"That's What Everyone Else Is Saying…": Collaborative Reflection-in-Action during Creative Activities

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Abstract: With the progression of more user-friendly music production software packages (i.e., Apple's GarageBand) and the importance of social media, learners are engaging with music without having any formal education on important musical concepts. It has been suggested that novice music learners should start with what they know how to intuitively do already, which will allow them to move to more sophisticated musical concepts (e.g., notation, intervals). However, music production is becoming more a group project than a solitary one in which everyone in a group has a voice. A fourth grade classroom (N = 36) engaged in a music curriculum using the learning software Impromptu. Findings suggest that when students are able to reflect-in-action, their reflections become building blocks for others in the group to use and add to their knowledge base.

Keywords: music, intuitions, social negotiation

Introduction

Since the release of "How Popular Musicians Learn" (Green,2002), there has been a stark divide in the field of music and music education about her claims that traditional (musical) literacy (e.g., note reading, note writing, formal instrument training) through formal instruction is not the norm in the changing musical culture. More specifically, musicians are learning their craft by engaging in constructionist and sociocultural practices (e.g, playing in bands) and learning from each other (Green, 2002; Sawyer, 2008). And with the advancement of technology-based consumer music production tools, learners are able to create music with no prior musical knowledge or performance skills.

This is exemplified when looking at tools like Apple's GarageBand. Since its release in 2004, online web communities have begun to emerge that give users a place to share, critique, and collaborate with other GarageBand users. Not even 15 years ago was this possible; space was limited and the technology to create too expensive. This is a major shift in how music is both consumed and, more importantly, created. What was once perceived as a solitary act of music composing via paper and pencil is now a group activity (e.g., rock and roll band).

This provides a challenging area for CSCL and the Learning Sciences to investigate because it requires researchers to design environments that emphasize an intuitive approach to (music) learning within group settings using technological tools that are not normally used in music learning environments. It has been suggested that utilizing an intuitive approach to music learning provides a "doorway-in" (Wiggins, 2009 p. 39) into more formal musical concepts. Bamberger (1996) further suggests that if beginning music learners can start off at a mid-level structure (what they already intuitively know) this allows them to move to more sophisticated musical concepts (e.g., pitches, whole song evaluation).

The purpose of this paper is to present data guided by the question: How do fourth-grade students take up and utilize intuitive discourse during computer-aided music making activities? Fourth-grade students (N = 36) took part in a five-week music learning course using the software Impromptu (Bamberger, 2000). During the course, students worked as a whole group to compose different tunes based on the goals of the specific activity. Data includes transcribed audio from video that was taken during whole class activities. The transcribed data was coded and mapped onto the structural musical ladder (Bamberger, 1996) and further analyzed to detect when students took up and used other student's ideas in the creation of a musical composition.

Background

The National Assessment of Educational Progress (NAEP) in the Arts show students in 8th grade averaged a score of 150 out of 300 in music (Keiper, Sandene, Persky, & Kuang, 2009). Unfortunately, this low score is confounded by the fact that both time and money are being cut from most arts related programs in schools today. However, the larger issue is the way in which music educators approach the teaching and learning (e.g., the transmission model) of music. Commonly, novice learners are introduced to concepts like musical notation, rhythm, and tempo via instrument performance, dancing, and body movement exercises. If the goal in music education is to get learners to identify, describe, and demonstrate their knowledge, then the activity of music composition aligns well with these goals.

One glaring omission from the 2008 NAEP was that youth were not given the opportunity to create their own music. And, out of all the activities that do take place in a music classroom, giving learners the opportunity to make their own songs was least valued by educators (Keiper, Sandene, Persky, & Kuang, 2009). Giving young learners the opportunity to create their own music gives teachers and researchers a more clear insight into the development and knowledge of the learner (Swainwick & Tillman, 1986). Music composition, while arguably a creative and aesthetic activity, is also an ongoing and evolving problem solving activity. The composer is constantly solving new and interesting problems that emerge in the composition process both during and after the composition has been constructed (e.g., melodies, harmonies, counterpoint, tempo, dynamics). Composing a tune previously meant putting pencil to (staff) paper and then waiting to hear the finished product. Technology has changed that and the feedback is instant. Users do not need to know about musical literacy concepts (e.g., notation, chords,intervals) in order to compose music.

Yet, Webster (2006), in his extensive review of technology's role in music learning, asserts that still little is known about the true impact of technology in music learning because 1) we do not know how technology is being integrated, 2) how much do music teachers know about the technology, and 3) there seems to be no philosophical consensus on why and how technology should be used in music learning.

Webster's (2006) assertion that there is no consensus on why and how technology should be used in music learning is one that should be addressed first. If there is no theoretical or philosophical framework for using technology to support learning, then the technology and the time in classrooms and after-school programs is wasted. While there have been calls for a theory of technology in the music classroom, much of the discourse has been nothing more than making the technology available and reporting on how users engage with the technology (c.f., Savage, 2005; Bray, 1997; Dalgarno, 1997). This is where CSCL can play a large contributing role. Educators who are concerned with music learning must recognize that the computer and other technologies are fundamentally changing the way in which people participate and interact. The best way to understand how these technologies support learning is to incorporate already established theories of learning, design, instruction, and analysis that have technology incorporated into its framework (Webster, 2006).

Composition and constructionism

Simply giving the learner access to the technology is not sufficient. While they may create a music composition, without giving them a chance to reflect on their work, both during and after—what Schön (1983) calls reflection-in-action (during the creative process) and reflection-on-action (after the creative process to affect future decisions)—does not provide a clear lens at viewing what the learner knows. Constructionism, I argue, provides that lens.

Constructionism is the idea that learning happens when learners can construct their knowledge and this happens best when they are building (constructing) something that is personally meaningful to them (c.f. Papert, 1991; Kafai, 2006). Building on this, sociocultural constructionism (Pinkett, 2000; Peppler & Kafai, 2007; 2009) 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. Unpacked further, a sociocultural constructionist model places greater emphasis on exploration and the distributed nature of knowledge that happens between teacher and student or between groups of students working together (Papert, 1993). Both the sociocultural nature of learning and interaction as well as the opportunity to reflect through discourse are central themes in the field of CSCL, but virtually non-existent in formal music education (c.f., Green, 2002).

Reflection-in-action and intuitions

Approaching music literacy (e.g., reading, writing, and performing) from an intuitive perspective provides the learner the opportunity to engage with music at a level she feels most appropriate. Intuitions have garnered some attention in the Learning Sciences over the years. Specifically the work of diSessa (1993), who promoted the idea that through our experiences in the world, we develop a "sense of mechanism" (p. 106) of how things work. This sense of mechanism is then further broken down into phenomenological primitives (p-prims) that are small pieces of knowledge that help us explain some phenomena (e.g., Ohm's P-prim). Intuitions in music have experienced greater attention through the work of Jeanne Bamberger. However, there are no musical analog's similar to p-prims. For example, there is no "rhythmic p-prim" that has been identified.

The reason for this is because of the cultural and contextual nature of music. Bamberger (1996) and others (c.f., Swainwick, 1994; Wiggins, 2009) have suggested that giving learners the opportunity to start with what they intuitively know already is key to moving to other, more sophisticated forms of musical knowledge.

Bamberger promotes the notion that novice music learners begin at a mid-level structure; that is, what they understand and then move up and down a musical ladder; recognition and use of sophisticated musical literacy concepts (1996) (see Figure 1).

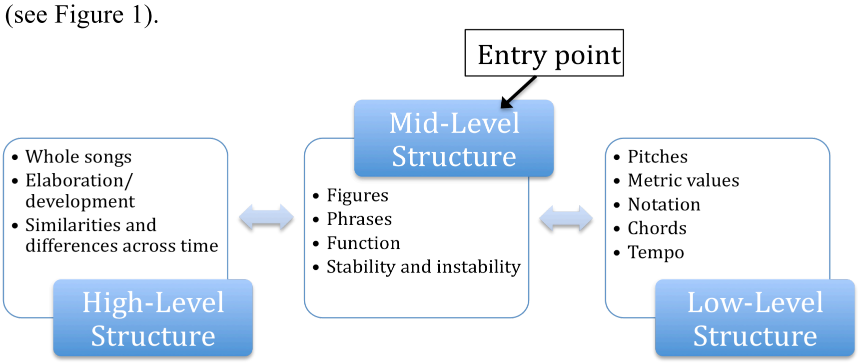

Figure 1: The Structural Musical Ladder – Adapted from Bamberger (1996, p. 45)

Through students interactions with music, especially when using the computer tool Impromptu, learners move to more detailed, or low-level, structures (e.g., notation, pitches, chords) as well as larger, or high-level structures (e.g., evaluation, developments, similarities and differences). This is because as they interact with the software and each other, their hearing of a tune, and thus their intuitions, change. To make sense of what is going on, they must deconstruct the tune to lower-level structures and/or think about higher-level structures of the tune they are composing (Bamberger, 1999). This is why it is crucial to give learners the opportunity to express what it is they know or think they know (Chi, et al, 1994). To do this, learners should be encouraged to talk while they are in the act of making something.

Reflecting both in- and on-action is, in essence, a metacognitive process in which professionals / experts can express what they know—via a demonstration, performance, or talking—within a specific domain (Schön, 1983; 1987). When a professional (e.g., an expert) engages in their domain specialty, the knowledge they use is located within the activity itself and any new knowledge gained is constructed through a reflection-in-action process. More specifically, when the feedback during an activity is, for example, surprising, this promotes a reflection-in-action. This reflection, in turn, allows for explicit knowledge to be used and new knowledge to be constructed. A component of these reflections are the professional's intuitions (Schön, 1983; 1987). I contend that intuitions and a reflection-in-action activity can help the non-professional construct new knowledge.

Methods

The research in this paper specifically addresses the impact of utilizing reflection-in and on-action approaches in computer-aided music composition activities. More specifically I ask: How do fourth-grade students take up and utilize intuitive discourse during computer-aided music making activities?

The data and subsequent analysis is drawn from two fourth-grade classroom (N = 36) working to construct musical compositions using the music learning tool Impromptu (Bamberger, 2000). The 20-hour curriculum, grounded in a constructionist framework (Papert, 1980), involved students reconstructing tunes, building rhythmic patterns to tunes, and composing their own tunes while engaged in a dialog with the practitioner and others in the class.

The tool and curriculum

The computer software Impromptu (Bamberger, 2000) was used throughout the study. Impromptu is a music learning tool that allows users to construct and manipulate tunes and rhythmic patterns using what is known as tuneblocks (see Figure 2). Users pick a tune from the library. Once the tune is selected, they are presented with an assortment of tuneblocks. These tuneblocks can be arranged in any order and repeated as many times as the user sees fit in the playroom. Users can also manipulate the tuneblock itself. For example, the user can click on the magnifying glass icon in the tuneblock editor, click on a tuneblock, and then proceed to change the pitch, duration, and/or rhythmic structure of the block.

This tool is unique, especially to this study, in two ways. First, Impromptu is not a composition tool, but a learning tool. Bamberger (2000) explicitly designed to the software to allow users to question their intuitive notions about music and thus modify or change their intuitions based on their interactions with the musical tuneblocks. Second, and most importantly, the users begin at a mid-level structure or, as Bamberger (1996) argued, with what they already know. Studies of intuitions both within music and other domains suggest that the learner should be engaged with something familiar so that an intuition may be triggered when engaging with a problem (Bamberger, 1996; Bowers, et al., 1990; diSessa, 1993; Easen & Wilcockson, 1996; Fischbein, 1982; Laevers, 1998; Wiggins, 2009).

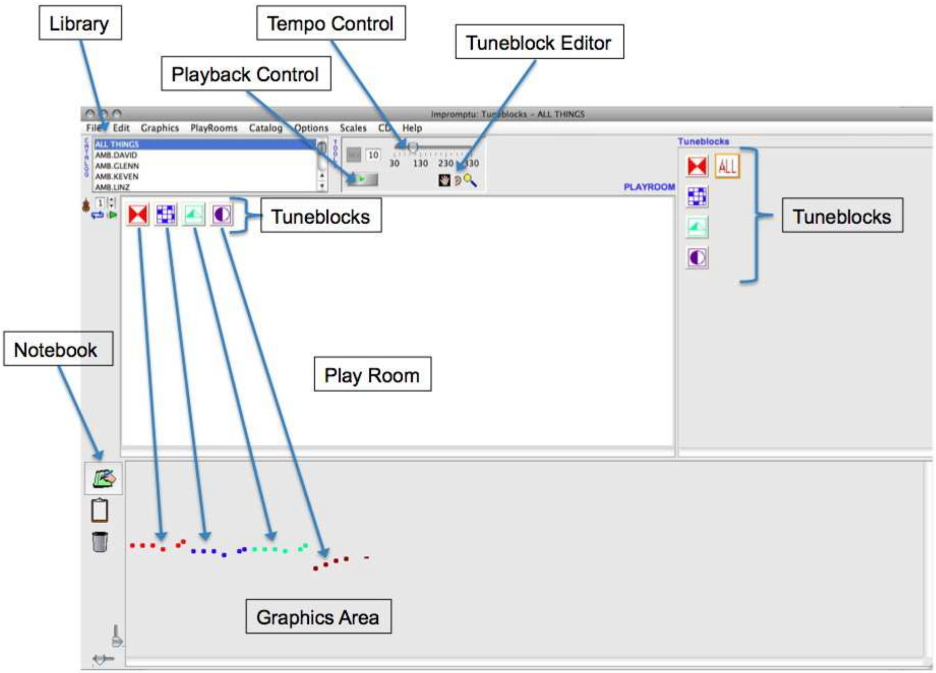

Figure 2: Impromptu screenshot with labels added

The 20-hour curriculum for this project is taken from Bamberger's (2000) college level curriculum and adapted for a fourth-grade classroom. The activities included Reconstruction, Construction, Building Meter, and the Final Project. Briefly, the Reconstruction activity involved choosing a particular tune from the Impromptu library (e.g., Hot Cross Buns) and using the given tuneblocks to put the tune back together. The Construction activity consisted of picking a pre-determined tune from the library and using the blocks to create a new composition. The tuneblocks for this activity were rhythmically and melodically balanced (e.g., tonal) and did not require the student to alter the individual tuneblock. The Building Meter activity consisted of choosing a pre-determined tune from the Impromptu library (e.g., Lanner) and building a beat to the tune using the given rhythmic tuneblocks. The Final Project activity allows the students to make their own tune. This involves picking a tune from the Impromptu library that consists of blocks that are atonal (no melodic or rhythmic balance) and, should the student feel it is necessary, edit the given blocks and/or create new blocks in order to compose their music.

Data and analysis

The data are comprised of audio and video of the activities made during the composition activities. The qualitative excerpts provided were analyzed using a microdevelopment approach in which learning and development is investigated over relatively short periods of time (Granott & Parziale, 2002). Specifically, during each of the whole-class activities (Reconstruction, Construction, Building Meter, and Final), units of analysis were based on turn-taking events between practitioner and student or between student and student. These turn taking events were coded based on the Structural Musical Ladder (Bamberger, 1996) (see Table 1).

Table 1: Description of the structural musical ladder and the specific codes that apply

Structural Musical Ladder	Code	Description
High-Level Structure *Overall organization of piece of music, motiv, or phrase (e.g., tuneblock). Includes style, mood, and evaluation*	Style	Style refers to the genre (e.g., rock and roll) of the piece being heard or created
	Mood	Mood refers to the feeling the piece of music has on the listener
	Evaluation	Evaluation is an assessment of the piece being heard or created
	Instrumentation	Describes the instrument(s) used in the piece of music
Mid-Level Structure *Describes the ways in which elements of the tune function within a specific context. This can include melodic contour, repetition, rhythm, tempo, tonal center, resolution (i.e., endings), antecedent/consequence, and division of beats*	Repetition	Describes/notices how patterns (e.g., tuneblocks) repeat
	Rhythm	Describes rhythm of the piece and how the beats work together to form the rhythm
	Tempo	Describes the speed of the piece
	Tonal Center	Describes the overall tonality of the piece. That is, the notes in the piece compliment one another and are pleasing
	Resolution	Describes the ending of a tune or how a tune should end/resolve
	Antecedent/ Consequence	Describes a "question and answer" functionality of the music. Usually happens when one phrase ends with either a high or low note (or sequences of notes) and the subsequent phrase ends with the opposite of the preceding phrase.
	Division of Beats	Describes how the beats in the music are divided up
	Melodic Contour	Describes the relationship of the notes and how they work together in the context of what is being heard / created
Low-Level Structures *A deconstruction of mid-level structures including pitches, chords, and metric values.*	Pitches	Describes or demonstrates (e.g., hums) the individual notes and or sound of individual notes being uses
	Chords	Describes the use of chords (e.g., two or more notes played together) in the tune being created
	Interval – Melodic / Rhythmic	Describes or demonstrates how melodic (e.g., pitches) or rhythmic elements are divided.

Specifically I was looking for instances when students would discuss and/or put to use another student(s) suggestion and how this impacted their movement on the Structural Musical Ladder.

Findings

Due to space limitation, one excerpt from the "Final Activity" is presented. Students were told they could construct any type of tune they would like using any or all of the strategies that were employed throughout the intervention. At this point in the excerpt, the class had spent considerable time deciding on the genre or style of music they would like to compose. The style they chose was called “techno-adventuresome” indicating that the song should be exciting—like what would be heard in the movies—but also electronic sounding. As students made suggestions, the practitioner would build the blocks and play them. Opinions were mixed on what was being constructed at this point. For this specific excerpt, the practitioner played a newly constructed beginning. When asking the class what they thought, a student—Sam—has suggested that in order for it to be “techno”, it needs to be faster and the conversation develops from that point (see Table 2).

Table 2: “Final Activity” whole-class excerpt

Line #	Name	Transcription
1	Practitioner	Making it faster really didn’t work
2	Connor	It’s a war song (uses hands to act like he’s holding a gun) (Teacher walks in—class gets quiet)
3	Ali	I don’t like it at the beginning. Now it’s like way to deep and makes you feel like you’re in a weird movie and it’s getting really scary. And then um, I think it should be like Sam said and more techno, like change the instrument…
4	Practitioner	How do we want to change it? Owen, go ahead?
5	Owen	I think we should make a new block and, um, make it take littler steps and then make another block and add on to it, like from the note we stopped at and then keep on going. Or we could just put them all in one block…
6	Practitioner	So how is that going to sound? Can you hum it for me? Can you…
7	Owen	Instead of just…it’s gonna take, like, steps up and it’s gonna go every other note. It’s gonna go…it’s gonna start higher, then we’re gonna go all the way high, then we’re gonna start, uh, a little bit lower, then were gonna go down, uh, to the next octave then your gonna just do nothing. Then your going to use a couple more notes on the next octave. Like uhh..
8	Practitioner	So you’re saying, for example, we go A, B, C, D. Then the next block would be…
9	Owen	No, C, D, D--C, D, E, F, G, A, B, C…Next octave…C, D, D
10	Practitioner	Ok, I see what you are saying, same notes, just an octave higher.
11	Owen	Yeah, just an octave higher. Because that is what everyone else is saying and they want it to build up and um…
12	Practitioner	Build up to what though?
13	Owen	Build up uhh…Build up to the red. And, and if it is already past the red, we’ll just, um, knock it down and do this (points to block on the screen)

Both Ali and Owen take up other students’ intuitive thoughts and use them to try and come up with a solution to the problem. They also seem to move fluidly up and down the musical structural ladder by being able to think about the melodic phrases that are being heard (e.g., mid-level structure) and how those phrases may impact the entire piece as a whole (e.g., higher-level structure) and how concepts like the pitches of notes (e.g., low-level structures) may be used.

Ali (line 3) mentions that she does not like the beginning of the piece and agrees with Sam that the tune should be more techno sounding. Her explanation of how the beginning sounds using metaphors like “weird movie” and “really scary” highlights her focus on the genre and style of the piece (high-level structure). To find a solution on how to make the song more techno, echoing Sam’s earlier statement along with other classmates sentiments, she suggest changing the instruments. This is important because, to this point, the students have tried speeding up the tune, which was not effective. Other than starting over and making new blocks, the other alternative is to change the instruments. By focusing on the instrumentation, Ali draws on her own intuitive knowledge about what it means for a song to be techno by deducing that changing the speed did not work—as suggested by Sam—but changing the instrument may impact the overall tune.

It is important to remember that considerable time has been taken in discussing and agreeing what “techno-adventuresome” music was and sounded like and also constructing a beginning to the tune. It was evident that the students were not happy with what has been done to this point. The practitioner asks for suggestions on how the song could be changed for it to meet the goal of being “techno-adventuresome” (line 4). Owen then devises an elaborate plan for addressing the issues being raised. Like Ali before, Owen takes in the suggestions of his peers and constructs a plan of action he think will work. Specifically, he states "…that is what everyone is saying…" indicating that he has heard what everyone has been saying and his plan might work in order to solve the problem at hand (line 11).

The movement up and down the structural musical ladder is apparent in his explanation. Owen's initial description of his solution (line 5) indicates he has thought through what he wants to do, but it is incomplete. It focuses on both the mid-level structure (e.g., making a new block) and moves fluidly to a low-level structure about what the block should be (e.g.,notes and their function). When the practitioner asks for clarification (line 6), Owen then is able to refine his thinking and get rather specific about his plan (line 7) again, focusing on low-level structures. When the practitioner asks for further clarification (lines 8 and 10) Owen is able to summarize his plan and relate it to his peers issues with the tune (line 11) indicating that he has not only thought about how the notes should function in his plan, but how they will impact the overall tune signifying a movement to a more high-level structure.

Conclusions and implications

The connection to reflecting-in-action suggests that even younger students, who are not professionals or experts in a domain (e.g., music), can use their intuitions to reflect on what it is they are doing, similar in ways to what professionals do. This also suggest that the reflection (e.g., the talk) needs to be closely tied to what the student is doing in the moment so that the reflection becomes more meaningful and promotes further construction of knowledge beyond, for example, mid-level structures (e.g., what they already know). More interesting, especially to the CSCL community, is that when students have a commonly shared goal (e.g., composing a piece of music), their reflections-in-action become building blocks for others to construct their understanding. It should be noted that the above excerpt was taken at during the last project of the curriculum. However, even at the beginning of the curriculum, students were incorporating someone else's ideas into their explanations of what was happening in the composition.

Intuitions, both their impact on learning and how to encourage their use despite their correctness, is largely overlooked in education research. Intuitions help us in seeing the whole of a problem and fill in gaps in our experiences to give us a complete picture of how things work in the world (Bruner, 1977; diSessa, 1993; Fischbein, 1982; Noddings & Shore, 1984). Literature in the Learning Sciences and elsewhere tends to treat intuitions as a 'catch-all' phrase that lacks a clear operational definition (c.f., Clement, 1993; Resnick & Wilenski, 1998; Zietsman & Clement, 1997) and seems to encompass what people know, yet do not know how they have come to know (Noddings & Shore, 1984). Intuitions are extremely useful in understanding both learning and teaching within specific domains (e.g., music) (Bamberger, 2013; diSessa, 1993; Schön, 1983; 1987).

More research needs to be done to understand what types of reflection-in-action activities encourage collaboration, the size of the groups working together, and the domains that this would be ideal for. Creative activities like music composition provide learners with the experience of doing what an expert does, or as Resnick and Wilensky (1998) state, it gives the student an opportunity "dive in" (p. 155) or play the role of a music composer. This "diving in" allows learners to make use of what they know how to do already. Music composition and intuitions are relatively understudied in areas of educational research like CSCL and the Learning Sciences and this study provides a way in which to investigate them. This research can solidify the idea that intuitions should not just be used as a 'catch-all' phrase to explain what cannot be explained. Intuitions provide key foundations to critical thinking and problem solving if there is a clear foundation given for intuitions and how it relates to the researchers theoretical framework.

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