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Author Details:
Sarah Elliott
St. Therese's School
Hobart
Tasmania Australia
sarah.elliott@kramster.net
+61 3 6244 8080

Dr William J Baker
University of Tasmania
Faculty of Education
Tasmania Australia
Bill.Baker@utas.edu.au
+61 3 6324 3407

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Title

Student perceptions of problem-solving in and through music in the senior primary classroom.

Abstract

This paper presents the findings of a research project that investigated the perceptions of five senior primary school students in Tasmania, Australia regarding a problem-solving task in music education. Much research has been undertaken regarding problem-solving in education and some has been undertaken about problem-solving in music education, however very few studies have sought to present the students' perspective of this approach, and it is this gap that this study sought to address. Data were collected through student learning journals, one focus group interview and individual interviews, and were analysed through the identification and exploration of emergent themes and the construction of matrices. Findings from this project suggest that the student participants found the problem-solving task to be an enjoyable experience and that they gained a strong sense of satisfaction from completing the task. Student participants also highlight the perceived benefits of an open-ended task with few clearly defined parameters. As a result of this project further research into the benefits derived from problem-solving tasks in music education is suggested.

Introduction

Much of the prior research regarding the use of problem-solving in education has been concerned with issues such as: how it is best used; what students will learn; and the nature of the problems used. Within music education, research into problem-solving has centred on students' thinking and problem-solving processes during problem-solving tasks. Educational research has revealed the benefits of using problem-solving methods in teaching and learning and the best ways of using a problem-solving approach in order to maximise student understanding. This study focused upon the students' perspective of problem-solving: what the experience of problem-solving in music education was like for students. This presentation reviews some of the literature pertinent to problem-solving in education and music education, outlines the methodology that framed the study, presents data collected and discusses those data and their implications.

Literature

Problem-solving is one approach to teaching and learning which supports content-based learning along with a variety of other such skills as decision-making, time management and problem-solving. Killen (2003) explains that one can teach for problem-solving (learning the skills used to problem-solve); about problem-solving (learning how to problem-solve); and through problem-solving (learning other content matter and skills during problem-solving activities). Innes (2006, p. 760) suggests that problem-solving requires "productive dialogue in problem-solving groups" for students to "acquire deep principles and disciplinary understanding". In problem-solving students use their 'inner-talk' to solve a problem (Vialle , Lysaght & Verenikina, 2000) a feature of which is the discussion of solutions with their peers (Good & Brophy, 1997). The importance of the social setting for problem-solving is supported by both Innes (2006) and Good and Brophy (1997).

Research into problem-solving in music education appears to be primarily concerned with problem-solving in and through music composition (Berkley, 2004; Burnard & Younker, 2004; DeLorenzo, 1987, as cited in DeLorenzo, 1989; Wiggins, 1994). Berkley (2004) investigated the influence of teaching and learning processes on Year 11 General Certificate of Secondary Education (GCSE) music students' compositions in the UK. She concluded from a review of the literature and through the presentation of case studies of educators teaching musical composition that the pedagogy for teaching composition can conceptualise "composing as problem-solving" (p. 247).

Burnard and Younker (2004) studied students' problem-setting and problem-solving processes within the context of musical composition, across a variety of ages, musical backgrounds and cultures. Through six case studies they found that students think through the process of creativity in different ways, describing six operating levels: "floater to linear, serial to recursive, staged to regulated" (p. 72). These operating levels describe students' methods in problem-finding and problem-solving. A 1987 study by DeLorenzo (cited in DeLorenzo, 1989) explored Grade 6 students' creative processes during creative problem-solving tasks in four schools. DeLorenzo found that students who were "highly involved problem solvers explored and organized sound for

its musical expressiveness, while uninvolved problem solvers rarely based their decision making on musical concerns" (p. 188). DeLorenzo recommended "continued systematic research" of "creative music problem solving" (p. 198) to aid music teachers in their construction of valuable creative experiences. Through a case study of two Grade 5 students Wiggins (1994) found that during three group compositional tasks the problem-solving processes of students moved "through three stages: from whole, to part, and back to whole" (p. 240). There has been significant research into problem-solving in general education and some research has been conducted into problem-solving in music education. However, there is a gap in this research with regard to students' own perceptions of their learning during the completion of problem-solving activities in music education. This project sought to address this gap.

Methodology

This qualitative study (Bogdan & Biklen, 1992; Burns, 1997, Hatch, 2002, Sarantakos, 2005) was grounded in a social constructivist approach and utilised student learning journals (Larsen & Merrion, 1987; Hiemstra 2001; Hatch, 2002), one focus group interview (Hatch, 2002, Morgan, 2002, Eder & Fingerson, 2002), and individual interviews (Stake, 1995; Eder & Fingerson 2002) to collect data. Data were analysed through thematic analysis via coding (Bogdan & Biklen, 1992; Gee, 2003) and the emergent themes were subsequently categorised into six areas.

In order to ensure suitability in the provision of rich data that would most fully inform the research question, participants were selected by means of a purposeful sampling approach (Burns, 1997; Patton, 1990). The sample for this study consisted of five Grade 6 students from a state primary school in Tasmania. The school was selected on the basis of the researchers' personal knowledge of their teaching and learning program and the students were selected through consultation with the music specialist teacher.

The student participants were removed from their regular teaching and learning program to participate in a three-lesson sequence in music education featuring a problem-solving task that took place over a two-day period. During this learning sequence students were asked to create and perform a 'soundscape' in response to a poem of their choice using tuned and untuned percussion instruments. During the first class participants listened to an example of a soundscape accompanying a poem, wrote down their ideas and discussed them as a group. In subsequent sessions participants worked in groups to create their own soundscape to accompany their chosen poem. Each lesson incorporated some general discussion time regarding participant progress in the task, and each lesson ended with ten to fifteen minutes of silent time for participants to reflect on the task in their learning journals. At the end of the learning sequence the students participated in a focus group interview and individual interviews, and these were all audio recorded and subsequently transcribed. At the conclusion of the data collection students were given the opportunity to member-check all data collected.

This study used thematic analysis via coding, for the analysis of data, thus viewing emergent themes as data were reviewed, rather than premising analysis upon a pre-existing hypotheses already in place (Bogdan & Biklen, 1992). Thematic analysis allowed for the exploration of significant statements with the assistance of matrices and one table to compare and contrast findings with relevant literature. The writing process enabled meaning-making to occur during data analysis. The analysis of data highlighted six themes in relation to the research question: what is the experience of a problem-solving task in music education like for senior primary students? Students highlighted the following perceptions: a sense of personal enjoyment in their completion of the task, their own learning in and through music as a result of the task, their understanding about problem-solving, the significance of collaborative learning, the importance of an open-ended task to their learning, and the importance of engaging in a process of experimentation to solve the task.

Data

This section will present and briefly discuss the six themes that emerged from the analysis of data with respect to particpant percpetions of the problem-solving task. All participant names are pseudonymns.

1. A sense of personal enjoyment in the task

Data highlighted the personal enjoyment that participants reported with respect to the task particularly through the acts of creating and performing, collaborating, the open-ended structure of the task, and, the ability to experiment in completing the task. Participants often described a sense of personal enjoyment in the task that was commonly related to the processes embedded in the task. Michael stated in his first journal entry that: *I really enjoyed today and can't wait to do it again!* The word fun was often used to describe participant experiences along with similar words and phrases such as: *enjoyed, really good* and *liked*. Aspects described as enjoyable were: *working in my group*; *we learnt a lot; experimenting and testing out new sounds; composing music and make your own music; the task was all open;* and *performing*. In her third journal entry Melanie explained reasons for her sense of enjoyment:

> *I really liked performing it even though I was nervous…I don't usually do stuff like this but making different sounds and experimenting with instruments to make sounds come to life is a great learning experience for me and I think for everyone else it is too. Another thing I have really enjoyed in this is working with someone I don't usually work with…Today's task was really fun and I wish this was on all the time.*

For Laura the task allowed her to be both a composer and performer and this contributed to her sense of enjoyment, she states that: *I learned what it's like to actually compose something you have written yourself, even if it isn't very good, it was still very fun making, organising and finally composing and performing a piece of music*. The phrase *I learned what it's like to actually compose something* is highly significant as it may possibly indicate her perception of herself as composer and performer.

An interesting contrast is also made between musical creation and musical 're-creation' by Laura: I think I kind of learned what it felt like to make, create music…[be]cause in band we just learn other people's music but it was good to actually create my own. Nick echoed the sense of enjoyment and the value of creation rather than re-creation that were described by Laura, writing that: [he] thought the learning task was great fun because it is different to using a flute.

2. Learning in and through music

Participants made reference to their musical learning and to the learning processes that they had employed in completing the task. These references included: learning *some good ways of how to come up with an idea for a poem and how we might be inspired*; *what it's like to actually compose* [sic] *something you have written yourself;* and, that *putting music together can be a different experience.* Other understandings included the idea that *words and music go together;* that there are *many different sounds to make* and *lots of cool sounds you can make*; *that you can make a sound that you like and not use them*; and, that *you don't have to write your music* down. These descriptions reveal a high level of student engagement with the musical processes embedded in the task. The reference to the selection of sound sources is significant as it reveals a sophisticated understanding of the composition process that is characterised by the selection of appropriate sounds from an array of possibilities.

Participants also described the processes through which they had learnt and even articulated learning in respect of risk-taking:

By trying new things out you can learn from them; if you try something out that you haven't done before and you make mistakes you learn from them and gradually your learning experiences will build up; and that you don't have to always learn from your mistakes you can learn from other people's as well.

Unprompted, Laura revealed her own understanding of the role of music in the development of dramatic purposes and, in so doing, again focused on the importance of 'being' the composer whilst also demonstrating that she had made an important musical connection:

> *Like if it's sad or happy or exciting or scary … like in the movies … the music makes it scary but you kind of understand it more if you're writing it yourself.*

This statement highlighted the perception that this approach facilitated the formulation of connections between different aspects of learning, thus deepening students' levels of understanding.

3. Problem-solving

Participants also referred to the term "problem-solving". Problems were interpreted in many different ways by participants, and converged and diverged with understandings of problem-solving as discussed in the literature. Participant reflections of problem-solving ranged from problems to do with the personalities in the group through to those to do with the task.

Melanie reflected on the decision-making process that the task required, stating:

> *In my group we did have a lot of problems, but sometimes we just learnt to get over them or sometimes we learnt to compromise and to just choose one of them. And so then it didn't turn out to be as big a problem as we thought…sometimes just certain bits of the poem we wanted to do certain music so my team mate wanted to do a different sort of music and I wanted to do something else too, so we had to choose between them. Sometimes we'd move on and make one together.*

Some participants described problem-solving processes, as Laura did in relation to the need to experiment with solutions and select appropriate responses: *You have to try out a few different sounds to knowif you find two good ones and then you have to try them out and test them, to see … which one is right.*

Some participants described the task in music with reference to those they had experienced in other subjects such as mathematics. Jeremy highlighted the relationship he saw between the two, and also the way in which his own thinking about problem-solving had evolved:

> *I thought it was maybe maths but now I find out that it's in music. Well when I thought of a problem I thought of like a sum or just something like that, I don't know, how many kilometres can I get if they're moving at a certain speed, but now I think of problem-solving as just like anything like it can be music, it can be writing, it can be like in anything.*

Nick also described the task with reference to mathematics, stating:

> *Problems can come in … different shapes [and] forms and not just like a spontaneous problem it can just be [a] music or maths problem. So it can just be anything, really. Well, maths obviously would be like, say, for example one plus one, with the answer missing, so you have to figure out that. With a music problem you could get something like every now and then there's a note missing from it and you have to figure what to go in. And spontaneous you just have no clue what the answer is, and you … just figure it out.*

Michael also linked problem-solving in music to mathematics and, in so doing, revealed the depth of his own reflection regarding the nature of problem-solving:

> *Your teacher gives you a maths sheet, she says "do this problem", but you could have a problem out in the playground with little kids or something, or you could trip over a stick, that's a problem. With the music one it was a bit different because we were told what to do, but we weren't told how to do it. And so we were able to work out our own way of how to do it, but we had to go along a certain line, like a certain form of doing it.*

4. <u>The importance of collaborative learning</u>

Participant responses in relation to collaborative learning demonstrated the benefits to students in working in this way. Collaborative learning encouraged more ideas and provided access to more instruments, and thus more ways of solving the problem. It allowed for greater interaction and discussion in solving the problem and was therefore useful in learning through open-ended, multi-solution tasks.

Some student understandings of collaboration were expressed quite simply: *I liked working with my group*; and *I think our groups work really well*. Others referred to the groups and how participants worked in their groups, such as: *even with two people in a group it can be tricky*.

Participants were asked what they thought the task would have been like if it had been completed individually. Their responses included *really boring; trickier;* and *you couldn't really do it because you need a lot of people for different instruments, like you can't play the autoharp, the bongos, the shaker, the glockenspiel all at once*. Melanie described how working in the group might be different from working individually, stating:
When you're with a group you're sort of interacting more and you get to choose different things and you're not just doing stuff on your own and you get to compromise and everything … If you can't really think of anything then your group member might have something and so you could go with that, or they could help you choose a sound or something.

Michael also referred to the value of collaborative learning in the task, stating:
It's a lot easier to talk to your friends, instead of sitting there thinking it through by yourself… your friends can help you along the way. Yeah, it's cool, it's like having a third and fourth head.

Laura described the differences between band experiences and the collaborative task, stating:

> *I do band… but that's with a really big group and not really working together, you're not discussing things. So it was good to discuss. We just get given pieces at band and stuff, and we just have to play them. But you had to actually write your own and discuss what would be better and how to mix music with the words.*

For Laura the experience of the creative problem-solving task was quite different to her experience of purely re-creative musical tasks.
5.
6. <u>The significance of an 'open-ended' task to learning</u>

Participants often described the problem-solving task in music in a positive sense as being open. Students described their learning as being: *easier* as there were *not all these rules*. Michael referred to the benefit of the broadly-stated nature of the task explaing simply that: *you said compose a piece and so we could do that however we wanted, as long as we composed a piece*. Participants could: *make up your own things*, and *be a bit more creative.* This sense of freedom in deciding how to engage with and solve the task was a very strong theme to emerge from the data.

Michael's reference to 'however we wanted' is important as it demonstrates the benefit he perceived in solving the task in a manner that he and his group deemed appropriate. This perhaps reveals that when the task was framed appropriately students engaged in the application of authentic processes in the solution to that problem.

Laura described her experiences of the problem-solving task with reference to a similar previous task with which she had been involved and to the different parameters of each task:

> *Well, it's good not having heaps of rules that you have to stick by … 'cause we did a thing a bit like this with [the music teacher] the other day, and like we had to have a metal thing, a skin thing and a wooden thing and it was just, it wasn't as good, having all those in it.*

The open nature of the task was important to Laura because, like Michael, she could make decisions regarding the way in which she and her group approached the solution to the task.

7. <u>The importance of engaging in a process of experimentation to solve the task</u>

One of the advantages of the open-ended task was that it required students to engage in a process of experimentation in order to determine the problem and arrive at a solution. For one participant experimentation was about: *getting the right sound* through [trying] *them out and* [testing] *them to see…which one is right.* This highlights the benefit for students of engagement in processes that allow them to construct their own meaning through experimentation. Aspects of the experimentation process were also sometimes viewed as *annoying*. For Melanie *experimenting was actually fun at the same time but then it could be a bit annoying after awhile…we had to test out so many sounds it started getting a bit boring after awhile.* Michael also expressed some frustration stating that *the annoying part of experimenting* [was] *that you can't always use the sounds that you make and like.* Laura also described the importance of experimentation to complete the task, stating: *it was challenging to find a bit of music I liked the sound of to fit in with the words but just like after a bit of experimenting you've kind of worked it out.*

Discussion and conclusion

The sense of personal enjoyment described by participants is consistent with Wai & Giles' (2006) study of student perceptions within a problem-solving task in geography. Participants described the problem-solving task as a novel or different experience, and referred to their own personal enjoyment in the task. In Wai and Giles' study this was referred to as a sense of "general satisfaction" (p. 160). This simple yet significant feature was not evident elsewhere in the problem-solving literature foregrounded in this study.

The importance of enabling students to engage in problem-solving tasks that are authentic was also highlighted in this study. This is consistent with the view that authentic learning can assist the development of complex schema networks (Elliott, 1995; Stepien & Gallagher, 1993; Wiggins, 2001) and thereby deepen understanding. The development of student understanding

appears to have been aided by the processes of writing and talking, along with peer collaboration during and after the learning sequence enabling them to construct their own understandings. This is significant for future teaching practice in the music classroom and for the training of music educators.

The descriptions of problem-solving described by participants revealed many similarities with the characteristics of problem-solving located in the literature foregrounded in this study. These included: a group context for solving problems; the importance of sharing ideas and discussing solutions; the significance of opportunities for students to demonstrate or perform their understanding of the solution to the problem; and the context in which authentic musical processes are engaged.

Chin and Chia (2006) demonstrated that problem-solving using ill-structured problems encourages a multidisciplinary approach to teaching and learning. This was not revealed in participants' descriptions of problem-solving. They appear to have started with and maintained their discipline-based view of problem-solving, perhaps simply adding music education to that view, or alternatively expressing their understanding through an 'it can be anything' view that was not extended further. This multidisciplinary view seems not to have been a feature of this study.

Eggen and Kauchak (2006), Killen (2003) and Stepien and Gallagher (1993) describe problem-solving activities as enabling problem-solving skills to be learnt by participants. With the exceptions of the skills of experimenting to solve the problem, and the importance of group work within the task, participants did not explicitly describe the problem-solving skills they had gained from the task. This divergence may simply have been a characteristic of the participant group or the nature of the task undertaken, and this area would certainly benefit from further investigation.

This study has provided some insights into the ways in which these students described their experience of problem-solving in music education. Through the experiences described by these participants it has been possible to explore and attempt to understand the ways in which these students viewed their involvement in this experience. Glimpses of the experiences of those five students were enabled through this research and hence the gap in the research in this area that was identified earlier has begun to be investigated. This study has highlighted the need for further research into student experiences of problem-solving in music education. Such research may be undertaken with a larger sample that may include a more diverse age range, with a view to providing further insight into the phenomenon.

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