisation.

A review of CAI related literature, jazz methodologies and curriculum design, reflections on the author's own experiences, and interviews with teachers of jazz improvisation form the framework for the development of the teaching resource.

A six-lesson unit on teaching introductory jazz improvisation with the support of CAI was created. The unit was modeled on *The Ontario Curriculum, grades 9 and 10: The Arts* (1999).

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Acknowledgements

Thanks to the people who have shared their thoughts on teaching, such as my colleagues in Hong Kong and the students and professors in the 2005 Master of Music Education cohort at the University of Victoria.

Dedication

To the Niermeier and Mak families who have supported my wife and I through very busy recent years.

CHAPTER ONE

INTRODUCTION

The following document is an investigation into the role of CAI (Computer-Assisted Instruction) in the instrumental band classroom and its use in supporting the instruction of introductory jazz improvisation.

My Background

I am currently teaching music at an international school in Hong Kong, one with a substantial budget and many students with a first language other than English. I have taught in private and public schools throughout my ten-year career at all grade levels in Toronto, Canada as well as in Hong Kong, China. I am keen on the use of technology in my classes, and I enjoy playing and teaching jazz music. Combining these two interests, I was curious to discover how CAI might be used to support the teaching of introductory instrumental jazz improvisation.

Rationale and Importance of the Study

The need for investigation into the use of CAI in jazz improvisation was called for by Fern (1995), who created *interactive multimedia* software for instruction in *jazz improvisation*. The steps for learning improvisation in the software included guided transcription, non-guided transcription, and individual practice. In guided transcription, a four-measure transcribed solo by Miles Davis was shown in on-screen notation for the student to play while a CD performance of the solo by Miles Davis was played. Then, in the non-guided transcription section, the music was shown on the screen while the student practiced the solo with a MIDI accompaniment. In the individual practice area, students could click on a chord to see a set of notes which belong to a scale appropriate

for playing with that chord. Clicking on a chord would cause it to sound for 64 measures of accompanied practice. Limiting practice to a single chord helped beginners take smaller steps towards improvising over chord changes. The software was used in conjunction with the software *Hypercard*, which has since been discontinued.

Fern (1995) states that jazz method books often focus on theory and tend to ignore listening. Although the method created by Fern includes a listening element of recorded performances by masters of jazz improvisation, the author stresses that it is a supplement to teacher-guided listening. *The Master Series - Miles Davis* is no longer available, but it was carefully written, and has some features not available in current software which could benefit students learning jazz improvisation.

In his conclusion, Fern wrote: "This study should be replicated at the secondary level" and "a longitudinal study is needed both at the secondary and college levels comparing interactive *computer-based* instruction and traditional classroom instruction in jazz improvisation" (p. 43). Since Fern's (1995) study, many advances have been made with regard to music education software, thus necessitating a fresh investigation into the area of incorporating CAI in the instruction of jazz improvisation. Except for a handful of online forums which facilitate communication among users of software, there are few extant resources for teachers on how to incorporate software into the teaching of introductory jazz improvisation.

Research Purpose and Questions

Therefore, the purpose of this project was to develop a resource for teachers who wish to use CAI in the instrumental band classroom for supporting the instruction of introductory jazz improvisation.

A review of CAI related literature, jazz methodologies, and curriculum design, reflections on my own experience, and interviews with teachers of jazz improvisation formed the framework for the development of the teaching resource. The following questions guided the investigation:

1) What are the different types of CAI music software available for the classroom setting?
2) What recent developments in software are useful to teachers?
3) What skills should beginning band students acquire before they are taught to improvise?
4) What should students learn when beginning to improvise?
5) When the students are ready, how can teachers take advantage of the strengths of CAI software when teaching improvisation?
6) For what aspects of teaching improvisation is CAI best suited?
7) What aspects of teaching are best left to the music teacher?
8) How can these results be shared in a way useful to readers?

Methodology

Following a review of literature of the development of computers, available software for music education, jazz methodology, and curriculum design, an interview protocol was developed for use with four instrumental music teachers. The interview protocol was designed to gather information on the background of the interviewees and their experience with and opinions of teaching music with the support of CAI.

Then, based on my own knowledge, experience, and understanding of CAI and jazz improvisation and the results of the literature review and interviews, a curriculum

design was chosen from which I developed a six-lesson unit.

Delimitations and Limitations

The project contains the following delimitations:

1) The project does not compare tools of CAI, but provides suggestions for their use.

2) Students' progress was not considered in the process – only teachers' methods of instruction and their preferences towards CAI were collected.

3) Interviews were conducted in the spring and summer of 2006.

4) The focus of the project was on the use of CAI to support the teaching of introductory jazz improvisation.

5) The software examined has potential use in the instruction of jazz improvisation.

The project contains the following limitations:

1) Interviewees teach in Hong Kong International Schools or in Canadian public middle or high schools.

2) Interviewees have experience in improvising, using CAI, and teaching improvisation.

Assumptions

The following assumptions are implicit in this project:

1) Readers will have a basic understanding of music and the use of CAI.

2) This project can provide useful information for teachers interested in using technology in teaching band and improvisation.

3) Interviewees may have biases for or against the use of CAI.

4) Interviewees have differing amounts of experience with CAI and/or jazz improvisation.

5) Interviewees may have an inadequate budget for implementing some of the options

available in purchasing hardware or software for their students.

6) Students may not have the equipment at home required to use current CAI software.

Definition of Terms

CAI (Computer-Assisted Music Instruction Software): applications designed to facilitate the processes by which students learn music.

Computer-Based Music Notation Software: applications which allow the user to create music notation through the computer keyboard or a MIDI piano keyboard.

Interactive multimedia: computer software which allows for user input, particularly beneficial in Computer-Assisted music instruction.

Jazz Improvisation: spontaneous melodic composition which adheres to the style of music in which it is contained.

MIDI (Musical Instrument Digital Interface): a system of storing notes and other data such as dynamics and articulation, but not timbres.

Moodle: a free Internet browser-based software which allows teachers to create on-line courses and facilitate interaction between students, teachers, and parents.

Music Fundamentals: elements of music such as timbre, meter, rhythm, pitch, scales, and chords.

Piano roll: music notation shown as blocks of varying lengths graphed in an axis to designate pitch similar to the paper version of scrolls found in player pianos.

Sampled: digitally recorded.

Organization and Overview of the Remaining Chapters

Following the review of literature in Chapter Two, methodology is described in Chapter Three. In Chapter Four, a unit on the implementation of CAI into the teaching of introductory jazz improvisation is presented. Finally, in Chapter Five, conclusions and recommendations for further study are given.

CHAPTER TWO

REVIEW OF THE LITERATURE

According to Reisner (2002), IBM was conducting experiments with CAI as early as 1950. In the beginning stages of CAI, software was very much drill based, and users of the software learned through repetition. By 1977, however, microcomputers were more readily available to the public, including the Commodore Pet, the Apple II, and the Radio Shack TRS-80. This meant research into CAI could expand significantly, and computers could be introduced into schools.

My first computer, purchased in 1978, was a Commodore Pet which had eight kilobytes of RAM (Random Access Memory). My current computer has over 50,000 times the same type of memory. Enormous increases in capacity and improved communication between computers, especially through the Internet, have opened a world of possibilities for music software. For example, software such as *Smartmusic* is now able to play MP3 files at different tempi without changing pitch to accompany students while they practice. This is a great improvement over the previously available smaller but less musical *MIDI* files.

The review that follows includes an investigation into the early development of computers, developments since 1992, the strengths and weaknesses of CAI, types of music software, available software relevant to jazz improvisation, available jazz methods, research on teaching jazz improvisation, and curriculum design in order to provide a framework for the building of the teaching unit in Chapter Four. The next section examines the development of computers with a focus on applications pertaining to education since the 1960s.

Early Development of Computers

Even before 1970 the advantages of computer technology to support music education were being questioned (Allvin, 1967), and from the mid 1970s to the start of the new millennium, research such as studies conducted by the Association for Technology in Musical Instruction expressed concerns over the use of CAI (Higgins, 1992; Webster, 2002). Between 1978 and 1980**,** commercially useful computer sound synthesis became possible, and in 1981 the introduction of Musical Instrument Digital Interface (MIDI) increased the capabilities of computer use by providing a protocol for transmission of data between computers and synthesizers. These developments led to the emergence of some outstanding tools for use in the music classroom, such as notation software, which could use a MIDI synthesizer for entering music and for playback.

In this early music education computer software, immediate user assessment was a great asset (Wille, 1982) since it resulted in more productive practice in the absence of a teacher. As a result, CAI became a tool which could facilitate the practice of mastery in music (Webster, 2002) by allowing several students to receive individualized instruction and assessment simultaneously.

Developments Since 1992

In general, CAI software has become more user-friendly, interactive, and individualized, and there have been substantial improvements in hardware. Computer technology is becoming more prevalent, and expertise in the use of this technology is growing. The demands of software on the computer have increased in recent years with the reduction in the use of hardware such as peripheral devices (Jacobson, 1999; Webster, 2002;), but it is feasible to expect that many students in United States public school music

classes will have access to a home computer capable of running much music software. The development of artificial intelligence and virtual reality has added a new dimension to the possible uses of music education software. Recent compositional software which stimulates musical thinking has evolved (Webster, 2002), moving beyond the earlier drill based computer software.

Yet often research findings have not been applied to the development of new software (Swan, van 't Hooft, & Kratcoski, 2005). Webster (2002) suggests that although there is a trend toward music researchers developing their own software technology, communication between students, educators, software developers would be beneficial.

Strengths and Weaknesses of CAI

Strengths

Research in non-musical literature has shown learning to be far more efficient when the learner has control over the specific procedures (Webster, 2002). A weakness of CAI software in the early years was the lack of attention to educational theories (sociocultural, constructivist, and cognitive science) in its design. Project-based, interactive, Internet-based, and multimedia strategies were rarely incorporated into software applications. Since that time, there has been a move to implement these educational theories, such as the constructivist shift of focus from the subject taught to the learner in constructivism and the restructuring of software to put more control into the hands of the user. Kozma (1991) stresses the importance of this aspect of learning when he writes: "The process of learning with computers is influenced by the ability of the medium to dynamically represent formal constructs and instantiate procedural relationships under the learner's control" (p. 205). Thus the effectiveness of the ability of

CAI to adjust to learners' needs is significant.

Webster (2002) notes that constructionist educational theory has been a recent focus in music, and that CAI and motivating students to learn through activity have been more effective than the past practice of dictation of information. He writes:

> The basic goal of constructionism is to place emphasis on creativity and to motivate learning through activity. Learning is seen as more effective when approached through activity. Learning is seen as more effective when approached as *situated in activity* rather than received passively. (p. 418)

Recent developments in CAI such as the use of MP3 recordings as accompaniment in performance software make wonderful use of this theory. Furthermore, it has been postulated that facts learned in a situated context help the learner understand the importance of information (Webster, 2002; Wong, Quek, Divaharan, Liu, Peer & Williams, 2006). Practice software, for example, allows music to be played with an accompaniment, which provides a context and facilitates student development of an understanding of the relationship between the parts of music.

Siegel (2005) found that high school music students lacked the tools for productive practice sessions. Weaknesses in their practice habits included the ability to set daily and weekly goals, a process which was difficult to monitor. Increasing Internet speeds have made communication between the growing numbers of computers in homes and schools more accessible, and so teachers can use Internet-based CAI to encourage students to form daily habits and submit their assignments weekly. This approach could also prevent students from developing bad habits caused by fatigue if regular practice and submission of assignments is achieved.

Further research may uncover other ways CAI music software can guide students to be more efficient at practicing, including better practicing methods while learning to improvise.

Students using recent software have much more control over their learning than their counterparts had with earlier software. They can work at their own pace, control the speed of music, hear or omit the melody, select a small section of the music to practice, and create practice loops (Wittlich, 1989).

Weaknesses

In software which measures pitch accuracy, early attempts at judging deviation from equal-tempered pitch (Peters, 1974) were found to be too confining, not allowing for the deviation found in a musical context. Later software versions of pitch evaluation were more useful because they allowed for musical flexibility in pitch; however, unwanted errors in tuning resulted. Compounding the problem of pitch extraction, attack, timbre, vibrato, noise, and input inaccuracies further hindered the analysis of pitch.

In 1980, unsuccessful attempts were made to improve the tone quality of trumpet students with the use of an oscilloscope. It has also been documented that CAI software designed to develop rhythmic skills have been unsuccessful (Galyen, 2005; Vincent, 1987) when compared with CAI used in teaching theory and sight-reading, though research is needed to discover if this is still the case.

There has also been a clear difference in attitudes towards CAI among students of different ages and gender (Webster, 2002). In his review Webster discussed several studies conducted between 1993 and 1998 whose results suggested that “older males were more confident than females in their use of music technology but …[the differences

between] younger males and females were more balanced" (p.433). Studies have shown that although attitudes between males and females differ towards technology, overall achievement of males and females has been similar. Although there has been little music-focused research in this area, any differing attitudes by age and gender should be carefully considered as a possible obstacle when developing new software and when teachers implement CAI, although students' attitudes towards the use of technology are generally positive (Hancock, 2003, Webster, 2002).

Also of concern is the cost of computers, software, and accessories. Although the costs involved in CAI can be considerable, fewer accessories are needed as computers and software become more capable, and the cost of software has generally lowered. Despite these developments and recent increases in available school music budgets (*The 2005 Survey of School Music Budgets*, 2005), many schools still find the cost of CAI prohibitive.

Another obstacle with implementing CAI in education (Simpson, 2005; Webster, 2002) is the gap between available technology and the educators willing and able to use it. Educators attempting to implement CAI into their teaching sometimes find that the set up and maintenance of computers outweigh the benefits (Lee, 2006). If CAI is used, teachers and students also need to spend time learning how to it. User manuals tend be very difficult to follow, and thus many teachers are reluctant to attempt using software due to the time involved in becoming familiar with its workings. In many cases, however, CAI can reduce instruction time needed to achieve similar results or even cause an improvement in these results.

Types of Music Education Software

Theory and Ear Training

In a review of literature on the uses of computer technology in music education, Higgins (1992) stated that the earliest music educational software was created in the late 1960s. The software assisted instruction in theory, pitch extraction (which could determine deviation from equal-temperament), and ear-training—particularly for wind players who received training in hearing articulation, phrasing, and rhythm.

Performance Software

Early in the 1980s, comparative studies (Higgins, 1992) showed students who used CAI benefited from improved practice characteristics, and performance improved for students who were self-motivated and self-critical compared to similar students who did not use CAI. Studies by Kent (1970) and Weeks (1987) found that although CAI had not improved instrumental musicians' performance, students using CAI scored higher on a written cognitive test on instrument fingerings.

Composition and Notation

Early versions of software in composition instruction contained a drill and practice format which was unfortunately not found to be stimulating; however, the use of notation software increased motivation and helped students to learn music fundamentals such as note names, key signatures, and rhythms. Instruction in music theory developed and became more successful with the use of a guided discovery-based and rule-based structure of learning through repeated trials. Higgins (1992) stated that even though the development of CAI for use in music was level with other disciplines, both research on the pedagogical application and the correlation of learner traits to attributes of technology

were lacking. He concluded that new technologies were delayed in their acceptance in music education, technology was limited to classroom use, there was a lack of focus on heuristic aspects of music education, new technology was not being applied to remedy weaknesses discovered in research, and there was a lack of proficiency in people developing new technology.

Webster (2002) summarized the development of CAI since Higgins' findings in 1992. Webster categorized types of software available. Table 1 summarizes his results.

Table 1

Categorization of types and subtypes of music educational CAI software

Types	*Listening*	*Performance*	*Other*
Subtypes	Music Fundamentals such as hearing differences in dynamics or articulation	Instrumental fingerings and instrument maintenance	Composition instruction in techniques such as diminution and uses of harmony
	Music Appreciation such as understanding the historical context of compositions and why people of that time enjoyed listening to it	Vocal technique such as warm-ups and exercises	Assessment of theoretical knowledge such as music reading
		Accompaniment support such as the recordings included in *iPas* and *Smartmusic* for learners to play along with	Error Detection in performance, such as the pitch detection in *iPas* and S*martmusic*
			Distance Learning, such as Internet based software like *Smartmusic*
			Theory such as understanding intervals
			Conducting technique

Available CAI Software Relevant to Jazz Improvisation

Much of the available computer software deals with concepts relating to jazz instruction. The following section describes some of the most relevant software and considers the feasibility of using it to support jazz improvisation instruction.

Band-in-a-Box

Band-in-a-Box is software used primarily for generating accompaniments by entering chords into the software and then choosing a style of accompaniment. The software will generate an accompaniment with piano, bass, drums, guitar and strings. It can also record, which would give students the chance to listen to their solos. Since *Band-in-a-Box* is useful for practicing a solo with accompaniments entered, it would allow for practicing the same chord changes in different styles and in different keys, or limiting the number of chords practiced. Available "fake" books include songs in a wide variety of styles where students could play along; however, these books are 'add-ons' and cost extra. Recent improvements to the software include audio files of drum tracks played by professional musicians which replace the computer-generated MIDI tracks used in previous versions. The software can also import an audio file such as an MP3, analyze the chords and display them, and even generate chords from a melody. This could be useful for the student entering an improvised solo. He/she could compare the chords the computer generated to the chords on which the solo was based. Although playing notes outside the intended chord structure can make a solo more expressive, this feature would allow the student to learn to play notes within the original chords.

Additional software features include the ability to generate computer solos in the style of a selection of master musicians as well as the availability of the package in

several different languages.

Band-in-a-Box also has an ear training section in which the root, chord, or the combination of both is played and users have to identify what is heard. There are games included which are designed to develop music skills, such as "Music Replay" which trains recognition of pitch, rhythm, and the combination of both in recognition of melody. Another is "Notematch," a game similar to the card game "Memory." The software version uses pitches, intervals, chords, and rhythms. As often with software, discount pricing is available for educators.

Tomassetti (2003) suggests that when students begin to improvise, practice with an accompaniment is key to success in lessons and at home, and using Aebersold or Band-in-a-box is key in helping students learn to improvise musically.

iPas

The practice and assessment software *iPas* along with an accompaniment CD is available as part of the *Standard of Excellence Enhanced Method* books. The accompaniment files from the book 1 and 2 CDs are available on line for free (http://www.kjos.com).

Exercises from the *Standard of Excellence Method Books* can be recorded, and rhythms and pitches are assessed. A tuner, glossary of terms, and metronome are available, and there is a collection of practice tips which pop-up before a student plays an exercise. Students can elect to hear the solo part, the accompaniment, or both, and note fingerings can be shown as the music plays during practice sessions. Students need to play fermatas at regular note length and music notation is not shown; *piano roll* is shown in its place. Tempo is adjustable, but students get a lower mark if they play at less than

the recommended tempo. The jazz method book from the *Standard of Excellence* series is not yet part of *iPas*.

Garage Band

Garage Band has become very popular because it allows users to create music very quickly with MIDI instruments, stylistic loops, and record audio tracks. There are more than 200 effects and jingles, and movie tracks can be included. Useful particularly for implementing jazz improvisation are its abilities to import midi tracks by dragging them into a piece's timeline, to record audio, and to view notation. Limitations of the software include the facts that although one can transpose, one cannot change tempo and key signature during a song, and that no assessment package is included. *Garage Band* can be used for making one's own compositions or playing chord changes in jazz styles. This could be very useful for producing accompaniments or chord progressions for student practice.

Finale Performance Assessment Software

This is a piece of software similar to a very basic version of *Smartmusic*, but it does not include exercises, method books, solo accompaniments, or most of the tools included in *Smartmusic*. The software is free and assesses rhythm and pitch. Tools based on *Smartmusic* such as fingerings, tuner, and recording are available. Some materials available online are listed in table 5 (p.19).

Smartmusic

Smartmusic is practice aid software that provides students with feedback on notes and rhythms played versus the notation or audio example that the student is performing from in exercises such as ear training, scales and arpeggios, and pieces. There are

exercises and pieces in many different styles, including classical, jazz, and blues. Several tools in *Smartmusic*, such as the tuner and metronome, can help students learn fundamental skills. There are no tools specific to jazz improvisation, but the ability to transpose jazz and classical exercises is very valuable for preparing to improvise in any key. There is a glossary of terms which can help students further understand the music they play. A great resource for beginners is the fingering charts, which are available to students if they click on a note.

The ability to change speed is another helpful feature. Students can slow down difficult music when practicing. This ability to change tempo includes the jazz exercises, which can also be practiced in smaller selections of music from any beat of any bar.

One of the most useful features of *Smartmusic* is that students can record themselves in CD quality. Students can hear their own performances and adjust the balance of their solos and accompaniments. Hearing themselves play gives students a different perspective on their performances and an increased sensitivity to their tone and ability to balance with an accompanying instrument. Teachers can assess this ability both before and after students listen to their recordings and make the necessary adjustments. The pitch recognition feature of *Smartmusic* used for these assignments is especially effective for beginning brass students, who can easily become accustomed to playing incorrect pitches. On the other hand, students may not develop important listening skills as quickly if they are dependent on the computer and teachers to provide feedback on playing correct pitches.

Ear training exercises found in some CAI software or teacher directed ear training can strengthen the ability to recognize correct pitches. This is an appealing feature of

Smartmusic. See Table 2 and Table 3 for a list of *Smartmusic* assignments for students in their first and second year of band classes respectively. See Table 4 for a list of scale numbers relating to instruments.

Table 2

List of Smartmusic assignments for students in their first year of study

Assignment Number	List of Exercises with Suggested Deadlines Deadline for all Assignments is June 9
1	Exercise 40, Major Scale number 1(in eighth notes) Due last week of December
2	Exercise 40, Major Scale number 2 Due first week of January
3	Exercise 40, Major Scale number 3 Due second full week of January
4	Exercise 40, Major Scale number 4 Due last week of January
5	Exercise 40, Major Scale number 5 Due first full week of February
6	Exercise 40, Major Scale number 6 Due second week of February
7	Exercise 40, Major Scale number 7 Due first full week of March
8	Exercises 2210, Major Scale Intervals in scale #1 Due second week of March
9	Exercises 4020, Major Scale Arpeggios in scale #1Due first full week of April
10	Exercises 6110, 6300, and 6500 (Ear Training) Due second week of April
11	State Scales, MN, MBDA #6000 in scale #1 Due last week of April
12	State Scales, FL, High School #6024 Due first week of May

Table 3

Scale numbers according to instrument

Scale Number (all major scales)	Flute, Oboe, Bassoon, Trombone, and Tuba	Clarinet, Tenor Saxophone, and Trumpet	Alto and Baritone Saxophone	French Horn
1	B-flat	C	G	A
2	C	D	A	B-flat
3	D	E	B	C
4	E-flat	F	C	D
5	F	G	D	E-flat
6	G	A	E	F
7	A-flat	B-flat	F#	G

Table 4

List of Smartmusic assignments for students in their second year of study

Assignment Number	List of Exercises with Suggested Deadlines Deadline for all Assignments is June 9
1	Exercise 40, scale numbers 1-3 Due second week of January (Scales)
2	Exercise 140, scale numbers 4-7 Due first week of February
3	Exercise 240, scale numbers 1-3 Due second full week of February
4	Exercise 340, scale numbers 4-7 Due last week of February
5	Exercise 440, scale numbers 1-7 Due first full week of March
6	Exercises 2210, and 4020 in scale #1, 4120 in scale 4, and 4420 in scale 6 Due second week of March (Intervals and Arpeggios)
7	Exercises 6110, 6120, and 6130 Due third week of March (Rhythm)
8	State Scales MN, MBDA 1 (#6000), FL, High School, 1-2 (#6024-5) in scale 1 Due last week of March
9	Exercises 8000, 8010, and 8050 Due first full week of April (Play by ear)
10	Jazz Exercises 7010, 7020, and 7030 Due second week of April
11	Jazz Exercises 7012, 7026, and 7060 Due last week of April
12	Jazz Exercises 7013, 7028, and 7066 Due first week of May

Smartmusic includes a warm-up area with a piano for playing reference notes, and a set of exercises that could be used as a warm-up.

Students can choose to hear the line they need to play in *Smartmusic* – but one must be aware that if students have this feature turned on and they play wrong notes, the assessment may treat the notes as correct if the microphone is picking up sound from the speakers!

Although CAI can enhance instruction in jazz improvisation, it is important to remember what is not learned when using CAI. For example, even if students learn chord symbols and use jazz exercises in practice software, they need to know how to choose an appropriate scale when they see a chord symbol and create their own original solos, not simply insert the correct exercise pattern.

Summary on the use of CAI in Teaching Music

The shift in paradigm from teacher-centered to student-centered learning has prompted a corresponding shift in the world of CAI. There has, until recently, been little use of CAI in facilitating performance and other applied work, but software in this area has developed substantially in the past 20 years (Repp, 1999; Sheldon, Reese, & Grashel, 1999). According to a study by Wong et al. (2006), the use of computer-supported learning in Singapore classrooms indicates that computers can facilitate the shift from teacher-centered to student-centered learning. It is essential to remember that technology is a means of enhancing the musical experience, not a replacement for teacher instruction.

In conclusion, it is worth heeding Lehman's (1985) warning: "There are hundreds of ways to misuse computers in education, and only a few ways to use them properly" (p. 15).

Traits of Available Jazz Methods

Jazz improvisation methods by Ramon Ricker and Marc Sabatella, as well as the *Standard of Excellence Jazz Ensemble Method*, the *Aebersold* method, and exercises found in *Smartmusic*, will now be examined to build an understanding of what elements a comprehensive piece of software for learning jazz improvisation should possess.

The *Ramon Ricker Jazz Improvisation Series* limits what students learn when beginning to improvise so as not to overwhelm them. The first book in the series starts with a one note solo, and lessons progress gradually to playing over chord changes. Intervals, modes, scales, chord to scale relationships, and rhythm changes are covered in the first book. The book contains scat singing solos, ear training samples and guidelines, and a detailed description of the purpose and qualities of each note of a scale. Basic

repertoire is suggested.

The *Standard of Excellence Jazz Ensemble Method* includes rhythm studies and improvisation studies which involve a great deal of listening, a focus on articulation, and singing. There are pieces containing improvisation sections which students can play along with on the accompanying CD, and the scales used in these pieces are the basis of the exercises which lead up to each piece. Each section of the book focuses on a style of music, for example, rock, swing, or Latin.

Marc Sabatella's *A Jazz Improvisation Primer* includes a brief history of jazz, chord to scale relationships with a list of notes to avoid when playing over specific chords, how to apply the theory to practical improvisation using major and minor scales over a ii V chord progression, and how breaking the rules in ways such as overblowing on an instrument or playing outside the chord progression can be beneficial (www.outsideshore.com/primer/primer/index.html). The method is not a sample, but an online method which is in parts. The full text is available to purchase in hard cover, but it does not contain any extra information.

The *Aebersold Volume 1 – How to Play Jazz and Improvise* is a method with much practical application of harmonic theory, starting with intervals and working up to scales and chord progressions. The book also has suggestions for developing creativity, improving time and feel, relationships between scales and modes, and sample patterns and licks. There are also many other volumes of *Aebersold* material with accompanying CDs for improvisation practice, such as Blues style, specific chord progressions, composer-specific books, all with recommended skill levels.

Smartmusic contains many exercises and pieces which relate directly to learning jazz improvisation, but is not as extensive as the volumes available from *Aebersold*.

Research on teaching jazz improvisation

A review of the literature on teaching jazz improvisation revealed only three sources (Fern, 1995; Meadows, 1991; Tomassetti, 2003). According to Fern (1995), one instructor's process for improvisation involved learning the *head* or theme of the piece one phrase at a time by ear, learning the theory of scales and chords, learning the *head* from sheet music, learning strategies for approaching a solo harmonically and rhythmically, learning a series of licks, and finally learning how to transcribe solos. Students described the transcription process as frustrating.

According to Tomassetti (2003), the process of learning jazz improvisation involves students focusing "on scales and chords at the expense of logically and beautifully expressed musical lines" (p. 17). Thus, teachers must also instruct students in the shaping of phrases and shaping of energy in improvised lines. Meadows (1991) stressed the importance of covering large amounts of repertoire.

It is evident from the scant research in this area that more investigation is warranted and that both teacher and student friendly instructional units for teaching beginning jazz improvisation are sorely needed. Having reviewed the literature on CAI and jazz improvisation, it is now time to consider the topic of curriculum design. In order to provide a firm basis for constructing a unit on teaching beginning jazz improvisation with the support of CAI, an appropriate design must be chosen.

Curriculum Design

Curriculum is defined in many ways depending on which elements a curriculum theorist intends to focus. Despite the varied definitions quoted below, all are undergirded by philosophical viewpoints and assumptions. In his discussion on curriculum, Elliott (1995) presents the following definitions:

> A curriculum is a plan for learning…(Taba, 1962)
>
> [Curriculum is:] All the experiences a learner has under the guidance of the school… (Foshay and Beilin, 1969)
>
> [Curriculum is:] The planned and guided learning experiences and intended learning outcomes, formulated through the systematic reconstruction of knowledge and experience, under the auspices of the school, for the learner's continuous and wilful growth in personal-social competence. (Tanner and Tanner, 1975)
>
> Curriculum is an explicitly and implicitly intentional set of interactions designed to facilitate learning and development and to impose meaning on experience. (Miller and Seller, 1985)
>
> Many (if not most) books on education consider curriculum as consisting of experiences or the activities that engender these experiences. But this usage confuses curriculum with instruction. A more precise view of curriculum—and the common understanding of curriculum among laypeople—is that it is what is taught in school or what is intended to be learned. (Posner and Rudnitsky, 1986)
>
> (Elliott, 1995, pp. 242-3)

Despite the wideness of curricular views demonstrated by the definitions above, in reality

Tanner and Tanner's (1975) stance, and more recently that of Miller and Seller (1985), have been the most influential on Canadian music curricula design. Further, Elliott (1995) tells us that the Tylerian procedure, or a technical-rational approach to curriculum making, has dominated curriculum development since the 1950s (p. 243). Tyler's model consists of a four-step process: 1) develop learning objectives; 2) select learning activities in relation to objectives; 3) organize learning activities in relation to objectives; and 4) develop appropriate evaluation procedures. Tyler was influenced by Giles (Giles, McCutcheon, & Zechiel, 1942) who developed a similar 4-step curriculum design. However, whereas Tyler's design was linear in approach, the elements following one another in sequence, Giles conceived of the four steps as interactive, one influencing the other. The impact of Giles and Tyler can be witnessed in many school curricula.

Mentioned at the outset of this discussion was the connection between philosophical stance and curriculum design. Ornstein and Hunkins (1988) explain this connection when they write:

> A person's philosophical stance will have an impact on his or her interpretation and selection of objectives; influence the content he or she selects and how he or she will organize it; affect his or her decisions about how to teach or deliver the curriculum content; and guide his or her judgments about how to evaluate the success of the curriculum developed. (p. 166)

Ornstein and Hunkins (1988) discuss various sources of curriculum design such as science, society, knowledge, eternal and divine, and the learner. They then outline the origin and main features of three representative curriculum designs. By far the most popular are subject-centered designs which are further divided into subject designs,

discipline designs, broad field designs, and correlation designs. A second type are learner-centered designs which originated in response to the progressive movement among early 20th century educators who believed that curricula needed to place students rather than subject matter at the center of curriculum. Child-centered, experience-centered, romantic, and humanistic are four types of learner-centered designs. Finally Ornstein and Hunkins (1988) present problem-centered designs of which the life-situation design is perhaps the best-known variation (pp. 171-185).

Curriculum Documents

Hanley (2002) tells us that curriculum documents contain the content or subject material to be learned. She names four types of documents: policy documents, curriculum guides, curriculum frameworks, and resource documents (p. 164-5). Curriculum guides "generally include such items as a rationale, aims, goals, objectives or outcomes, overviews, scope and sequence, topics or concepts, instructional strategies, activities, unit plans, sample lesson plans, evaluation strategies, teacher resources, and references" (p.165). One can see by her explanation that curriculum guides are similar to the Giles and Tylerian designs discussed earlier. It is to the Ontario curriculum guide that I turned when searching for a model on which to base my 6-lesson unit. A more complete discussion of this guide and my reasons for choosing its design will follow in the next chapter.

Summary

In this chapter, I have reviewed the literature on the early development of computers, developments since 1992, the strengths and weaknesses of CAI, types of music software, available software relevant to jazz improvisation, available jazz methods,

research on teaching jazz improvisation, and curriculum design in order to provide a framework for the building of the teaching unit in Chapter Four.

One overarching conclusion that can be made from this review is that due to the rapid development of computers, the way in which CAI is used in education is also constantly changing. To explain, music software changes constantly, and due to the incredible rate of these changes, there continue to be difficulties with its implementation such as programming bugs, hardware and software conflicts, and a lack of user-friendliness. Nevertheless, it is clear that CAI is here to stay and also that clear, usable resources which combine extant knowledge on the teaching of jazz improvisation with CAI are sorely lacking. The unit that will be presented in Chapter Four will fill a gap in the existing literature and available teaching resources.

The following chapter describes the methodology used to create the unit on teaching introductory jazz improvisation with the support of CAI.

CHAPTER THREE

METHODOLOGY

In this chapter, the methodology used to create the unit on teaching beginning jazz improvisation with the support of CAI is described. First, I will recount how I learned to improvise, then describe my own experience with improvising, and then relate what practices have proven successful in learning, teaching, and playing jazz improvisation. Second, I will document the process of interviewing four instrumental teachers concerning their use of CAI in order to glean information that would be beneficial in developing the teaching unit. Finally, I will explain and defend my choice of the Ontario Music Curriculum as the template on which to craft the teaching unit.

Reflection on my own Practice of Learning, Playing, and Teaching Jazz Improvisation

How I learned to Improvise

I was classically trained as a trombone player throughout my schooling. When, as a secondary student, I became interested in learning jazz improvisation, I looked at some lead sheets and used my understanding of chords to figure out what notes to play during each chord change of each piece I tried to play along with. I received no guidance, feedback, or formal instruction in jazz improvisation during this time. Not surprisingly, I found the task daunting.

My Experiences Playing Jazz Improvisation

At university I joined a jazz band where we were required to improvise. Having the chance to practice improvising and to receive feedback was helpful. Around the same time I was a member of the military band of The Royal Regiment of Canada. We had a

concert band, marching band, and a dance band in which I occasionally would improvise. Despite these two opportunities, I still lack confidence in improvising.

Instructional Strategies for Learning, Teaching, and Playing Jazz Improvisation

I reviewed my own curriculum by examining my current curriculum documents and lesson plans for relevance to developing fundamental skills, learning to improvise, and implementing CAI into these practices. I reflected on successes from my previous teaching experiences with particular focus on educational theories used, teaching jazz improvisation, preparing students before they learn to improvise with and without the use of CAI, and the positive attitude towards CAI that I bring to teaching.

As part of the review of literature, I described software and hardware which I have used in my own teaching. CAI software which might apply to jazz improvisation instruction was explored. In particular, *Smartmusic* was examined thoroughly because it is the software I currently enjoy using as a tool for instructing students in music fundamentals. *Smartmusic* also contains jazz materials, so the software was useful to explore for its potential for jazz improvisation instruction. In addition, I investigated a selection of software that was new to me in search of other materials available for teaching jazz improvisation. In addition, I reviewed jazz improvisation methods to further inform my background knowledge of jazz pedagogy.

Although I have a solid background in teaching band instruments and in the use of CAI, my lack of experience in jazz improvisation created a need for consulting educators with more experience in this area. Thus, I decided to interview four colleagues experienced in teaching jazz improvisation. That process is described below.

Interviews

As noted in Chapter One, an interview protocol was developed for use with four instrumental music teachers. Questions were formulated after reviewing the literature and reflecting on my own practice. The interview questions were designed to discover what processes teachers guided students through before and while they learned to improvise, and what CAI was or was not implemented in supporting these processes. Participants were also asked what they liked and disliked about available CAI hardware and software. The questions were designed with three goals in mind: the background of interviewees, uses of CAI other than improvisation, and use of CAI in teaching improvisation. The design of the interview was based on the interview questions in Fern's (1995) research since he was researching the use of CAI for teaching improvisation also. After questions were formulated, interviews with colleagues who instruct jazz improvisation and have used CAI were conducted. I chose participants from different geographical locations and with differing attitudes toward CAI to obtain a more complete and unbiased understanding of CAI. I hypothesized that the information gleaned from the interviews would prove useful for understanding how CAI could be used in the process of preparing for and learning jazz improvisation.

Four middle/high school band teachers from Hong Kong and Canada with experience in teaching jazz improvisation and implementing CAI were selected from a group of 30 colleagues, either band teachers in Hong Kong, China or students at the University of Victoria, Canada. I was interested in their insights into the strengths and weaknesses of CAI. I was already familiar with the opinions of the colleagues in Hong Kong, and through brief discussions with Canadian colleagues I discovered who was

familiar with and had opinions about the use of CAI in band teaching. Two teachers worked at the middle and two at the high school level.

Interviews were recorded using a mobile phone. Interviews conducted in Hong Kong took place at the interviewees' schools, and the interviews in Canada took place in restaurants, since the interviewees' schools were not accessible. The recordings were transcribed into a Word document, and transcriptions were then analyzed for commonalities and material which would be important to include in the unit plan.

The use of tables aided in the determination of commonalities. A synopsis of the interview responses follows with quotes labeled as Teacher A, B, C, or D to maintain confidentiality. The interview was in three sections: background of participants, computer assisted music instruction other than improvisation, and jazz improvisation.

Section 1: Background of Participants

Question 1: Can you tell me a bit about yourself?

Teacher A is from the "Saskatoon/Regina area" in Saskatchewan, Canada, and teaches in Hong Kong. Teacher B is from Texas, and also teaches in Hong Kong. Teacher C was born in Manitoba, Canada, and currently teaches at an independent school in Surrey, BC, also in Canada. Teacher D grew up in "a small town in Manitoba" and currently teaches in Vancouver, BC, Canada.

Thus, although two of the teachers work in Hong Kong, three of the interviewees are Canadian and one is American.

Question 2: Can you name some jazz artists who have influenced how you improvise, and explain what you like about them?

Teacher A stated the following as one of the reasons for choosing players to listen

to: “Some of them I just studied because they were considered masters of the art, agreed on by many, many people.” Other reasons given for enjoying these artists were “the simplicity of Miles [Davis’] technique,” “Sunny Rollins for his motivic development,” and “Cannonball because he fused Blues and technique.”

Teacher B chose flugelhorn player Chuck Mangione “because he has great technique” and trumpet players Maynard Ferguson and Harry James. The teacher said, “That was from my era.” He said, “I like tight, together sounds of the group… especially in traditional Big Band style.”

Teacher C chose trumpet players Louis Armstrong and Dizzy Gillespie, tenor saxophonist “Stan Getz because of his smooth sound,” and tenor saxophonist Pat Labarber.

Teacher D said, “I really, really, love Miles Davis” because he has “amazing technique and uses space in a musical lyrical way.” Alto saxophonist Cannonball Adderly was chosen because “he has great chops and technique, and a bouncy swing style.” Tenor saxophonist John Coltrane was chosen because of his “great technique which is also shapely and powerful.” Tenor saxophonist Dexter Gordon was chosen because of his “gutsy blues. He has a raw edge to his sound.” Piano player Bill Evans was chosen because “he plays with such sensitivity.”

All of the participants noted excellent technique as an important quality in the players, and interviewees C and D mentioned the importance of sound quality.

Question 3: How important do you consider listening to great jazz performers when learning to improvise?

Teacher A said, "I think it's everything" and emphasized that "technique and theory are just kind of 'western' and I don't think it's the right approach any more," and that a "step-by-step method of transcribing [solos by the masters] is very important when learning to improvise." The "roughness of the sound of a jazz flute" was noted as important by Teacher B. "You need to listen to it!" was the advice "for students to have an idea of what they are trying to achieve." Teacher C stated that "listening is crucial" and mentioned the necessity of liaising with the school's librarian to request quality recordings of jazz which have good examples of improvisation to inspire students. Teacher D described listening as "very important," and stated that playing in a band where it is possible to "listen to good examples of improvisation from the people in the group" and to have the chance to learn from practical experience, was where the teacher "learned the most about improvising."

All interviewees concur that listening is important in relation to learning to improvise.

Question 4: Where did you study jazz improvisation? How was it taught?

Teacher A said, "I had some jazz theory classes in university, but I learned lots more from self-teaching and feeding off of each other in the jazz combo I was in." Teacher B said that "we did a little bit of listening when we learned to improvise at university, but we got very little help." Teacher C developed listening skills in high school by listening at home to records and transposing the music into different keys, and by playing by ear in church. In university, the teacher was taught to "transcribe solos and

write out the chord changes, and then recreate the solo without the music." Teacher D stated "instruction in jazz improvisation was non-existent" and his/her high school music teacher simply told students to "try playing something that fits the style of the music." The teacher attended a summer camp in jazz improvisation but felt overwhelmed by all the theory. The teacher felt that he/she learned the most while playing with a group which had members proficient in improvising.

All interviewees noted that instruction in improvisation in high school was insufficient. Two interviewees mentioned the theory taught for improvisation was not useful to them.

Table 5 summarizes the findings from section 1.

Table 5

Summary of findings in Section 1

Question	**Topic**	*Teacher A*	*Teacher B*	*Teacher C*	*Teacher D*
1	Born in Canada	✓		✓	✓
	Born in US		✓		
	Teaching in Hong Kong	✓	✓		
	Teaching in Canada			✓	✓
2	Considers technique as important	✓	✓	✓	✓
	Considers sound quality important			✓	✓
	Considers listening as important	✓	✓	✓	✓
3	Found what they learnt in school not to be useful	✓	✓	✓	✓
	Finds conventional theory instruction inadequate	✓			✓

From these findings the importance of listening, technique, and sound quality have emerged as skills needed for successful jazz improvisation. Traditional teaching methods that have taken a theoretical approach or in some cases offer very little or no guidance are considered inadequate.

Section 2: Computer Assisted Music Instruction other than Improvisation

Question 1: Do you involve CAI in any of the following and how does CAI fit in with your other ways of teaching:

a) Articulation

b) Breathing

c) Dynamics

d) Intonation

e) Performances

f) Pieces

g) Rhythm and Pitch

h) Scales and intervals

i) Sight reading

j) Sound production

k) Testing

l) Warm-ups

Teacher A does not include CAI in teaching breathing and sight reading. Computer software was "used to burn CDs for doing testing." Students' performances recorded with computer software were used for "listening back for articulation, dynamics, tuning, intonation, and their sound quality." Students use the tuner in *Smartmusic* at home, and use the software to "get feedback in rhythm and pitch while completing the scale project" when "the kids record their playing and send it to teachers by e-mail." Performances in class are also recorded using *Garage Band* and using the free audio recording software *Audacity*, and the teacher uses *Finale* to "make warm-ups. I

compose" and make "arrangements, transcriptions, and sometimes…alternate parts for students that aren't included in scores or need adjustment." Teacher B uses tuning software in class shown on a monitor mounted at the front of the class. Teacher C uses the software *Finale Performance Assessment* and *iPas* to teach students rhythm and pitch, and *Audacity* and recording software included in operating systems to record student performances. Teacher D uses Sibelius to "teach students about music notation."

CAI is used in all of the fundamental skills except for breathing. However; CAI is used by more than one interviewee only for recording performances, teaching rhythm, and teaching pitch. Only Teacher A makes use of CAI in teaching fundamentals in more than two ways.

Question 2: What kind of computer and other CAI hardware do you use now, or have you used in the past, and can you describe how it is useful in teaching fundamentals?

Teacher A uses "stations," which are "carts with a computer that's got a built in microphone on it, a MIDI keyboard, and speakers" for playing CDs and running software such as *Smartmusic* and *Garage Band*. This teacher also uses a computer connected to a projector and a sound system for playing movies and recordings. Teacher B uses a computer lab with Alfred's *Essentials of Music Theory* software installed. Teacher C uses MIDI keyboards, and a projector attached to a computer. Teacher D uses MIDI compatible keyboards which "could be used to enter notation into *Sibelius*."

None of the teachers interviewed used the equipment while teaching improvisation, but three of the teachers use MIDI keyboards, and three of the teachers make use of computer labs.

Question 3: What equipment which would help students learn to improvise would you

consider acquiring, and why would it be of value?

Teacher A said, "I'd like to get more stations," referring to the carts mentioned in question 2. Teachers B, C and D said they did not think more equipment was necessary. Teacher B said, "it's an issue of budget for us" and that "budget is available for technology, but only when it's being used in the academic subjects." Teacher D stressed budget and technical support as reasons for not purchasing equipment.

Only Teacher A, the teacher to have the most varied use of CAI, had a wish list for acquiring more equipment.

Question 4: Do students use any music software at home, and if so, what do they use it for?

Teacher A requires students to "use *Smartmusic* at home to do assignments in the scales project" which involves recording scale and interval patterns, as well as a "solo project" in which students record a piece with an accompaniment and submit the recordings by e-mail. Teacher C allows students to sign out copies of the *iPas* and *Finale Performance Assessment* software for use at home. Teachers B and D do not require students to use any computer software at home.

Thus, two of the teachers require students to use performance assessment software in their homes and the others do not.

Question 5: If you use any computer software in class, can you describe how computers enhance classroom teaching?

Teacher A uses the metronome and tuner in *Smartmusic* in the classroom. Teacher B uses tuning software, and has some students use theory software individually while the rest of the class works on playing. Teacher C uses a variety of recording software. Also,

students compose a melody with *Finale Notepad* and arrange it for a group of the same instruments to play. Students need to consider the range of the instrument and include variations. The computer is also used to play most of the compositions to the rest of the class. Teacher D uses *Sibelius* notation software for students to arrange and transpose a piece.

CAI is used by all teachers as a means of assisting the practical application of theory, performance, and composition.

Question 6: What do you hope to accomplish by having students use the music software?

Teachers A and B use the software to show students in a group setting how to use the metronome and tuner. Teacher A said, "students use the stations as a metronome and as a tuner, and they use them in groups." Teacher B said, "I show the kids how to follow the needle."

Teachers B and C use theory software which takes students through an individually paced series of lessons while assessing their performance. Teacher C uses recording software to allow students to hear their performances. Teacher D uses the notation software *Sibelius* to reinforce music notation concepts by "doing a solo project that students create the sheet music for."

The most common purposes for using software are to assist in teaching students how to use a metronome or tuner and as a means for students to work on theory at an individualized level.

Question 7: Are there any tips you have for young directors on the use of CAI?

Teacher A suggests that "they should use computers as an addition to teaching, not as a substitute." Teacher C believes that "notation is an important skill, and

computers can be useful for creating sheet music." He continued, "Computers are used to play student compositions for the class." Teacher D warns that "computers can be used too much" but that they are "a good way of providing an alternate way for students to be successful in music."

Table 6 summarizes the findings from section 2.

Table 6

Summary of findings in Section 2

Question	**Topic**	*Teacher A*	*Teacher B*	*Teacher C*	*Teacher D*
1	Teacher uses CAI when teaching… Articulation	✓	×	×	×
	Breathing	×	×	×	×
	Dynamics	✓	×	×	×
	Intonation	✓	✓	×	×
	warm-ups	✓	×	×	×
	Pieces	✓	×	×	×
	rhythm and pitch	✓	×	✓	×
	scales and intervals	✓	×	×	×
	sight reading	×	×	×	✓
	Sound production	✓	×	×	×
	Teacher uses CAI when testing	✓	×	×	×
	Teacher uses CAI for performances	✓	×	✓	×
2	Teacher uses CAI when teaching improvisation	×	×	×	×
3	Teacher would like to acquire more equipment	✓	×	×	×
4	Teacher requires students to use CAI in their homes	✓	×	×	×
5	CAI is used in the classroom	✓	✓	✓	✓
6	CAI is used to help teach use of metronome and tuner	✓	✓	×	×
	CAI is used to teach theory, allowing students to work at their own pace	×	×	✓	✓
7	Teacher suggests that computers should not be relied on too heavily				

From these findings, we can see that one teacher uses CAI extensively to assist in the instruction of music fundamentals, but the other three teachers use CAI very little for the same purpose. Although little-used overall, CAI was employed by two of the teachers during performances and to enhance teaching of intonation, rhythm, pitch, and theory.

Section 3: Jazz Improvisation

Question 1: What steps do you take your students through when they are learning to improvise?

Teacher A guided students through a "call and response" and said "students play lots of written out solos" and "focus on articulation and style." All solos were in a blues scale, and written solos were memorized.

Teacher B used a method book "containing technical studies based on chords" and exercises which are "tedious" and "too difficult for the students." The teacher also said "sometimes the pattern was left out, and the students needed to continue playing the pattern" on their own. Since there was a lack of success in using the method book, the teacher stopped teaching jazz improvisation this year.

Teacher C's "not until teaching it first" method meant students learned the basics from the teacher before using the books *Standard of Excellence Jazz Ensemble Method* and *Essential Elements for Jazz Ensemble*. Students were first taught to play simple solos by rote, "based on a single scale such as dorian or mixolydian in several different styles, beginning with the root, then the root triad, and then the first five notes of each scale." The same procedure was then repeated beginning at the top of the scale. The teacher used a collection of rhythmic patterns which were repeated and developed. Rules, such as 'stepping down after a skip up' [1] and repeating mistakes to make them seem intentional, and musical quotes[2] were also practiced. Although this teacher learned by transcribing solos while in university, students in his/her program did not learn to transcribe.

Teacher D approached teaching students in a method similar to the *Ramon Ricker*

[1] Playing the note following a rising interval an interval of a second lower.

Jazz Improvisation Series Vol. 1: The Beginning Improviser method of starting with just one note to "provide students with a very solid ground" and gradually adding a second note after securing a foundation in rhythm, articulation, and style. The teacher said "It's the rhythm, not the notes that are important in jazz improvisation." Classes discussed the meaning of the word "improvise" and related improvisation vocabulary, such as "chorus or head, rhythm section, and chord progression." Teacher D introduces improvisation by having students engage in a "call and response" with a variety of simple rhythms and a simple drum accompaniment, such as "high hat on beats 2 and 4 and quarter notes on the ride cymbal, with the response on the snare drum." Beat 4 of each 4/4 measure is a rest so students can come in at beginning of the next measure. Students have limited options, and create a simple rhythm of quarter, half, eighth, and dotted quarter notes, all playing at the same time so none of the students is being listened to. Then one student at a time will play for one measure in what the teacher refers to as going "down the row," with encouraging comments in a measure of rest added between each student's solo. Students are cued, and "if a student misses a turn, the turn is skipped so students understand the flow of the music." At the end of the process, students receive feedback. The teacher makes a point of starting with stronger students who are more confident "to get some consistency." This process is repeated several times, always keeping to simple rhythms and only one note. Even though these processes progress in very small stages, the teacher states that "the students want to know what they have to do and once they get that, they feel comfortable." Next, students repeat their original pattern, and then play a variation on that pattern. At that point, the students will be "dying to add another note, which is

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[2] Playing a familiar melody as part of an improvised passage.

usually note 2" (the second note of the scale.) The steps of call and response, soli, and "down the row" are repeated, with students having the choice to start on the first or second note. The same process of taking turns would follow with each student having two measures of playing the same pattern, then three measures (playing the same pattern twice and then altering it in the third measure), with a measure of rest between each bar of playing.

Teacher D noted that students felt very secure in what they were doing throughout the process, a very different feeling from the "shaky ground" the teacher felt when learning to improvise in high school with no instruction. In fact, the teacher said, "students are usually begging for the next note or variable." Students work through some more small steps including removing the measure of rest and adding notes. Eventually students work up to a series of choruses. "In the first chorus, a student will solo over the entire 12 bar blues, using the minor pentatonic scale. In the second chorus, the notes from triads of each chord are used. In the third chorus, students use the major mixolydian scale, and in the last chorus they are free to play anything they want. Students may try 'babbling freely' for a few notes, but through all steps they are encouraged to stay with a repeated rhythmic pattern." Students also practice "using the blues scale on the IV chord in measures 4 and 5 in any chorus, so that they get a sense of the form" of the 12 bars they are playing. Focus remains on the use of an interesting rhythmic idea, aiming to "add shape" to the complete solo. The students then move on to using "the three notes of the triad for each chord, then the notes of the major pentatonic scale." Finally, students can choose any notes they wish, but are encouraged to return to the blues scale on the IV chord in "measures 5 and 6 which are key to the harmonic progression," so students are

again aware of the form of the 12 bar blues.

The students also rehearse in small groups to have more opportunities to practice improvisational skills, with goals in mind such as "moving forward," remembering the importance of rhythm "without completely abandoning harmony," and using their own ideas while maintaining a "link to the music." Teacher D felt that "memorizing licks had its place" and "old material sounds new to the new generation," but felt memorizing chord progressions would be a "better use of students' effort" stressing that students need to "*understand* how to improvise instead of memorizing how to improvise." The teacher also noted that students with a background in music tuition are technically strong, but "have difficulty swinging rhythms."

Commonalities among the four participants regarding teaching improvisation are the use of limitation (of notes, rhythms, and chords), a focus on articulation, style, and rhythm, and learning solos by rote or sheet music.

Question 2: In which of these steps do you involve CAI, and what are the reasons you do or don't involve computers?

Teacher A does not use any CAI while teaching improvisation, and uses the *Aebersold* method with CD accompaniment. There are some accompaniments found in *Smartmusic* from the *Aebersold* method, and the teacher said "I just haven't used it yet" when asked about using *Smartmusic*, but would be interested in using the software "if it seems worthwhile." Teachers B and C do not use CAI directly in teaching improvisation, but both teachers use *Alfred's Essentials of Music Theory*. Teacher B remarked about using computers to teach improvisation, "why bother! It isn't necessary." Teacher D does not involve CAI in teaching jazz improvisation. The teacher said, "a computer has a

technical way of learning."

Three of the four teachers had a negative response to the possibility of using CAI in teaching jazz improvisation.

Question 3: In terms of the following tasks, do you think CAI or teacher instruction is better suited. Why?

a) *Listening to jazz improvisation performances*
b) *Individual instrument practice reading chord progressions*
c) *Creativity*
d) *Transcription (unless you think your students should not learn this yet)*
e) *Transposition*
f) *Style*
g) *Technical exercises (scales, arpeggios)*
h) *Warm-ups*
i) *Theory*

Teacher A chose teacher instruction to be better at *listening to jazz improvisation performances, creativity, style,* and *warm-ups,* and CAI to be better at *individual instrument practice reading chord progressions, transcription, transposition, technical exercises,* and *theory.* For transcription in particular, this participant said that teacher guidance was necessary. Teacher B chose teacher instruction to be better at all tasks except for theory. For listening to jazz improvisation performances, he/she said "teachers have got to help students learn how to listen for sound quality and style on CDs." For creativity, although the participant chose teacher instruction to be stronger, he/she

admitted that through CAI "students could benefit from listening to their compositions instantly." Although teacher instruction was preferred in teaching transposition, Teacher B warned "teach transposition only if you have to [and if you do] "don't tackle too much." For theory, the participant said "some students are enthralled by the computer," although "some students don't learn well from computers." Teacher C chose teacher instruction to be better at *listening to jazz improvisation performances, creativity, style,* and *warm-ups*, and CAI to be better at *individual instrument practice reading chord progressions, transcription, transposition, technical exercises,* and *theory*. For individual practice reading chord progressions, Teacher C said CAI is better, but only after students are taught by the teacher. He/she stated that it "depends on the teacher" whether or not transcription should be taught by CAI. The teacher said that "computer instruction is getting stronger," and any teacher should "get involved" in teaching transcription with CAI. For warm-ups, the teacher thought students should work individually. For theory, Teacher C found that listening to a narrator in theory software is a great advantage of CAI, and teachers can be useful "for help" in "recognition of problems" or "adding" in areas where students are stronger. Teacher D chose teacher instruction to be better in all tasks.

According to the teachers, the majority of tasks were best left to teacher instruction. Teachers A and C were more positive about the use of CAI, and noted the strength of CAI in the areas of reading chord progressions, transcription, transposition, technical exercises, and theory.

Question 4: What computer programs have you used when teaching improvisation, and what strengths and weaknesses do you think each of them has?

None of the participants uses CAI directly in teaching jazz improvisation.

Question 5: If you are familiar with any of these computer programs or books, could you comment on what you like or dislike and what you would like to see changed about each:

a) *Band-in-a-Box*
b) *Aebersold*
c) *Practica Musica*
d) *Smartmusic*
e) *Garage Band*

Teacher A has used all of the software mentioned. The teacher uses *Band-in-a-Box* "all the time," and says "it's a great program and it has more and more styles all the time." The teacher stated, "there's good support material available" and the method is "especially good for piano and bass players," but it is "not in a good order." The teacher said "*Practica Musica* is an excellent program" and likes the progress chart, but did not use the software currently. The teacher used *Garage Band*, and found "it's a great toy." Teacher B was not familiar with any of this software, but uses a tuner similar to the one found in Smartmusic and uses theory software similar to *Practica Musica*. Teacher C was not familiar with any of the software, and said "cost is an issue." This teacher uses the software *Finale Performance Assistant* and *iPas*, which are similar to *Smartmusic*, and uses recording software with features similar to *Garage Band*. Teacher D was not familiar with any of the software either, but was familiar with methods such as *Aebersold*.

Only Teacher A has experience with the software *Smartmusic* and *Band-in-a-Box*. The other three interviewees were not familiar with any of this software.

Question 6: Have you used any other software worth mentioning? What are its strengths and weaknesses?

Teacher A talked about the use of MIDI files being imported into other software, such as *Finale* and *Digital Performer* which is "useful for recording and midi control," and said that *Garage Band* "saves so much time when you're making accompaniments for student to solo with" or "arrangements of music for groups of students to play." Another use of MIDI files mentioned was the creation of *Smartmusic* accompaniment files through *Finale*: "you can put audio files in to *Finale* 2008 and make accompaniments." The teacher said, "I like to use the *Basie Jam* CDs and *Patterns for Jazz* by Jerry Coker" when teaching jazz improvisation. The participant also suggested using the Internet for posting "listening and other assignments" and for "recordings of student performances, and some reference materials." Teacher C mentioned using *Cubasis* and *Sibelius Compass* in school. Teachers B and D did not mention other software.

Question 7: Final comments?

None of the teachers made any final comments.

Table 7 summarizes the findings from section 3.

Table 7

Summary of findings in Section 3

Question	**Topic**	*Teacher A*	*Teacher B*	*Teacher C*	*Teacher D*
1	Uses limitation when teaching improvisation	×	×	✓	✓
	Students focus on Rhythm	×	×	✓	✓
	Style	✓	×	×	✓
	Articulation	✓	×	×	✓
	Learning solos by rote or sheet music	✓	×	✓	✓
2	Attitude of teacher towards using CAI to assist in teaching improvisation	✓	×	×	×
3	Teacher instruction (T) or CAI (C) is better suited for Listening	T	T	T	T
	Creativity	C	T	C	T
	Transcription	T	T	T	T
	Transposition	C	T	C	T
	Style	T	T	T	T
	Technical exercises	C	T	C	T
	Warm-ups	T	T	T	T
	Theory	C	C	C	T
4	Teacher uses CAI to instruct jazz improvisation	×	×	×	×
5	Teacher has used the software Band-in-a-Box	✓	×	×	×
	Practica Musica	✓	×	×	×
	Smartmusic	✓	×	×	×
	Garage Band	✓	×	×	×
	has used the Aebersold method	✓	×	×	✓

Although all of the interviewees use some form of CAI in their classrooms, including the use of a metronome and tuner, and use software to support the instruction of performance, theory, and actual performance, none of the interviewees currently uses CAI to support student learning of jazz improvisation. Teachers A and C see a potential for its application in instructing the creativity, transposition, technique, and theory involved in improvising. Theory, technique, and listening were taught when the interviewees learned to improvise, and all of the teachers interviewed consider these to be

essential to learning to improvise. Yet all of the interviewees did not consider the teaching they received to be helpful. Three of the interviewees have a negative attitude towards the idea of using CAI to help teach jazz improvisation. Teacher A shows a much broader exposure to CAI and has shown a more positive attitude toward its use.

Clearly, from the variety of responses to interview questions, these teachers have different methods for delivering their curriculum, depending on their preferences. For example, Teacher A uses CAI in almost all of the music fundamentals discussed in the interview because of the positive attitude, and Teacher B only uses a metronome and tuner due to resistance to the involvement of computers into music instruction.

I must admit I was surprised by these results but can certainly understand the budget and time constraints that music teachers face and also know that one tends to teach as one was taught. Since these teachers did not learn jazz improvisation through the use of CAI, it is unlikely that they would institute a system of teaching CAI-assisted improvisation in their own classrooms.

However, from my investigation into various software applications, I can see a potential application of CAI to teaching techniques used by at least two of the teachers: limitation, a focus on rhythm, style, articulation, and learning solos by rote or sheet music. To explain, there are rhythm exercises, jazz exercises, and exercises which focus on articulation in *Smartmusic* which could be used for learning solos by rote or via sheet music. For example, Play-by-ear blues rhythm exercises demonstrate swing rhythm and are learned by rote, and many are manageable for beginning students since they use a limited range of notes and are limited to a few measures in length. Jazz exercises tend to be arpeggiated or scalar patterns in which students follow a chord progression and

notation shown on screen. Exercises which focus on articulation similarly have notation shown on screen. All of these exercises can be transposed using a pull-down menu, which could be an excellent way of introducing transposition while reading sheet music or listening to audio recordings for Play-by-ear exercises. These exercises are organized according to level of difficulty and can therefore be chosen to provide an area of focus, such as using a limited number of chords in jazz exercises. Jazz band pieces in *Smartmusic* are accompanied by an MP3 recording of a high quality band whose playing models a good jazz style. It can be exciting for students to practice with a recording of such a high quality ensemble, and inspiring for students to hear quality ensembles and improvised solos in the recordings.

I learned much from reflecting on my own practice and interviewing the four music teachers.

First, I learned that when implementing CAI the following considerations from the interview findings could increase the chances for success: Students should have their needs addressed first in teacher directed learning. For example, listening should be a major component of teaching and style should be a focus of listening, but listening should be teacher directed before contemplating the use of CAI. Next, the teacher should ensure that students take small steps in the process of learning to improvise, such as starting with a one-note solo. The number of rhythms students could choose from, such as only using quarter notes and eighth notes can also prevent students from becoming overwhelmed. Susequently, pains should be taken so that students do not rely too much on the computer. Transposition, for example, should be a skill that students learn, and students should not rely on the computer to do the thinking for them. Finally, teachers should take

advantage of the strengths of CAI.

Some of these advantages are 1) placing hardware on a cart with wheels to facilitate easy relocation of equipment to be used in different teaching spaces; 2) having students complete assignments at home using performance or recording software. This enables them to hear recordings of their own playing and could motivate them to practice regularly; 3) using software to create limited chord accompaniments for practicing improvisation; 4) employing theory software that enables individual instruction or permits a teacher to focus on performance skills with a smaller group of students while others practice theory drills.

To conclude, all of the interviewees felt that the traditional teaching of improvisation which has tended to focus on theory is inadequate. The incorporation of performance software could be helpful to students because they can learn from practicing pieces while accompanied by a recording of professional musicians and receiving feedback on note and rhythm accuracy from the software. Practicing patterns in jazz exercises such as those found in the *Aebersold* method, included as part of *Smartmusic*, can facilitate students' development of a repertoire of patterns which could be used in improvisation.

Now, it is time to revisit the topic of curriculum design and defend my choice of the Ontario Curriculum as the template on which to craft the six-lesson unit on teaching introductory jazz improvisation with the support of CAI.

Curriculum Design

I gleaned much useful information from the review of literature, examination of my own practice, and interviews with four instrumental music teachers, information that

would be incorporated into the unit plan on teaching introductory jazz improvisation with the support of CAI. However, before I could begin crafting the unit, I needed to decide on a curriculum design.

Informed by the work of Ornstein and Hunkins (1980), I decided on a subject-centered design, which was most appropriate for my purposes. Since music is taught by specialists at the middle school and secondary levels, designing the unit on the discipline of music made sense. In searching for a subject-centered design that would have the components and flexibility I needed, I examined the Ontario, British Columbia, and International Baccalaureate Curricula.

In the Ontario grade nine music curriculum (Ministry of Education and Training, 1999), students are required to "demonstrate the effective use of analog and/or digital technology in music applications" and to use recording equipment. Using practice aid software such as *Smartmusic* directly fulfills these requirements. There are several other criteria in the grade nine level curriculum which are reinforced by the use of similar software, such as the ability to "read and understand musical notation." Students can improve their understanding of music notation through exploring note duration, tempo indicators, the available pitches on their instrument, dynamics, repeats, directions such as *DC al coda*, and articulations while using practice aid software. Students can get immediate feedback on whether or not they played correct notes and rhythms. Fulfilling these curriculum requirements can also be met through music notation software such as *Finale Notepad*, *Finale*, or *Sibelius*. Another requirement of the Ontario Curriculum which could be taught using the improvisation section of *Smartmusic* or other software such as *Garage Band* is composition.

The British Columbia and the International Baccalaureate curricula were useful in thinking about how I might present my own unit on jazz improvisation. They were similar in that they state technology should play an important role in education, and that performance is an essential part of a music education. However, I chose the Ontario curriculum because it is more familiar to me and is positioned well to teaching beginning jazz improvisation with the support of CAI.

Having settled on the Ontario grade nine music curriculum as a model, I was ready to craft the unit.

Summary

In this chapter, the methodology used to create the unit on teaching beginning jazz improvisation with the support of CAI was described. First, I reflected on my own practice for strategies that have proven successful in learning, teaching, and playing jazz improvisation. Second, I documented the process of interviewing four instrumental teachers concerning their use of CAI in order to glean information that would be beneficial in developing the teaching unit. Finally, I explained and defended my choice of the Ontario Music Curriculum as the template on which to craft the teaching unit. The following chapter will introduce and present the unit on teaching introductory jazz improvisation with the support of CAI.

CHAPTER FOUR

INTRODUCTORY JAZZ IMPROVISATION WITH THE SUPPORT OF CAI

The following unit on teaching introductory jazz improvisation with the support of CAI was modeled on the framework of *The Ontario Curriculum, Grades 9 and 10: The Arts, 1999.* The six-lesson unit contains the following sections: introduction to the unit (aim, rationale, prerequisites, and main objectives), overall expectations, specific expectations, lesson plans, and supplementary documents.

Introduction to the Unit

Aim

The aim of the unit is to provide readers with suggestions for the effective use of CAI software, with a focus on the use of CAI in teaching beginning jazz improvisation. Six 40- minute lessons are contained in the unit.

Rationale

Considering weaknesses in past jazz improvisation methods and educational practices such as a focus on theory and lack of opportunities for students to practice improvising in a safe environment, the use of CAI in teaching jazz improvisation has the potential to facilitate the process through which students learn to improvise. Therefore creating a unit, which combines the use of CAI with traditional approaches to teaching beginning jazz improvisation, seemed worthwhile. The Ontario curriculum's overview and presentation of overall and specific expectations which target streams of music fundamentals such as creation and analysis was useful as a model on which to create a

similar structure which specifically addresses the implementation of CAI to learning beginning jazz improvisation. Finally, since many current curricula recommend the application of CAI to music, it is my contention that the following unit will be a useful resource for educators.

Prerequisites

This unit is intended for instrumental music teachers interested in incorporating CAI into their programs, in particular for the teaching of beginning jazz improvisation. It is expected that readers will have some knowledge of and experience with computers. The information provided aims to be useful both for teachers who are novices with CAI as well as those who are more familiar with its applications.

The unit of study is based on the belief that CAI can be effective in supporting the development of skills used in jazz improvisation and has been compiled from uses of CAI that I have found to be successful, examination of the literature, and interviews conducted with instrumental teachers which focused on the application of CAI in teaching beginning jazz improvisation.

Main Objectives

These objectives are taken from the Ontario grade 9 music curriculum, which calls for students to use technology to support learning.

This unit will assist readers in

1) understanding the importance of careful planning when using CAI in an instrumental music program,

2) planning to use CAI to support the instruction of beginning jazz improvisation and/or the skills learned before beginning to improvise, and

3) implementing the lessons contained within the unit with assistance from the resources suggested within.

Overall Expectations

By the end of the unit, it is expected that students will:

1) demonstrate instrumental techniques and an understanding of musical elements while performing an improvisation over a 12 bar blues (Creation and Performance),

2) record an analysis of their success during and after the unit (Reflection and Analysis)

3) demonstrate an understanding of the 12 bar blues (Form)

Specific Expectations

In this unit, students will continue to develop skills and an understanding of concepts related to the playing of their instruments. They will develop these skills through:

1) listening to examples of improvisation,

2) practicing skill building exercises,

3) employing self, peer, and teacher evaluation, and

4) employing self reflection.

Fundamental Concepts

Duration: Swing rhythm

Pitch: Blues scale

Expressive controls: Dynamics, articulation

Timbre: Development of sound quality

Texture: Homophony

Harmony: Major, Minor, and Seventh chords

Form: 12 bar blues

Lesson Plans

The following lesson plans (see Table 8) make use of ideas which develop or give examples of exercises for developing harmony, rhythm, form, and technique. The lessons are suitable for teaching beginning jazz improvisation with the support of CAI to students who have limited experience on their instruments.

Table 8

Lesson Plans

<table>
<tr><th colspan="3">Unit: Jazz Improvisation Lesson 1 – Beat and Rhythm</th></tr>
<tr><td colspan="2">Prepared by: David Niermeier (please feel free to edit for your own use)</td><td>Grade:</td></tr>
<tr><td colspan="3">Overall Expectation of Unit: Students will learn to improvise over a 12 bar blues using a minimum of 3 notes</td></tr>
<tr><td colspan="3">Fundamental concepts addressed: ☑duration ☑pitch ☑dynamics and ☑other expressive controls (articulation) ☒timbre ☒texture ☑harmony ☒form</td></tr>
<tr><td colspan="3">Specific Expectations: Students will learn to use Smartmusic so that they can then record assignments at home and e-mail them to the teacher.</td></tr>
<tr><td>Purpose</td><td>For students to improve their ability in beat and rhythm using rhythms that are related to jazz, such as the blues Play by Ear exercises in Smartmusic</td><td rowspan="2">Support</td></tr>
<tr><td>Objectives</td><td>Perfect rhythmic performance of Play by Ear exercises (including note start and note length)</td></tr>
<tr><td>Procedure</td><td>Use class time for instructing students in the use of the software, and demonstrate how it can be used. Tutorial videos are often available which can help students learn software quickly.
1. Start the class by warming up with a B-flat concert scale with each note lasting for 8 beats at a speed of 60 per quarter note.
2. Teacher: play a one measure long improvised rhythm on each note of the B-flat scale, repeated so it lasts 2 measures. Ask students to echo the patterns, and follow the articulation and dynamics demonstrated.
3. Play some blues patterns in Smartmusic from projected sheet music, taking turns between Concert Pitch, B-flat, E-flat, and F instruments
4. Show students how rhythm will be assessed demonstrating how to choose to view the assessment feature in Smartmusic, and completing an exercise showing both correct and incorrect examples of pitch and rhythm by singing or playing into a microphone.
State that only assignments with perfect rhythm will be accepted. Then, have the whole class complete some of the Play-by-Ear exercises in Smartmusic together as a class so that they know what they must do at home.
6. Start the exercise with the class at a slower tempo both singing and playing their instruments.
5. Learn and play a short jazz piece or lick (such as the bass line from the piece So What by Miles Davis) and play it several times with a chance for individual students or a group of students to improvise a one measure solo using a limited number of rhythms.</td><td rowspan="2">Technology Required
Performance software Smartmusic, a computer with a microphone attached in students' homes, or available at school outside regular class time, and a computer which can seen by all students in the class, preferably by attaching a projector</td></tr>
<tr><td>Verification</td><td>Students will complete several exercises in performance-based software and submit the recordings to the teacher via e-mail as a home based assignment. For example, in one month students could be expected to complete five of the blues listening exercises in Smartmusic.
To pass each exercise, students must use the assessment feature in Smartmusic and submit their score showing 100%.
Students will demonstrate their understanding of the software by completing an assignment at home and sending it via e-mail to the teacher for assessment. The rubric found in figure 1 on p. 73 could be used.</td></tr>
</table>

<table>
<tr><td colspan="3">Unit: Jazz Improvisation Lesson 2 – Harmony</td></tr>
<tr><td colspan="2">Prepared by:</td><td>Grade:</td></tr>
<tr><td colspan="3">Overall Expectation of Unit: Students will learn to improvise over a 12 bar blues using a minimum of 3 notes</td></tr>
<tr><td colspan="3">Fundamental concepts addressed: ☒duration ☑pitch ☒dynamics and ☒other expressive controls ☒timbre ☒texture ☑harmony ☑form</td></tr>
<tr><td colspan="3">Specific Expectations: Students will learn the chords of the 12-bar blues in B-flat, work through exercises to reinforce their understanding of this harmony, and reflect on how this can be applied.</td></tr>
<tr><td>Purpose</td><td>To prepare students with the theory needed to begin learning to improvise, over the chords of the 12-bar blues</td><td rowspan="3">Support
Supervising teacher should be prepared to deal with technical difficulties which may arise, such as losing the connection between a USB music keyboard and the computer, or if software crashes, and know how to answer questions regarding the theory the students are learning. It may be helpful for students to work in groups.</td></tr>
<tr><td>Objectives</td><td>A minimum achievement should be required depending on the software, and clear consequences for failing to meet the standard should be communicated to the students. Since students will work at different levels, the minimum requirement should be a measure of how far each student has progressed since the beginning of the lesson or unit. For example, students using Practica Musica could be required to pass two levels of an activity in a single period, or lose effort grades.</td></tr>
<tr><td>Procedure</td><td>Inform students ahead of time of the consequences if they do not accomplish the minimum required work, such as coming in for remedial sessions, or abide by your behavior expectations. Provide a manual for students as a reference for tasks common to their theory work (such as the manual provided with Practica Musica).
1. Students will learn the theory needed to progress through levels of achievement from the software, including the structure of a triad, the tonic, dominant, and subdominant chords which make up the 12-bar blues, and the notes of the blues scale.
2. Students will progress through ear training exercises in Practica Musica.
3. Students will write in a reflective journal the applications of understanding this theory will have on their playing.</td></tr>
<tr><td>Verification</td><td>A record should be kept of the progress students have made; often the software will do this.</td><td>Technology Required
Computer lab and theory software such as Practica Musica</td></tr>
<tr><td>Reflection</td><td>What went well?
What could be improved?
Did students learn the objectives?
How do we know?</td><td></td></tr>
</table>

Unit: Jazz Improvisation Lesson 3 – 1 note improvisation

Prepared by:	**Grade:**

Overall Expectation of Unit: Students will learn to improvise over a 12 bar blues using a minimum of 3 notes

Fundamental concepts addressed: ☑duration ☑pitch ☑dynamics and other expressive controls ☒timbre ☒texture ☒harmony ☑form

Specific Expectations: Students will be able to improvise using only the tonic note over a 12-bar blues

Purpose	To build improvising skills through experimenting with limited rhythms and notes	**Support**
Objectives	Students will learn to improvise over a 12-bar blues using only the tonic note from the B-flat blues scale	
Procedure	1. Students warm up individually with an ascending and descending B-flat blues scale in whole notes, then in half notes, then in quarter notes, then in eighth notes. 2. Teacher – clap some improvised rhythms and ask students to imitate the pattern and focus on the dynamics while echo-clapping the patterns. 3. Play some improvised rhythm patterns on one note of the blues scale at a time, lasting for 7 beats each. Students echo-play the patterns after one beat of rest. 4. Show a movie from youtube.com showing a good example of a middle or high school student improvising on a band instrument, such as http://www.youtube.com/watch?v=5m1h_gGXTLA 5. Play the recording of the 12-bar blues and have all students improvise a one bar phrase on the tonic note during the 1st, 3rd, 5th, 7th, 9th, and 11th measures using only quarter notes. 6. Play the recording again and have all students improvise a one bar phrase on the tonic note during the 1st, 3rd, 5th, 7th, 9th, and 11th measures using only swinging eighth notes and quarter notes. 7. Play the recording and have all students improvise a two bar phrase on the tonic note during the 1st and 2nd, 5th and 6th, and 9th and 10th measures, using only swinging eighth notes and quarter notes. 8. Play the recording on the 12-bar blues and have all students improvise a two bar phrase on the tonic note during the 1st and 2nd, 5th and 6th, and 9th and 10th measures, using only swinging eighth notes, quarter notes, and swinging triplets. 9. Play the recording of Swing Away, by Brian Appleby available free at http://www.apromusic.com/Resources/Swing%20Away.mp3 and have students choose one of the three solo sections to improvise a one note solo on the tonic, limited to the rhythms used during the class.	
Verification	Observe students	**Technology Required** **Recording of 12-bar blues**
Reflection	**What went well?** **What could be improved?** **Did students learn the objectives?** **How do we know?**	

Unit: Jazz Improvisation Lesson 4 – 2 note improvisation

Prepared by:	**Grade:**

Overall Expectation of Unit: Students will learn to improvise over a 12 bar blues using a minimum of 3 notes

Fundamental concepts addressed: ☑duration ☑pitch ☑dynamics and other expressive controls ☒timbre ☒texture ☒harmony ☑form

Specific Expectations: Students will be able to improvise using only the tonic and dominant notes over a 12-bar blues

Purpose	To build improvising skills through experimenting with limited rhythms and notes	**Support**
Objectives	Students will learn to improvise over a 12-bar blues using only the tonic note from the B-flat blues scale	
Procedure	1. Warm up with a B-flat concert scale in whole notes, then in half notes, then in quarter notes, then in eighth notes descending and ascending. 2. Teacher – clap some improvised rhythms and ask students to imitate the pattern and focus on the dynamics while echo-clapping the patterns. 3. Play some improvised rhythm patterns on one note of the blues scale at a time, lasting for 7 beats each. Students echo-singing the patterns after one beat of rest. 4. Show a movie from youtube.com showing a good example of a middle or high school student improvising on a band instrument, such as http://www.youtube.com/watch?v=6B1WusaASv0 5. Play the recording of the 12-bar blues and have all students improvise a one bar phrase on the tonic note during the 1st, 3rd, 5th, 7th, 9th, and 11th measures using only quarter notes. 6. Explain that some notes sound more pleasant when played over each chord of the 12-bar blues. 7. Play the recording and have all students play a quarter, two eighths, quarter rhythm, quarter rest using the only the dominant note (F) on each measure. See if they agree that when the sub-dominant chord is played, that there is a clash between the note played and the chord. Explain that this clash does not always need to be avoided, but should be used with caution. 8. Play the recording of the 12-bar blues and have all students improvise a one bar phrase on the tonic note during the 1st, 3rd, 5th, 7th, 9th, and 11th measures using only quarter notes, and using the tonic note in the fifth measure to avoid the clash. 9. Play the recording of Swing Away, by Brian Appleby available free at http://www.apromusic.com/Resources/Swing%20Away.mp3 and have students choose one of the three solo sections to improvise a two note solo over, using the tonic in measure five, six, and ten.	
Verification	Observe students	**Technology Required** **Recording of 12-bar blues**
Reflection	**What went well?** **What could be improved?** **Did students learn the objectives?** **How do we know?**	

Unit: Jazz Improvisation Lesson 5 – 3 note improvisation

Prepared by:	**Grade:**

Overall Expectation of Unit: Students will learn to improvise over a 12 bar blues using a minimum of 3 notes

Fundamental concepts addressed: ☑duration ☑pitch ☑dynamics and other expressive controls ☒timbre ☒texture ☒harmony ☑form

Specific Expectations: Students will be able to improvise using only the tonic, dominant, and subdominant notes over a 12-bar blues

Purpose	To build improvising skills through experimenting with limited rhythms and notes	**Support**
Objectives	Students will learn to improvise over a 12-bar blues using only the tonic note from the B-flat blues scale	
Procedure	1. Warm up with a B-flat concert scale in whole notes, then in half notes, then in quarter notes, then in eighth notes descending and ascending. 2. Teacher – clap some improvised rhythms and ask students to imitate the pattern and focus on the articulation while echo-sing the patterns. 3. Play some improvised rhythm patterns on one note of the blues scale at a time, lasting for 7 beats each. Students echo-playing the patterns after one beat of rest. 4. Show a movie from youtube.com showing a good example of a middle or high school student improvising on a band instrument 5. Play the recording of the 12-bar blues and have all students improvise a one bar phrase choosing the tonic, dominant, or subdominant note during the 1st, 3rd, 5th, 7th, 9th, and 11th measures using only quarter notes, keeping the harmonic progression in mind. Display the harmonic progression on a projector connected to a computer. 6. Play the recording again and have all students improvise a one bar phrase choosing the tonic, dominant, or subdominant note during the 1st, 3rd, 5th, 7th, 9th, and 11th measures using swinging eighth notes, quarter notes, and triplet eighths. 7. Play the recording and have all students improvise using only swinging eighth notes and quarter notes, and only on the tonic and dominant notes. 8. Play the recording on the 12-bar blues and have all students improvise choosing the tonic, dominant, or subdominant note, using only swinging eighth notes, quarter notes, and swinging triplets. 9. Play the youtube version of Miles Davis "Freddie Freeloader" at http://www.youtube.com/watch?v=ZD4M2foMDF0 and have two students at a time take a twelve bar phrase to improvise over while the solos are being played.	
Verification	Observe students	
Reflection	**What went well?** **What could be improved?** **Did students learn the objectives?** **How do we know?**	**Technology Required** **Recording of 12-bar blues**

Unit: Jazz Improvisation Lesson 6 - Reflection

Prepared by:	**Grade:**

Overall Expectation of Unit: Students will learn to improvise over a 12 bar blues using a minimum of 3 notes

Fundamental concepts addressed:
☑☒duration pitch dynamics and other expressive controls timbre texture harmony form

Specific Expectations:

Purpose	Reflect on the process of learning to improvise and set goals improving their improvisation	**Support**
Objectives **Skills/information to be learned**	Students will determine at what stage of this process they feel comfortable and practice at the next stage	
Procedure **Steps to follow, examples, and provocations**	1. Discuss as a class responses to the following questions: a) What did you do well during this unit? b) What could you have done better in this unit? c) What action will you take to improve your improvisation? 2. Warm up with a B-flat concert scale in whole notes, then in half notes, then in quarter notes, then in eighth notes ascending and descending. 3. Using the B-flat blues scale, students will choose how many notes to play and improvise when they feel comfortable over the following recording of a 12-bar blues: http://www.nationaljazzworkshop.org/freematerials/playalongs/blues/Blues_in_B_flat.mp3 Students who feel like tackling more than the three notes learned so far should be reminded that limiting rhythms and working progressively towards more notes will prevent them from being overwhelmed. 4. Watch the movie of "Freddy Freeloader" on youtube.com http://www.youtube.com/watch?v=ZD4M2foMDF0 and ask students to write some goals to work towards while listening to the solos. 5. Ask students to choose one of their goals to practice improving, and ask them to play along again with the following recording of the 12-bar B-flat blues: http://www.nationaljazzworkshop.org/freematerials/playalongs/blues/Blues_in_B_flat.mp3. 6. For homework, have students their reflective journals a reflection on how well they have learned, how they might have learned better, and at what stage in learning to improvise they feel they would be able to comfortably perform at. For example, a student might feel comfortable play all three notes, but want to limit rhythms to quarter and eighth notes. They could alternatively complete the attached reflection worksheet.	
Verification **Assessment of student understanding**	Observe students Journals could be assessed by the following simple rubric (level 4 is highest) 1 Reflections do not accurately reflect student's progress 2 Reflections accurately reflect student's progress some of the time 3 Reflections accurately reflect student's progress most of the time 4 Reflections accurately depict the student's progress, and a goal towards improving improvisation based on these reflections is appropriate	**Technology Required** **Recording of 12-bar blues, computer and projector to watch youtube**
Reflection	**What went well?** **What could be improved?** **Did students learn the objectives?** **How do we know?**	

Reflection Worksheet

	Topic	*N/A*	*Beginning*	*Progressing*	*Well*
	Overall expectations				
1	I can improvise a solo over a 12-bar blues				
2	I can define what a 12-bar blues is				
	Specific expectations				
3	I can use the basic functions of performance software				
4	I can demonstrate a swing rhythm				
5	I can demonstrate the blues scale				
6	I can apply dynamics in an improvised solo				
7	I can apply articulation in an improvised solo				
8	I can demonstrate a beautiful tone on my instrument				
9	I can define Homophony				
10	I can define major chords				
11	I can define minor chords				
12	I can define seventh chord				
13	I can improvise a one note solo over a 12-bar blues accomplaniment				
14	I can improvise a two note solo over a 12-bar blues accomplaniment				
15	I can improvise a three note solo over a 12-bar blues accomplaniment				

I think I progressed well in this unit because _____

_____

I think I could I have done this better _____

_____

My next step is to _____

_____

Supplementary Documents

The following supplementary documents provide further support for the lessons found in this unit.

The introductory material – *Can CAI be used to support jazz improvisation?* and *CAI as a* tool – is followed by a set of materials in alphabetical order: Assessment, Attitudes, Budget, Communication, Customized Learning Tools, Developing Creativity, Ensuring Students Practice, Language Support, Limitation, Method Books, Motivation, Reducing Anxiety, Roles of People Involved, and Teaching Students New Software.

Can CAI be used to support Jazz Improvisation Instruction?

In the early development of computers, there was much skepticism over whether computers could be useful in education. With recent software development, many of the shortcomings of computer technology have been resolved, such as improved feedback, increased speeds, and increased availability of computers. Using CAI to support music instruction can motivate students, can provide feedback making home practice more effective, and can allow students to take greater control of the learning process.

CAI as a tool

It is important to realize that CAI cannot do a teacher's job. Just as a metronome is a tool for rhythm, teachers must guide students to make the best use of CAI as a tool for learning.

One of the greatest abilities of a teacher is to give feedback in response to every aspect of a student's playing including incorrect posture, hand position, and habits which can cause unnecessary challenges for students such as incorrect embouchure placement on brass instruments. Circulating amongst students during lessons is an excellent way of

providing students with such feedback, as well as providing feedback on students' progress in learning to improvise.

Teachers can compensate for aspects of playing which computers do not assess, such as tonguing, the length of notes, and sound quality. Teachers must therefore not rely too heavily on CAI. Teacher guidance can help students avoid weaknesses caused by the shortcomings of software, and direct students to take advantage of its strengths.

On the other hand, CAI can provide feedback to students when they work at home or when a teacher is not available. While students use CAI at home, reading large amounts of music will strengthen students' ability to read music. Teacher guidance in developing techniques for accurate music reading is also important, and although instruction by a teacher is essential, one of the best uses of computers is in skill-developing exercises, such as jazz exercises designed to develop skills pertaining to improvisation and blues exercises which can develop a student's ability to perform a swing rhythm.

Teachers can also guide students in other ways to make the best of CAI. Alternate fingerings are provided in *Smartmusic*, for example, but they are difficult to see, so teachers could tell students that alternate fingerings can be useful in making passages easier to play and show how to find them in *Smartmusic*. Similarly, before using the "Intelligent Accompaniment" feature in *Smartmusic,* beginning students should be confident in maintaining a steady tempo.

Assessment

Formative and summative assessment from self, peer, and teacher assessed tests and assignments can make students accustomed to being critical of their own

performance. The rubric using mastery pedagogy, which I designed (see Figure 1), can be used for any of these types of summative assessment, and the jazz improvisation rubric in Figure 2 could also be used for self, peer, or teacher assessment as part of the unit.

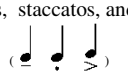
Mastery pedagogy is based on the idea of learning beginning skills before moving on to more difficult concepts. The rubric in Figure 1 is designed to ensure students do not continue to the next unit of study until they demonstrate a thorough understanding of concepts learned in their current lesson or unit. To pass a test, students need to achieve a "Demonstrates Thorough Understanding" in all categories of the test rubric, with the possible exception of one mark in the "demonstrates competence" column. Tests can be constructed to cover several pages of material or involve sight reading; students need to demonstrate they can apply the skills they have learned in the unit, such as dynamics, articulation, and reading music. A copy of these test results is given to students so they know what to improve for the next testing opportunity.

Figure 1

Band Rubric

Types of test: 1. Assigned Line 2. Surprise line and 3. Sight Reading

NAME:_____	CLASS:	DATE:_____
TEST#: ___ MARK: (Pass / Fail)	**Note:** Passing requires that all criteria are "Demonstrated Thorough Understanding," with one "Demonstrates Competence" allowed	

BASIC	**Demonstrates Thorough Understanding**	**Demonstrates Competence**	**Needs improvement**
Posture	Sitting straight, feet flat on the floor, instrument held correctly, head up	Few problems with body or instrument position	Severe problems with body or instrument position
Sound Quality	Full, rich, and focused sound quality characteristic of the instrument	Sound quality is slightly thin, weak, or harsh	Sound quality is unpleasant and unfocused
Breathing	Full breaths, diacostal breathing, air flow strong, breathing only during rests	Few problems with breathing techniques	Major problems with breathing techniques
Tuning	Instrument is played in tune	Instrument is played slightly out of tune	Instrument is played significantly out of tune
Embouchure	Proper embouchure muscles, properly shaped lips, and cheeks not puffed.	Few problems with embouchure	Severe problems with embouchure
Fingerings	All correct fingerings, without any fingerings written in, and correct hand position	Almost all fingerings are correct	Several mistakes with fingerings
Pitches	All notes played with the correct fingering sounded on the correct partial	Almost all partials were played correctly	Many partials were not played correctly
Range	Notes in all of instruments' ranges (high, middle, and low) sound consistently full, rich, and focused	Notes in extreme ranges do not sound full, rich and focused	Severe problems with notes in extreme ranges
Basic Articulation	All notes played with correct tonguing or slurring	Most notes articulated accurately	Most notes lack accurate articulation
Rhythmic Accuracy	All notes played at the correct time and last for the correct length of time	Few problems with rhythmic accuracy	Severe problems with rhythmic accuracy
Instrument Condition	All parts of instrument functioning correctly. (Slide, valves, reeds, ligature)	Instrument in almost perfect playing condition	Instrument is in need of repair and causing difficulties
Phrasing	Phrases are played in one breath	Phrases are interrupted by a breath of air	Several breaths are taken during one phrase
INTERMEDIATE			
Dynamics	All dynamic marking are clearly demonstrated	Almost all dynamics are clearly demonstrated	Dynamics are not clearly demonstrated
Advanced Articulation	All tenutos, staccatos, and Accents 	Most notes articulated accurately	Most notes lack accurate articulation
Tuning	All notes are played in tune	Almost all notes were played in tune	Severe problems with tuning
ADVANCED			
Sound Quality	Consistently beautiful sound characteristic of the instrument	Sound quality is lacking slightly	Sound quality is unpleasant or unfocused
Ensemble Skills	Plays in balance, in tune, and blends with ensemble	Slightly weak in ensemble skills	Weak in ensemble skills
Phrase Shaping	Phrases have shape and direction to them	Phrases have little shape and direction	Phrases lack shape and direction

According to Hanley (2002), assessment should: Assess the depth of understanding, present goals clearly, identify strengths, be challenging, show progress towards mastery, use multi-faceted scoring systems, involve self-assessment, and allow for interaction between assessor and learner. Because mastery learning allows for differentiation, the following rubric fulfills these requirements.

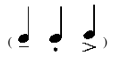
It is important to note that since students will pass tests at different times, covering music from several tests can provide support for students at all levels.

I designed the rubric in Figure 2 so that students could be assessed at increasingly difficult levels of improvisation, such as starting with a short improvisation over a single chord with a limited number of notes and rhythms, and gradually mastering steps towards full improvisation.

Figure 2

Rubric for improvising

NAME:_____	CLASS:	DATE:_____
TEST#: ___ MARK: (Pass / Fail)	**Note:** Passing requires that all criteria are "Demonstrated Thorough Understanding," with one "Demonstrates Competence" allowed	

BASIC	**Demonstrates Thorough Understanding**	**Demonstrates Competence**	**Needs improvement**
Posture	Sitting straight, feet flat on the floor, instrument held correctly, head up	Few problems with body or instrument position	Severe problems with body or instrument position
Sound Quality	Full, rich, and focused sound quality characteristic of the instrument	Sound quality is slightly thin, weak, or harsh	Sound quality is unpleasant and unfocused
Breathing	Full breaths, diacostal breathing, air flow strong, breathing only during rests	Few problems with breathing techniques	Major problems with breathing techniques
Tuning	Instrument is played in tune	Instrument is played slightly out of tune	Instrument is played significantly out of tune
Embouchure	Proper embouchure muscles, properly shaped lips, and cheeks not puffed.	Few problems with embouchure	Severe problems with embouchure
Fingerings	All correct fingerings, without any fingerings written in, and correct hand position	Almost all fingerings are correct	Several mistakes with fingerings
Pitches	All notes played with the correct fingering sounded on the correct partial	Almost all partials were played correctly	Many partials were not played correctly
Range	Notes in all of instruments' ranges (high, middle, and low) sound consistently full, rich, and focused	Notes in extreme ranges do not sound full, rich and focused	Severe problems with notes in extreme ranges
Basic Articulation	All notes played with correct tonguing or slurring	Most notes articulated accurately	Most notes lack accurate articulation
Rhythmic Accuracy	All notes played at the correct time and last for the correct length of time	Few problems with rhythmic accuracy	Severe problems with rhythmic accuracy
Instrument Condition	All parts of instrument functioning correctly. (Slide, valves, reeds, ligature)	Instrument in almost perfect playing condition	Instrument is in need of repair and causing difficulties
Phrasing	Phrases are played in one breath	Phrases are interrupted by a breath of air	Several breaths are taken during one phrase
Improvisation	Solo reflects harmony and rhythm of the piece	Most of the solo reflects the harmony and rhythm of the piece	The solo reflects rarely reflects the harmony and rhythm of the piece
INTERMEDIATE			
Dynamics	All dynamic marking are clearly demonstrated	Almost all dynamics are clearly demonstrated	Dynamics are not clearly demonstrated
Advanced Articulation	All tenutos, staccatos, and accents 	Most notes articulated accurately	Most notes lack accurate articulation
Tuning	All notes are played in tune	Almost all notes were played in tune	Severe problems with tuning
Improvisation	Solo demonstrates advanced technique	Technique is slightly weak	The solo is lacks the use of adequate technical ability
ADVANCED			
Sound Quality	Consistently beautiful sound characteristic of the instrument	Sound quality is lacking slightly	Sound quality is unpleasant or unfocused
Ensemble Skills	Plays in balance, in tune, and blends with ensemble	Slightly weak in ensemble skills	Weak in ensemble skills
Phrase Shaping	Phrases have shape and direction to them	Phrases have little shape and direction	Phrases lack shape and direction
Improvisation	Solo reflects the form of the piece sufficiently	Solo sometimes does not reflect the form of the piece	The solo does not reflect the form of the piece accurately

Assignments to be completed during such a unit could be posted on a classroom notice board or on a website, and students could be directed to complete them in succession. To pass each assignment, a student would need to play all notes and rhythms correctly. Students can receive this feedback from software such as *Smartmusic* and *iPas*. The teacher should assess whether the exercises are played with correct note length and good sound quality, since this is not part of the computer's assessment.

After finishing this unit, students who have not yet passed the assessment will need to focus on playing the material correctly while others work on air support or sound quality; more advanced students can focus on shaping phrases or assisting their peers. As new material is given to challenge the more advanced students, other students continue working on the tests they have not yet passed to ensure they are not being overwhelmed.

As well as allowing students to work at an individualized level of difficulty, teachers can benefit from the tracking and marking capabilities of ear training and theory software such as *Practica Musica* from lesson 2.

Attitudes

When applying CAI, teachers need to be aware that some students may be resistant to or scared of using computers. Teaching students and other staff the basic knowledge needed to use software and not expecting them to use advanced computer techniques will alleviate this stress.

Budget

An issue for any band teacher is the allocation of funds. Band instruments are expensive to buy and maintain, sheet music is costly, and there is a plethora of other expenses. The following is a list of ideas which can help teachers spend wisely when implementing the CAI required for this unit:

1) Keyboard amplifiers can double as a stereo system connected to a computer though a USB audio interface.

2) Teachers can seek out free and inexpensive software:

There is a great deal of free software, such as titles found at http://www.hitsquad.com/smm/freeware/, but the following titles are some of the more pertinent to this unit:

Audacity is free audio recording software.

Finale Notepad and *Sibelius Student* are similar to the notation software *Finale* and *Sibelius*, but with a limited number of functions.

3) Movies of band instrument performances from youtube.com such as those found in the unit are free to view and can give students the opportunity to rest their embouchure muscles while they develop a mental image of good tone and hear examples of phrase shaping. They may even be inspired by listening to players with great technique.

4) Marc Sabatella's *A Jazz Improvisation Method* contains a great deal of useful information and is free online.

5) Software available when purchasing other resources:

As part of the *Standard of Excellence Enhanced* method, the practice software

iPas assesses students' pitch and rhythm, and has useful tips for students playing wind instruments such as "Your chin and jaw must not move while tonguing." The tips are generic, however, and are not given in response to how the students are performing. These method books are also part of *Smartmusic*.

Garage Band is included as part of Mac OS X if teachers are considering buying a computer or computers.

6) Teachers can make use of resources already available:

As hardware becomes more accessible to all computer users, DVD and CD burners are more readily available. This can allow materials for student portfolios to be saved for future reference as the cost of such mass storage discs becomes more affordable. Many microphones are inexpensive, and students may already have a computer with a built-in microphone, or have a microphone in a web-cam which can be used with practice and recording software.

If a substantial budget is available, teachers might consider purchasing a collection of hardware used for multiple purposes, such as a laptop computer, a microphone, USB audio interface, MIDI piano keyboard, and speakers kept on a cart These carts could be used to support teaching jazz improvisation by recording students practicing improvisation, providing specific chord progression accompaniment, and playing chord progressions on a keyboard.

Communication

Another way of supporting student learning is enlisting parents' active participation. Parent involvement is essential since in many cases students spend most of their instrument time at home. Students and parents can be notified by phone or e-mail

when deadlines are missed for tests or home assignments. Positive feedback to parents can be a motivating factor.

Customized learning tools

When preparing to deliver this unit, software can be used for more than just CAI. *Finale*, for example, can be used to make customized accompaniments which can be saved and used in *Smartmusic*. Notation software can be used to create arrangements and transcriptions for ensembles with unconventional instrumentation. *Garage Band* and *Band-in-a-Box* are capable of creating accompaniments and chord progressions for student practice and/or performance.

Developing Creativity

Through the jazz exercises in this unit, students will develop a vocabulary which includes melodic and rhythmic elements. Once students are capable of accurate imitation, they need to understand how to create the sounds they have been imitating. According to Sabatella (http://www.outsideshore.com/primer/primer/ms-primer-5-1.html), "abilities include playing in a melodic way while considering the harmonic and rhythmic style of music in the accompaniment, and developing those ideas throughout the form of the solo." When this foundation has been mastered, students could begin to study the harmonic theory used in improvisation, practice at home, and then move on to practicing in a safe and nurturing communal environment which offers feedback. Many jazz musicians agree that ear training, either transcribing or copying by rote, is an important foundation for jazz improvisation, since imitation will help students learn jazz vocabulary, just as imitation can help one learn the vocabulary of spoken language.

Language Support

Software available in several different languages can be advantageous for students with weak English skills. Teachers might consider which software is available in different languages if they have students who would benefit from software available in their mother tongue(s).

Lesson Structure

After warming-up individually, as much as a third of class time should be spent playing exercises which focus on building music fundamentals which could be related to developing improvising. Mouthpiece practice for brass players helps students find the center of pitches and develop good sound quality, and singing for all students can take away from the technical demands of the instrument and allow them to focus on the creative side of improvising.

In call and response exercises where the teacher plays a rhythmic pattern and students repeat it, students could be directed to pay particular attention to one element of music (dynamics, for example). Call and response exercises are particularly useful for teachers to demonstrate the element of style, which is so important in jazz improvisation.

At this point, if the lesson is longer (80min., for example), giving students a rest can obviate habit which are detrimental to proper playing technique from forming. If students tire, they may compensate for a lack of air support or embouchure strength with poor technique, or develop poor posture.

Music teachers can use features of CAI for the whole classroom. For example, a strobe tuner could be demonstrated to all students while the computer screen is being projected for the class to see how to tune notes or bend pitches.

Technique building exercises such as long tones, scales, arpeggios, tonguing exercises and slurs complete the warm-up, and method books and pieces make up the rest of the class. The method books published by *ApRo* are highly recommended for students in their first year of playing, and several other method books are now part of *Smartmusic*. There are method books for jazz improvisation such as the *Standard of Excellence Jazz Ensemble*, and *Aebersold* method exercises are now available in *Smartmusic*.

To ensure all students are adequately challenged, teachers must endeavour to cover material suitable to all students. In addition, if a series of scales is taught in sequence such as Bb, C, D, and Eb, it is important to review the Bb scale regularly until all students have mastered it.

Limitation

To limit the time spent on instrument-specific teaching in mixed instrument classes, teachers can focus on a small number of instruments during the first half of the first year (for example, flute, clarinet, trumpet, and trombone). If a teacher chose to use this unit during a period of limited instruments, the instrument-specific instruction time would be reduced. Less time would be spent on teaching instrument-specific skills such as assembly, hand position, posture, breathing, embouchure, instrument maintenance, sound production, and suggestions for recommended listening, leaving more time to prepare students for learning jazz improvisation.

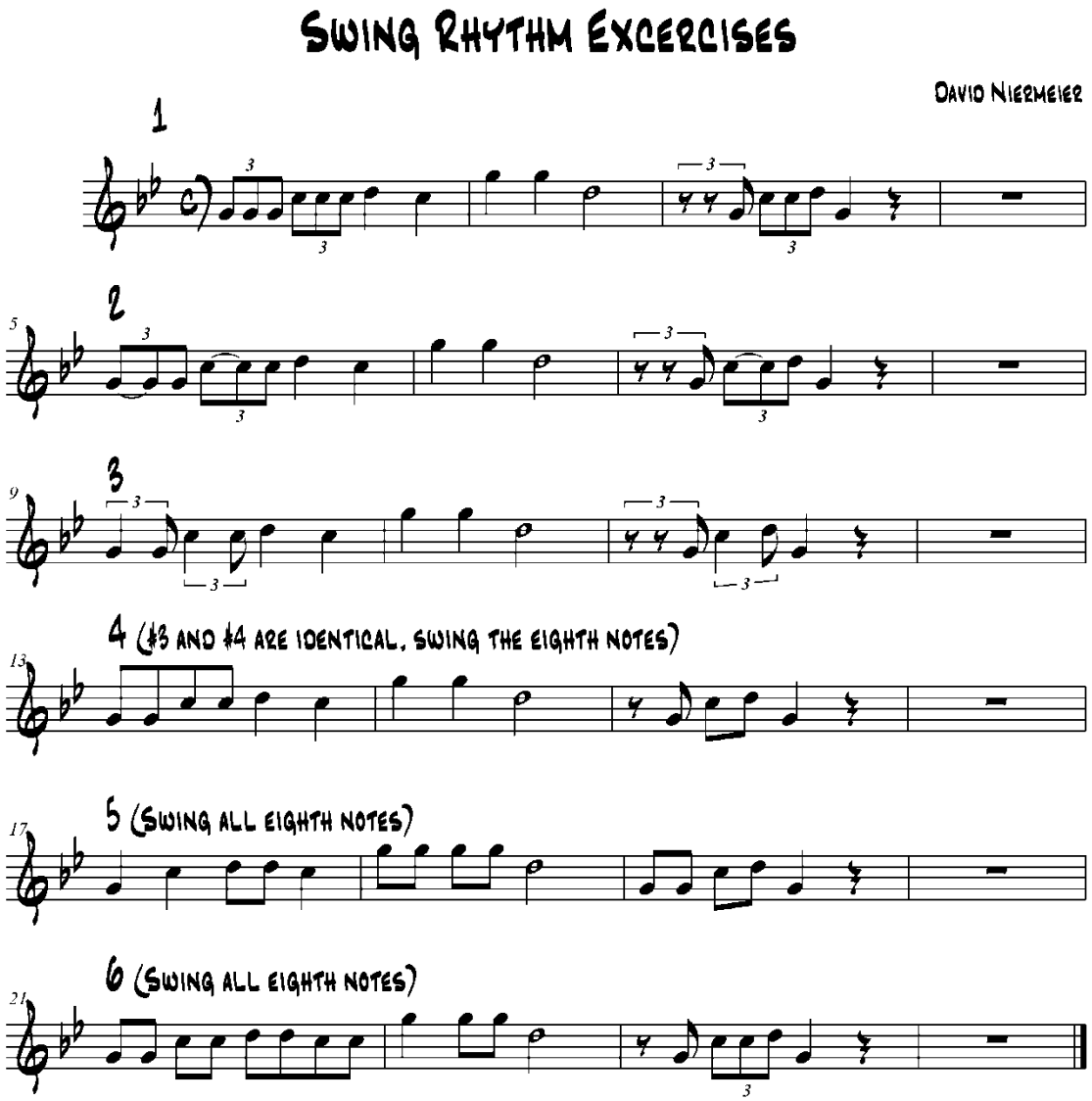
Limiting the speed or the number of notes to practice can improve accuracy during practice, which will allow students to learn music in a shorter time. This unit limits rhythms, pitches, and chords to help students improve quickly by taking small, more manageable steps. It can also prevent students from becoming overwhelmed and anxious from the numerous possible note and rhythm combinations. When students are comfortable with what they are learning, new notes and rhythms can be added gradually. For example, the worksheet in Figure 3 could be used as exercises to focus on developing swing rhythm.

If transposition were to be a part of this unit, using software to practice transposing so that students need only focus on reading notation can be a first step in learning this important skill. Transposition without the use of a computer is a challenging mental exercise which can be tackled when students are more secure in their transposing abilities.

When working to extend range, students may develop a poor sound quality from trying to force notes beyond their range. Encouraging students to move to new notes gradually from notes comfortably in their range, such as through transposing jazz exercises a minor second higher each time they are played, can help them maintain a better sound quality.

Figure 3

Swing Rhythm Worksheet



Use of Method Books

Method books in jazz tend to focus on theory and reading chord progressions, whereas classroom and individual teachers often focus on listening to renowned artists. This can be intimidating because the music in these recordings is often at a level far more

advanced than the student's. Nevertheless, listening to great jazz performances is crucial in developing improvisation skills.

Motivation

Enthusiasm towards computers will vary from student to student, but if students progress more quickly because of practice feedback from software, they will be more excited about learning their instruments.

Listening to great examples of jazz improvisation can be exciting, and can motivate students by showing them what is possible on their instruments. Playing jazz is exciting and therefore motivating, as long as pieces that are chosen are at an appropriate level to challenge students. Playing in a group with peers at a similar level and getting help from more experienced players can also motivate students.

Creating performance opportunities and easing students into the higher stress performances by playing to smaller groups and younger audiences in a casual atmosphere are good strategies to encourage young musicians to continue.

Challenging students to reach their potential and having a place for them to be involved is a talent of an excellent teacher. Advanced students can be given the chance to play two similar instruments such as alto and baritone saxophone, while having all students in a massed band playing easier pieces can motivate and excite even the weakest players.

Reducing Anxiety

When improvising, students might feel anxious since what they hear professionals play is far beyond their own abilities. Good examples of students improvising and examples of very simple improvisation by professionals might help students avoid having

unrealistic expectations. *Smartmusic* has some wonderful MP3 accompaniments of jazz ensemble pieces with excellent style and flawless technique, but teachers should consider the anxiety this could create and share these thoughts with their students. Playing with a computer accompaniment may be less stressful for some students than playing in front of their peers.

Giving students the opportunity to have individual attention in after-school sessions or small groups, or allowing students to submit solos recorded at home can also reduce performance pressure while still allowing for feedback.

Role of Parent, Teacher, Student, Principal, and Community

As well as the obvious involvement of students and their teachers in the process of learning to improvise, other parties can have a positive impact on students' learning. Parents' encouragement to practice at home regularly and a principal's attendance at student performances are two key ways to nurture young musicians. In addition, taking students to live performances or having parents or tutors who are proficient musicians perform for the school can be motivating.

Teaching students how to use new software

Videos which can help students and teachers learn basic features of new computer software are available. As with videos of jazz improvisation, allowing students to view these videos in the middle of instrumental classes gives their embouchure muscles a rest.

Teaching students to use new software can also give teachers a chance to review or teach new concepts. For example, students could be taught how to change tempo in software, and review the benefits of practicing slowly and accurately before attempting faster speeds. When teaching students to use practice loops in *Smartmusic*, teachers could

explain that playing small sections of music to avoid making mistakes is an effective practice technique. For example, students start by playing together only two notes of a difficult passage in a jazz piece in *Smartmusic*. Then one beat of the passage at a time is added until there is a mistake, at which point the selection is played repeatedly until students master that set of notes by playing it five times correctly in a row. Only then can students add one more note towards learning the passage.

Summary

In this chapter, the unit on teaching introductory jazz improvisation with the support of CAI was presented. The six-lesson unit contains the following sections: introduction to the unit (aim, rationale, prerequisites, and main objectives), overall expectations, specific expectations, lesson plans, and supplementary documents. Teachers should observe students carefully while implementing the ideas found in this unit and adjust lessons and planning accordingly. Assignments, technical support, and software should be chosen according to the needs of the students and budget available. The following chapter will present conclusions and implications for music education.

CHAPTER FIVE

CONCLUSIONS

In Chapter Four, the unit for teaching beginning jazz improvisation with the support of CAI was presented. In Chapter Five, I will first revisit the topic of the strengths and limitations of CAI-assisted learning in music using material from both the literature review and the four interviews. Next, I will summarize what I have learned about teaching beginning jazz improvisation with and without the support of CAI. Finally I will suggest recommendations for further study.

Strengths and Limitations of CAI

Since the conception of CAI, there have been dramatic advances in the way computers are used. New features are available for the instrumental band classroom which can be used for teaching jazz improvisation, such as count-in measures and repetition of selected music for practice in *iPas* and *Smartmusic*. However, teachers should consider the cost and time involved in adding CAI to their programs to determine what software and hardware, if any, to use. Despite the obvious appeal of CAI, the four teachers whom I interviewed for this project cautioned that CAI should not be overused but should rather supplement a comprehensive music program.

Strengths

First, since computers are ubiquitous in our society and the majority of young people are adept at and intrigued by the plethora of computer applications, I contend that CAI can motivate students.

Second, a useful reference for software developers and educators (Webster, 2002) is the wealth of information found in curriculum documents, such as those available from the Music Educators National Conference and the Technology Institute for Music Education, which provide information such as technology guidelines for materials and software.

Third, CAI can assist teachers in the instruction of pitch, rhythm, fingerings, tuning, theory, and tempo. The use of computers to teach theory allows students to be instructed at different levels simultaneously, and allows teachers to give individual attention while other students are working with the software. Software can be used to record performances and to create warm-ups, and as tools such as a tuner and a metronome. Other effective uses of CAI include theory software and notation software for students and teachers to make and transpose arrangements which then can be played back and printed.

Fourth, software can be an excellent resource for students to learn without the teacher's assistance, such as playing scales and arpeggios. Using computers to complete weekly performance assignments can promote regular practice while improving students' accuracy. In addition, this will help students develop the muscles needed to improve performance, especially for beginning students who often lack strength and endurance in embouchure muscles.

Fifth, both the teachers interviewed and I use CAI in teaching fundamentals, but not for instruction in improvisation. Nevertheless, the ability to transpose music into any key instantly is the kind of task better performed by a computer, and is one example of why CAI could be a great asset in supplementing teacher instruction for advanced students.

Finally, assessment by computers is consistent and unbiased and can be used to evaluate students' performance. An assessment rubric for jazz improvisation could allow for fast and comprehensive feedback from teachers.

Limitations

The following limitations of CAI do not negate its usefulness for instruction, but simply suggest shortcomings in the abilities of computers.

First, feedback from a computer is very limited. A computer can tell students if they played the correct notes and rhythms; however, a computer cannot tell how a student sounds.

Second, performance-assistant software does not assess the length of notes. For example, if a student plays a half note at the correct time on the correct pitch without sustaining it for a full two beats, *Smartmusic* will assess the note as being correct.

Third, accompaniment from a computer is largely non-responsive, and although *Smartmusic* can adjust tempo to follow a soloist's rubato, it does not respond to tension and release, dynamics, articulation, or timbre.

Fourth, technical difficulties, such as computer crashes, installation failures, and subscription issues can be time-consuming and frustrating.

Fifth, teachers may need to teach computer skills to students who are not

independent enough to run the software on their own, and if teachers are not comfortable using computers, then learning to use them confidently can be a challenge. Luckily, instructional videos provided by software developers can accelerate this learning.

Sixth, educators' attitudes towards technology can hinder the implementation of CAI. However, many students are computer-literate, and they can be an excellent help for teachers who are not familiar with setting up and using computer software.

Seventh, using computers to support a music curriculum is helpful, but not perfect. Higgins (1992) delineated the need for a certain degree of deviation in pitch and rhythm in a musical context; therefore music educators need to define what deviation is acceptable or even desirable. Improvising is an ideal time for students to use out of tune notes in order to express emotion, or include vibrato in their playing.

Finally, software is developing at an incredible rate and gaining excellent new features, but one must be aware that when new features are available, they may be flawed. For example, if a student were to play an exercise and take a 10 minute break while tracking practice time for use in reports to teachers, some versions of software would consider the student to have practiced for those ten minutes.

Teaching Beginning Jazz Improvisation with and without the support of CAI

Although a common theme found in interviews was that improvisation technique can be learned from either method books or computer software, a full understanding of where students should be headed can come from listening to a great player improvising. All of the interviewees are proficient in improvisation, but all stated that they learned much more outside of school, one by playing by ear in church and listening to recordings and the others by playing in ensembles. In fact, all four interviewees emphasized that

peers were a great asset when learning to improvise. But what can educators do to help students learn? Perhaps it is to provide an atmosphere where students can develop fundamentals, hear each other improvise, and discuss the learning process.

The process through which the interviewees guide their students to improvise involves learning the theory of chord progressions and scales through method books and learning "licks," yet they felt this theoretical approach to improvising often overwhelmed students. Teacher D said, "Learning improvisation is one of the hardest things I ever did," and Teacher B raised the question of whether or not it was worth teaching improvisation at all. Limitation was found to be a key element in making this process successful. To help students understand what improvisation skills need to be developed, I suggest using a set of instrument-specific skill-building exercises instruments at the start of each lesson.

Skill-building exercises found in *Smartmusic*, such as scale patterns and chord changes for practice in improvising, are simple enough to be assigned to beginners as homework and submitted to the teacher. This would give teachers or peers the opportunity to provide feedback, and regular practice would help students develop the stronger embouchure muscles needed for better breath control, and more accurate technique. If teachers choose to implement CAI in teaching jazz improvisation, they should plan carefully to take advantage of the strengths of computers.

Ever since the 1950s, the company *Music Minus One* has produced audio recordings of high quality accompaniment performances by a range of instruments from guitar to complete orchestra with which individuals could practice. The advantage of these recordings over a MIDI accompaniment had always been the lack of qualities such as emotional expression and the shaping of phrases in the MIDI performance. An average

MIDI file of an entire piece of music might be 15 kilobytes, whereas an MP3 will likely be approximately 5 Megabytes (or 5,000 kilobytes). On April 13, 2007 *Smartmusic* 10 was released, and now *Smartmusic* and *Finale* are both capable of including MP3 files. *Smartmusic* has the advantage over *Music Minus One* with the feedback it can provide on student performances. There are currently over 200 large ensemble scores in *Smartmusic* for band, strings, and choir with on-screen scrolling notation using MP3 files. Although MP3 files are a big improvement over MIDI files, computers will never be able to accompany a soloist with the emotional sensitivity of a live ensemble.

Aebersold pieces are also included in *Smartmusic*, and they are quite useful for more advanced students. Other jazz exercises are leveled, and separated into categories of blues, II V I Scales, II V I arpeggios, III, VI II V I Scales, and III VI II V I arpeggios. Blues "Play by ear licks" have just been added to the collection of *Smartmusic* exercises. A one measure lick is heard, and then the user is given the first note on screen and has to play the rest of the notes by ear. *Smartmusic* contains a thorough series of improvisation exercises for individual practice, but no guided or non-guided transcription exercises are included.

Smartmusic has recently added a Jazz Improvisation section, with recent upgrades to the software such as arpeggiated chords displayed on screen in place of lead sheet notation and the ability to choose articulation pattern for jazz excercises. I did not teach improvisation to beginning students before, because I thought students needed advanced technique before beginning the process. Now I believe beginning students can learn basic improvisation skills through limitation, especially with the support of software such as *Smartmusic*.

Depending on how much time teachers have to work with students on improvisation, transcription skills might also be included in these skill-building exercises. If teachers have limited time, partial transcriptions of very basic solos with previously transcribed versions of the complete solo available would give students some of the benefits of more thorough transcription work.

If there is not enough time to introduce students to transcription, jazz listening exercises could be done at home to develop listening skills. *Smartmusic* jazz and play-by-ear exercises using the *Aebersold* method are good sources. At school, being an accompanist in concerts or having a rhythm section for combos to practice and perform with can also allow students the chance to listen to each other, and give each other feedback on their playing as well as developing their listening skills.

Interview results from Fern (1995) suggested the *Aebersold* method is not a way of learning to improvise, rather a tool for practicing. Its vocabulary of riffs is similar to learning lines from great stories and then creating a story from these bits of language. However, its exercises or similar exercises are an important part of learning to improvise.

Recommendations for Further Study

As I and other music teachers begin to use CAI to support instruction in jazz improvisation, its role will become apparent. As software continues to evolve, a unit could be written for teachers working with younger students. A research study could examine how the attributes of technology impact on different types of learners to best apply the strengths of technology to individual needs.

Communication between computers has evolved from early modems using a speaker and a microphone connected to a telephone at a speed of 300 bits per second in

the late 1970s to current high speed connections which often reach one or two million bits per second. This speed allows for features such as the accompaniments in MP3 format to be downloaded from the Internet within minutes. What other developments will improve the abilities of CAI? Will we see other devices used to facilitate learning such as infra-red cameras or devices to measure breathing volume or air speed? What could the field of robotics add to music CAI? Perhaps computers will one day detect poor posture, help change the manner in which a student is holding an instrument to reduce repetitive stress injuries, or suggest the abdominal muscles need to work harder to pull more air into the lower lungs. The study of applying CAI to instrumental band teaching and to jazz improvisation has a world of possibilities waiting to be discovered.

Summary

CAI can be a time-saving tool for teachers and a reference for students while practicing independently. However, whether using CAI or not, a carefully planned curriculum for improvisation is of key importance for student success.

There is a plethora of software available for those interested in using CAI, but one must be mindful that CAI is not perfect. With a broader understanding of available CAI software, jazz methods, and the characteristics of CAI, I believe that CAI can be used to enhance the instruction of jazz improvisation. As Higgins (1992) says “It is the application of the technology, not the technology itself which influences interest and consequently success with the technology” (p. 491).

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Appendix A

UNIVERSITY OF VICTORIA ***Participant Consent Form***

OFFICE OF THE VICE-PRESIDENT, RESEARCH
HUMAN RESEARCH ETHICS COMMITTEE

Computer Assisted Instruction and Instrumental Music Education: A Balancing Act

You are being invited to participate in a study entitled Computer Assisted Instruction and Instrumental Music Education: A Balancing Act that is being conducted by David Niermeier who is a Master's student in the Department of Curriculum and Instruction, University of Victoria. This research is being conducted under the supervision of Dr. Steven Capaldo. You may contact Dr. Capaldo at 1 (250) 721-7837 and capaldo@uvic.ca. David is conducting this research as part of the requirements for a Masters of Education You may contact David if you have questions by email at dniermeier@ais.edu.hk or by phone at 9833-8164.

The purpose of this research project is explore how band directors coordinate their everyday instruction and management with a focus on the use of computer programs which involve music.

Research of this type is important because music education is a valuable curricular experience that provides benefits to all students, and Computer Assisted Instruction (CAI) can add to a program significantly if used in an effective way. The development of computer skills is also an asset of this cross-curricular endeavor.

You are being asked to participate in this study because your own knowledge and experience are especially relevant to this project. I anticipate disseminating the research results directly to all participants, my colleagues, thesis/class presentation, published article, chapter or book, the internet as well as any other educators who show interest in this study.

If you agree to voluntarily participate in this research, your participation will include an audio-recorded interview of approximately one hour in length. After the interview data **have** been analyzed, you may be asked if you can be observed by the researcher as a follow-up during one of your regularly scheduled periods of instruction. Additionally, the researcher may request to see texts particular to your work, such as reference materials pertaining to jazz improvisation or CAI. Such texts will not include personal information of either the director or his or her students.

Though there are no known or anticipated risks to you by participating in this research, you are asked to let the researcher know before you are interviewed whether participating may have problems, risks to you, or inconvenience of which s/he is unaware. This is to enable steps to be taken to deal with problems, risks, or inconvenience. If this isn't possible, the interview or discussion will not proceed.

The potential benefits of your participation in this research include receiving any part of your interview or group discussion that has been transcribed and gaining greater understanding of the effective use of CAI within the delivery of a band program. The researcher will also be willing to give you feedback on the findings of the research.

Your participation in this research must be completely voluntary and you should not feel obligated because of your professional relationship with the researcher. If you do decide to participate, you may withdraw at any time without any consequences or any explanation. If you do withdraw from the study, permission for your data to be included in the study will be requested. If you withdraw from the study and prefer the data to be withdrawn, **they** will then be destroyed.

In terms of protecting your anonymity, a pseudonym will be substituted for your name on all the written or electronic materials that you have provided and any descriptive particulars that might identify you will be removed. You might like to choose your own pseudonym. Additionally, the locality of the school and the school name will be fictional.

Your confidentiality and the confidentiality of the data will be protected: 1) by keeping it secure by means of password-protected computer files at all times; (2) by restricting access to data to the instructor and the supervisor and graduate supervisory committee, if applicable; (3) by committing to destroy any audio tapes after their use as data is completed.

The data that you will contribute will be included in the writing of a thesis.

Audio-tapes of interviews or discussion groups will be destroyed electronically after the data **have** been used.

In addition to being able to contact the researcher at the above phone numbers, you may verify the ethical approval of this study, or raise any concerns you might have, by contacting Human Research Ethics Office at the University of Victoria, 1 250-472-4545, ethics@uvic.ca.

Your signature below indicates that you understand the above conditions of participation in this study and that you have had the opportunity to have your questions answered by the researchers.

_____	_____	_____
Name of Participant	*Signature*	*Date*

A copy of this consent will be left with you, and a copy will be taken by the researcher.

Appendix B

School Administrator Consent Form

School Administrator's Consent Form for the Research Study
Exploring Symbolic Violence in Music Education: An Institutional Ethnography

You are being asked to approve a study to be conducted at your school entitled "Maximizing Adolescent Students' Engagement and Education within general music education." This study is being conducted by_____, a doctoral *(masters)* student in the Department of Curriculum and Instruction at the University of Victoria. You may contact _____ if you have further questions by phone _____ or e-mail, _____.

Dear Mr. Principal,
As a graduate student, I am required to conduct research as part of the requirements for a Doctorate of Philosophy degree in Interdisciplinary Studies. This research is being conducted under the supervision of Dr. Steven Capaldo. You may contact Dr. Capaldo at (250) 721-7837 and capaldo@uvic.ca. The purpose of this research project is to explore how band directors work each day to construct a program of music education for their students. Further, it is of interest to explore how all students are included in a music education program, regardless of their economic situations. It is important for teachers to learn about the social influences their curricular and administrative practices have on music education students. By approving this project, I hope to determine how to create more inclusive music education programs. In addition, other music teachers that read the project's results may be able to understand how to teach music to adolescent students with a greater appreciation of the life experiences those students bring to the classroom.

The band director at your school is being asked to participate in this study because he or she is an expert in the everyday experiences of being a music educator. If he or she agrees to participate voluntarily in this research, he or she will be interviewed and observed as they conduct their everyday instruction and management of the band program. The material taken from the interview and observations will be used as data in my study. Participation in this study poses only the inconvenience of participating in an interview for approximately one hour. This interview will be scheduled outside of instructional time. Interview material will consist of open-ended questions pertaining to the everyday instructional and managerial practices of the band director.

The band director's participation in this research must be completely voluntary. If he or she does decide to participate, his or her participation means that he or she will give me permission to use interview responses and observational field notes as data for my study. Know that the band director may withdraw from the study at any time without any consequences or any explanation. All he or she needs to do is inform me he or she wishes to withdraw from the study.

The band director's anonymity and the confidentiality of the data collected for this research project will also be protected. His or her real name will not appear in any part of the project, even the final copy. Instead, they will be assigned a pseudonym (a made-up name) that will be used instead. The school name and the locality will also have a pseudo name. All data including the consent letters, written notes, questionnaire results, and their student response journals will be kept in a locked filing cabinet and will be held for up to one year after completion of the study, at which time it will be destroyed. Any computer files I have regarding this project will also be erased after the duration of one year.

It is anticipated that the results of this study will be shared with other teachers and scholars. The final draft of the project will be bound and available to teachers and student teachers-in-training at the University of Victoria's Curriculum Library. I may also present my findings at educational and research conferences, and I may publish these findings as well.

In addition to being able to contact the researcher and the supervisor at the above phone numbers, you may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Associate Vice- President, Research at the University of Victoria (250-472-4362).

Your signature below indicates that you understand the above nature and conditions of this study, you approve of this study, and that you have had the opportunity to have your questions answered by my University supervisor, Dr. Steven Capaldo, or myself.

Sincerely,

_____
Project Researcher
University of Victoria

_____	_____	_____
Name of Administrator	*Signature*	*Date*

Appendix C

Questions for Interview

Section 1: Background of Interviewee

1. Can you tell me a bit about yourself?

2. Can you name some jazz artists who have influenced how you improvise, and explain what you like about them?

3. How important do you consider listening to great jazz performers when learning to improvise?

Section 2: Computer Assisted Music Instruction other than Improvisation / Music Fundamentals

1. Do you involve CAI in any of the following and how does CAI fit in with your other ways of teaching:

a) Articulation

b) Breathing

c) Dynamics

d) Intonation

e) Performances

f) Pieces

g) Rhythm and Pitch

h) Scales and intervals

i) Sight reading

j) Sound production

k) Testing

l) Warm-ups

2. What kind of computer and other CAI hardware do you use now, or have you used in the past, and can you describe how it is useful in teaching improvisation?

3. What equipment which would help students learn to improvise would you consider acquiring, and why would it be of value?

4. Do students use any music software at home, and if so, what do they use it for?

5. If you use any computer software in class, can you describe how computers are used to enhance classroom teaching?

6. What do you hope to accomplish by having students use the music software?

7. Are there any tips you have for young directors on the use of CAI?

Section 3: Improvisation

1. What steps do you take your students through when they are learning to improvise?

2. In which of these steps do you involve CAI, and what are the reasons you do or don't involve computers?

3. In terms of the following tasks, do you think CAI or teacher instruction is better suited. Why?

a) Listening to jazz improvisation performances

b) Individual instrument practice reading chord progressions

c) Creativity

d) Transcription (unless you think your students should not learn this yet)

e) Transposition

f) Style

g) Technical exercises (scales, arpeggios)

h) Warm-ups

i) Theory

4. What computer programs have you used when teaching improvisation, and what strengths and weaknesses do you think each of them has?

5. If you are familiar with any of these computer programs or books, could you comment on what you like or dislike and what you would like to see changed about each:

a) Band in a Box

b) *Aebersold*

c) Practica Musica

d) *Smartmusic*

e) *Garage Band*

6. Have you used any other software worth mentioning? What are its strengths and weaknesses?

7. Final comments?