Building tunes block by block: Constructing musical and cross-cultural understanding through Impromptu

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Abstract

Using a constructionist framework in music, specifically through an emphasis on composition, is revolutionizing the field of music and education by bridging the gap between the novice and professional. Much of the research has been spearheaded by Jeanne Bamberger and others, who noted the computer's potential to highlight what it means to be a composer and facilitating those with no musical background to express their musical 'intuitions' through the use of the computer (Bamberger, 1972, 1975a, 1975b, 1991). Her close work with Seymour Papert at MIT allowed her to develop MusicLOGO and *Impromptu*, which allows users to manipulate small blocks of melodic and rhythmic patterns, employing mathematical ratios, finding that people with little to no training in music, knew more than they could verbalize. Through their active constructions of tunes, they were building and developing intuitions about music. Despite her work and the work of other leading scholars in the field, constructionism is still a framework largely overlooked and understudied in the field of music education. However, music, specifically composition, is well aligned with the major tenets of constructionism and there is little known about how learners form a social, cultural, and historic identity through music composition. This is now an apt time to investigate how we can begin to use these tools to study how the sociocultural context changes learners' intuitions about music. The current study investigated how children develop musical understanding through cross-cultural activities composing music. 60 youth, equally divided, from the United States and Israel ranging from 8 to 12 years of age, reconstructed familiar and unfamiliar tunes, remixed tunes, and composed their own music using *Impromptu.* Each exercise built upon itself to help youth gain a better understanding of important musical concepts and allowed us to better understand what youth know about music from their own culture as well as others through their active construction of music compositions. Data is currently being triangulated (Lincoln & Guba, 1985) using three qualitative data sources, including artifact (music composition) analysis, reflections of artifacts, and discussions of shared music compositions. Preliminary findings suggest that through the active construction and reconstruction of tunes, youth refined their intuitive musical understanding as well as becoming more aware of the cultural differences reflected in other styles of music.

Keywords

Technology in music education; cross-cultural understanding; sociocultural constructionism

Introduction

Music composition was thought to be, at one time, classical in nature and left to those with many years of training, practice, and performance experience (Wiggins, 2009). The notion of what a composer is and who specifically can be a composer has become less distinct over time. Popular musicians are now relying on more sociocultural practices—playing in bands—rather than formal, conservatory education (Green, 2002). The lines are becoming more blurred since the personal computer and music have merged to offer users with little to no training or experience to become composers of music. These technologies have now moved from the confines of professional recording studios to homes and classrooms throughout the world (Savage, 2005; The´berg, 1997). Most software packages allow users to compose songs via pre-made loops—small bits of melodies and/or rhythms—record their own instruments, utilize MIDI, and even use traditional notation; becoming composers overnight.

Recognizing the importance the computer could play in music was Jeanne Bamberger who, in the 1970's was a researcher at the M.I.T. Artificial Intelligence Laboratory, worked alongside Seymour Papert and developed *MusicLOGO*, a computer program that allowed users to manipulate 'blocks' of tunes using mathematical ratio's. This later developed into what is now known as *Impromptu. Impromptu* allows users to reconstruct, remix, and construct tunes using 'tuneblocks'—virtual blocks that contain portions of melodies and/or rhythmic patters—all while building an understanding of important musical concepts such as form, melody, pitch, rhythm, and structure (Bamberger, 2000). What makes Bamberger's work important, and still relevant, is the high importance placed on the learner reflecting on the decisions they make in the construction process. This reflective process, not available on commercial software packages, is built into the software and now the composition and the thought processes in the construction of the composition become the artifacts available to the community at large. This is now and apt time to investigate how we can begin to use these tools to study how the sociocultural context changes learners' intuitions about music.

The current study investigates how children develop musical understanding through cross-cultural activities of composing music. While *Impromptu* was initially developed to help college-aged students become aware of their musical intuitions and was never meant as a composition tool for young children, our study takes advantage of the compositional tools available in *Impromptu* and gives younger learners a chance to manipulate and compose music from their own culture and cultures they are unfamiliar with. Youth, comprised of approximately 60 youth, equally divided, from the United States and Israel ranging from 8 to 12 years of age, will be reconstructing familiar and unfamiliar tunes, remixing tunes, and composing their own music using *Impromptu.* Each exercise builds upon itself to help youth gain a better understanding of important musical concepts (Bamberger, 2000) and will allow us to better understand what youth know about music from their own culture as well as others through their active construction of music compositions. Data will be triangulated (Lincoln & Guba, 1985) using three qualitative data sources, including artifact (music composition) analysis, reflections of artifacts, and discussions of shared music compositions. Preliminary findings suggest that through the active construction and reconstruction of tunes, youth refined their intuitive musical understanding as well as becoming more aware of the cultural differences reflected in other styles of music.

Background

While the research on music has been numerous, the research on music education in the areas of performance, teaching, pedagogies, and attitudes toward music education (see Duke, 2000; Colwell, 2006; Jorgenson, 2002; Allsup, 2002; Asmus, 1986; Goolsby, 1999) have helped further the notion that music and the arts, is a seemingly untapped area to further develop learning environments to foster knowledge development, social growth, and efficacious learners. The

arts, and music specifically, have been slow to move away from a more information processing approach to learning to more knowledge constructing environments with the teacher and students co-constructing their understanding. The use of the computer in this construction is viewed as little more than a performance enhancer (drill and practice software) or tool for consumption rather than creation (c.f., Webster, 2007 for full review of technology in music education). Even in her thoughtful views of teaching and learning music in a constructivist framework, Wiggins (2009), devotes very little to how the computer can help children develop their musical understanding. This is not to say that all music educators and researchers feel this way, but that they have not considered the important role the computer and its accompanying software can play in developing a learners understanding through constructing and reflecting of musical artifacts. Most artifacts and assessments in music are performance based (Goolsby, 1999); what can the learner do on a particular instrument with little to no regard for what the learner actually knows. Fortunately, in recent years, researchers have begun to investigate music composition (Swanwick and Tilman, 1986; Brophy, 1996; Burnard, 2000; Strand, 2005). The concern now is the computer's place in music composition. If the computer can be viewed as an extension of the learner instead of from a performance or music consumption view, than it becomes an "object to think with" (Papert, 1980).

One researcher who recognized the computer's potential in musical understanding in the early 1970's was Jeanne Bamberger. Bamberger argues that people know more than they can actually talk about through peoples' construction and reflection on music compositions. She argues that since music has it's own rule sets, people who are not exposed to it often, make their own sense of the sensory phenomena that happens in music; hence the notion of an intuition. If people have intuitions about music, and then are taught something that conflicts with these intuitions, it confuses the learner and makes learning more difficult (Bamberger, 1972, 1975a, 1975b). Wiggins (2009) agrees that young learners especially should not be exposed to the traditional notation system and favors allowing youth to create their own musical representations.

What makes Bamberger's work important, and still relevant, is the high importance placed on the learner reflecting on the decisions they make in the construction process. This reflective process, not available on commercial software packages, is built into the software and now the composition and the thought processes in the construction of the composition become the artifacts available to the community at large. Using these reflections, we can also reveal aspects of the learner's cultural identity. Little is known about how systematic reflections (with tools like what's built into *Impromptu)* reveal a sociocultural understanding of music and composition. The current investigation begins to use these tools to study how the sociocultural context forms the learners' intuitions about music.

Guiding Theoretical Framework

The theory learning based on constructionism builds on Piagetian frame of constructivism—making sense of the world around us through assimilation and accommodation of schemas—and adds that this happens when learners are actively engaged in constructing an artifact that is personally and epistemologically meaningful to them (Papert, 1980, 1993; Kafai, 2006; Bers, 2007). Building on this, sociocultural constructionism (Pinkett, 2000; Peppler & Kafai, 2007) argues that both individual and community development are better understood when the artifacts are an expression of the individual and the community as a whole and our understanding of the artifacts changes because of the sociocultural nature of the activity. While constructionism and sociocultural constructionism has been taken up in the world of math, science, robotics, and game design (c.f., Kafai, 2006; Bers, 2007; Kafai and Resnick, 1996; Peppler and Kafai, 2007), little attention has been given to music learning.

Research Approach

This research sought to understand how children, while constructing familiar tunes, re-mixing

familiar tunes, and constructing their own tunes, developed their understanding, capabilities, and reflection of musical concepts.

- What concepts or musical ideas do children learn about while constructing their musical artifacts?
- What do the reflections reveal about the child's cultural context and how does this vary cross-culturally?

Settings and Participants

To investigate these questions, we have coordinated with a elementary school classroom at a school located in a mid-sized, Midwestern city in the United States and a school and afterschool program in Ramat-Gan, Israel. Working with Israel provides a unique opportunity to investigate how the cultural context, as it relates to music, changes when the learners are engaged in the constructive, composition process. Youth in Israel are acculturated at an early age with traditional Israeli folk tunes, which differ from Western music in many ways; most notably in the use of semitones, a predominance of minor modes, and non-conventional phrase structure.
Participants, approximately 60 total and equally divided amongst the two sites, range from 8 to 12 years of age. Each location is equipped with a computer lab, consisting of Windows based computers with *Impromptu* installed on each computer and headphones for personal listening.

Methods

Research took place between February and July 2010. The 40-hour curriculum began with three exploratory exercises that introduced them to how *Impromptu* works. Each exercise was meant to be an introduction into how to use the *Impromptu* interface. Important in these exercises is the process of reflection. Learners were asked to write about each of the decisions they make during the composition process and why they made those decisions. Learners began to reconstruct and remix music from unfamiliar cultures to their own such as Chinese, Arabic, and American folk tunes. Once the exploratory exercises were complete, learners then began to compose their own piece of music using *Impromptu.* Compositions were shared both locally and cross-culturally and others were encouraged to reflect on each other's compositions.

Data Sources and Analysis Strategies

There were three data sources using three qualitative data sources, including artifact analysis, reflections of artifacts, and discussions of shared music compositions. Music compositions were analyzed and coded for development of the learners' intuitive understanding of musical concepts. Professional composers were used to identify certain concepts such as melody, rhythm, and form; essential functions of music composition. Learner reflections were also coded to note utterances of development of musical concepts mentioned such as "it sounds familiar to the people listening and that pulls a song together". Written reflections were also coded to identify how the learners view of themselves individually as well as socially, culturally, and historically, as a composer of music. We looked at utterances that would point to changes of their identity and compared it within and between groups such as "my music sounds happy" or "this music seems to not have an ending and I can fix it by adding this note". Finally, we coded the written and verbal reflections to point out how learners' cultural understanding of music changes over time by identifying utterances such as "there are too many notes and it's hard to follow" or "this doesn't sound like anything I've heard before, but it's interesting"

Findings

At the time of this proposal, data is still being collected with an expected end time of May 2010. Preliminary findings suggest that, through the active construction and reconstruction of tunes, youth are developing an understanding of musical concepts such as pitch, melody, and rhythm as well as the cultural differences in other styles of music.

One such instance of musical understanding comes from Ella, a 12-year-old female from the United States. Ella, like most of her classmates, participates in a weekly general music class. However, her exposure to more formal music (e.g., private lessons) outside the class is non-existent. As part of the 're-mixing' exercise, Ella was asked to remix the given tuneblocks in *Impromptu.* This particular tune, "Austrian", was unfamiliar to her. She was instructed to reflect on every decision she made and why. While her reflections may be brief, she is clearly thinking about pitch and the structure of her composition. Below are her reflections on remixing the tune "Austrian":

I did what I did first because it sounded different and interesting.
I did that because they went well together.
It kind of works with the feel of the song.
I did the next thing because it went well with the last one.
I put this one next because it sounds familiar to the people listening and that pulls a song together.
I did this next one because it feels out of place and surprises people.
This one was because it sounded like something was ending because it went down.
The next one was because It made the impression "This isn't over yet".
This one just to repeat it one more time.
This one to pull the other one together.
To end it nicely.

While Ella's reflections are short, they clearly point to her thinking about the songs melody (*"it sounded different and interesting"*), the form (*"…it sounds familiar to the people listening and that pulls the song together"*), and the structure (*"…it made the impression "This isn't over yet"*). These are all components of a composition that professional composers think through when they are writing using traditional notation (Swanwick and Tillman, 1986).

One other such instance is from Pia, a 12-year-old girl from the United States, that has some music exposure outside her school environment that is mostly driven by parental encouragement. Like Ella, Pia was also asked to 're-mix' an unfamiliar tune and keep a journal of her decisions as she constructed her new tune. This particular tune was a in the style of a traditional Arabic folk song. Pia (see Table 1) noticeably moves from thinking about the functions of music to the properties that make these functions possible. Also noted was her level of listening and how it developed from a less to more critical disposition.

Table 1-Pia's reflections and researcher comments on "Arabic" tune

Pia's Reflections on"Arabic" tune	Researcher Comments
1. First I did the gray one because I like how it gives the music a mysterious start to it, I like how it makes it song sort of creepy.	*Using terms like "creepy" speaks to the function of the music. Also trying to explain the cultural differences in the music.*
2. Then I did a purple one because I like how it makes the music sound like it ends, because the purple one has the notes that make it sound finished.	*Points out resolution in the tuneblock and how it sounds like it ends the music. Again, speaking to the function of the music*
3. After that I did a blue-green one because after I did the gray and purple one it made it sound sort of like and ending, and then the blue-green one comes up and it makes you think again.	*More function related talk here. Also using compositional functions like form in her composition.*
4. Then I did a green one because I like how it goes really high because after the blue-green one it sounded as if I needed to go higher, and the green one did that.	*Moving from function to what brings about these functions (e.g., the properties) and how that can help her composition*

5. Then I did a purple one again because I think it flows smoothly with after the green one, it makes it sound sort of like a scale going down. After that I did a blue-green one because I think it is the only one that sounds good after the purple one because it gives an ending feel to it, and the blue-green one it the only one that gives me a beginning feel to it	*Again, talking about functions and what the properties of the functions are.* *This also highlights her level of listening (e.g., critical) and the 'to-and-fro' between listening and creating. Very important when composing music.*

By comparison, the next table presents reflections of a 10-year-old boy at the Israeli site, named Moshe. The original melody of the tune "Arabic" featured the following order of blocks: 2 triangles – 2 triangles – 1 red - 1 triangle – 1 green – 1 purple. In comparing the original tune with Moshe's, we can see that both tunes opened with a repeat of the same block; both tunes featured a middle section that included the same two blocks, however, in a different order; and both tunes ended with the same green and purple blocks. However, Moshe's melody repeated the last two blocks, perhaps reflecting a more Western need for balance between the three sections.

Table 2- Moshe's reflections and researcher comments on "Arabic" tune

Moshe's Reflection on "Arabic" tune	**Researcher Comments**
1. I chose the grey one with the 2 triangles because it sounded like a nice beginning.	*The student was probably relating to the contour of the melody.*
2. I repeated this block again because this sounded like a stronger beginning and reminded me of the repeats in Frere Jacques.	*The student used repeats as a means of strengthening the beginning, middle and end parts of his song. He also remembered that we had studied a song which had highlighted repeats.*
3. I then chose the grey block with one triangle because I wanted the melody to go higher	*Beginning the middle section of the song, the student chose to rise in register.*
4. Then I chose the red block because its melody was also high	*As in the opening, here, too, the student was working in units of two.*
5. After this, I chose the green block because I wanted the melody to go down	*Feeling that it was time for a change, the student chose to balance the rise in melody with a fall in the melody.*
6. The purple block sounded like an ending	*The purple block sounded like a closing unit because of its melodic direction, which pointed down.*
7. I then repeated the green and the purple blocks so that I would have a strong ending	*Once again, the closing section was repeated twice, complimenting the opening and middle sections.*
8. I don't know other melodies that sound like this one, and I think that the melody sounded sad.	*Moshe was not familiar with Arabic songs, having come from an African background. However, he felt that the melody sounded sad, perhaps relating to its modal character.*

Discussion

Music and the arts is an area largely ignored by the learning sciences (Peppler and Kafai, 2008; Peppler and Davis, 2010) and constructionism as a framework in music is non-existent in the literature. The purpose of this study is to apply a sociocultural constructionist view to music

learning by allowing youth to engage in music composition activities that builds individual and cultural identity. While the data presented represents our early findings, it clearly shows a direction of musical understanding and it is our intention to show further music learning and well as the role music plays in developing cross-cultural understanding. As youth articulate their ideas and assumptions about how music operates, this opens both an inner-conversation with the learner as well as classroom dialogue about the cultural differences found in various musical forms. Impromptu and the embedded design features that support reflection and deeper listening, forces the learner to articulate their intuitions and begin to articulate the foundations of the theoretical underpinnings of the cultural roots of music -- building a bridge to some of the big ideas of ethnomusicology. Preliminary findings suggest that through the active construction and reconstruction of tunes, youth refined their intuitive musical understanding as well as becoming more aware of the cultural differences reflected in other styles of music.

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