Does Music Sooth the Savage Beast? A Pedagogical Attempt to Cross the Cultural Divide

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Abstract

A cultural divide exists in the classroom, with each participant (teacher and student) having rarely-coinciding objectives for a session. In this paper, the authors wish to reflect on the teaching and learning of science as a process of creating understanding from both sides of this cultural divide. Gary, the second author, describes the theoretical and social context of the teaching intervention and reflects on the outcomes for his pedagogy. Pip, the first author, presents the outcomes of his research into whether emotional mood is affected by music. Pip's research is far from perfect or conclusive. Rather, the manner in which the pedagogy has been applied has been successful in engaging Pip in the doing of science.

Introduction

> No need to hear your voice when I can talk about you better than you can speak about yourself. No need to hear your voice. Only tell me about your pain. I want to know your story. And then I will tell it back to you in a new way. Tell it back to you in such a way that it has become mine, my own. Re-writing you, I write myself anew. I am still author, authority. I am still the colonizer, the speak subject, and you are now at the centre of my talk (Hooks, 1990, p. 151).

Taylor and Timothy (2001), among other authors, have described how teaching in the western tradition of science in non-western countries has a distinct cross-cultural perspective and presents many challenges for the teacher and the learner within the social setting of the classroom and for the learner when they return to their cultural setting. However, little has been written about the cross-cultural effects of teaching the western tradition of science to students in western countries. These students are known to bring their own constructions of science to the classroom, which may or may not be in tune with the western tradition of science (Driver, Guesne, & Tiberghein, 1985). Northfield (1996) feels that teachers enter the classroom with a clear curriculum plan for the class. The students also enter the classroom with clear plans. However, Northfield found that these two sets of plans rarely aligned and in fact the various plans of the students were quite diverse.

In this paper, Pip and I explore how teaching and learning is a cross-cultural experience, even within sub-groups from a single culture. In this case, the sub-groups comprise the teacher sub-group, the engaged student sub-group, the disengaged student sub-group and the various students in between who move between engagement and disengagement. In doing this, I have asked Pip to speak for himself, in answer to Hooks (1990) criticism of much ethnographic work, where the authors voice is privileged over the voices of the subjects of the research.

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[1] Pip is currently enrolled in Year 11 at Beaconhills College, undertaking both Physics and Music studies. His voice is represented in this Tempus Sans ITC font.
[2] Gary is Head of Science at Beaconhills College. His voice is represented in this Times New Roman font.

The Teaching and Learning Context

Beaconhills College is a co-educational school of 1350 students from Preparatory Year (age 5) to Year 12 (age 18). It is located 60 km south-east of Melbourne on the rural/urban fringe of that city, in one of the largest growth corridors of south-eastern Australia. The population of the school is therefore highly diverse in most socio-economic factors, except that it is predominately Anglo-Celtic.

I am currently studying for my Doctor of Philosophy degree at Curtin University, Perth, Australia and have been developing a student-centred approach to teaching and learning based on social constructivism and in response to Giroux' pedagogy of critical citizenship (Giroux, 1987). I have therefore been exploring ways in which I can:

- meet the diverse needs of my learners, recognising that they display different learning styles, preferred intelligence and learning abilities,
- connect student experiences of the world with the activity of the classroom,
- provide students with opportunities to experience science as evolutionary, non-foundational, culturally and socially determined and arising from theory dependent inquiry,
- empower students to question my pedagogical plans,
- invite students to share control of the learning environment,
- give students the opportunity to discuss, explain, negotiate and reflect on the viability of their own and other students learning,
- develop a curriculum that challenges the issues of whose knowledge, history, language, visions, culture and authority prevail as legitimate objects of learning and analysis,
- provide students with the opportunity to investigate a diversity of discourse about a subject from as many sources as possible, and
- assist students to learn to critique the information they receive and evaluate that information through moral and ethical filters.

This paper describes one of my attempts to achieve these pedagogical aims.

In Term 4, 2001, I attempted to establish a curriculum plan that would meet the diverse needs of the 16-year-old students in my Year 10 class. As the students had already made their course selections for the following senior (non-compulsory) years of schooling during the previous term, it was important to find a way to engage the students in something they perceived as worthwhile during the final term of the school year. It had been my experience that the many students who had chosen not to continue with the study of science in the final years became disengaged and disruptive during this term. Yet the students who had chosen to continue with science required activities that would be of benefit to their future studies.

My response was to develop a student-designed research task. I required the students to develop a hypothesis that they would like to investigate, and which preferably had personal relevance to them. I then used conversation and question and answer sessions, with each individual or group, to guide students through appropriate scientific methodology. I rewarded the appropriate use of a scientific approach, creativity and problem solving abilities ahead of scientific content in the assessment of this task. However, the task had to have a scientific theme at its core.

Various projects were negotiated. A group of boys, concerned with the events of September 11, 2001, attempted to investigate the difference between a concrete core building and an iron frame building when exposed to great heating. A group of girls responding to the same stimulus

conducted surveys regarding emotional responses of different age groups within the College and tried to explain this in relation to psychological theories. Many other groups investigated a variety of phenomena, including aerodynamics of car design, the motion of golf balls, vulcanology and the psychology of fashion.

Pip combined his interest in music with his ability in science to investigate the cliché "music sooths the savage beast." In a sense, Pip's story is a successful one. He desired further knowledge of science, but as we will see lacked insight regarding the manner in which science is done. In Pip's telling of his own story, and my narrative regarding his story, we will be able to tease out some of the issues that could inform a consideration of teaching and learning of science in a western classroom as a cross-cultural situation. But rather than re-write his story, I would like Pip to tell it for himself.

The Project – Does Music Affect the Mood you are in?

Through evolution, humans have constantly changed and evolved through time. One aspect that we have adapted is that when we get angry, surprised or frightened, our heart rate increases. This happens because when we see, hear or smell something unusual or threatening, our brain increases our heart rate so that blood is pumping around the body, getting glucose and oxygen to limbs faster. Therefore, if we need to, we can either run away or fight. This is aptly named the fight or flight reaction.

Many people believe that music can affect the mood you are in. For instance, if you listen to angry music you will become angry. There is currently no proof that I could find for this, apart from theorems based on observation. When I started this experiment, I had no position in the argument, but I hoped to come to a conclusion by carrying out my experiment.

I hoped to test whether music has an effect on our mood by measuring the heart rate of subjects, who would be listening to different types of music. My hypothesis was that when loud angry music (fast paced, with drums and guitars played loud) is played, the brain will send signals to the heart to make it beat faster and that the opposite would occur when relaxing music is played.

Results

The results of the experiment were very positive. Figure 1 shows Kirra's heart rate changing with changes in the type of music played. I had time to test one subject only.

I started playing very mellow music (music played at a slower pace with instruments played quietly), and increased the intensity of the mood gradually. At the very beginning (see Figure 1, first 400 s), her heart rate was slightly erratic, but that could have just been her being a little excited before the experiment. Soon enough she calmed down, and her heart rate was pretty much steady (Figure 1, 500 to 16 000 s).

The first sign of a change in heart rate was song 6, called "Heavens Coming Down" by The Tea Party. This song isn't very loud or distorted, but the guitar part resembles the sound of church

bells, which obviously affected the listener, because after the introduction finished and the guitar started playing, her heart rate jumped up. This was the first obvious change. The second was on track 7, called "Resurrection" by Fear Factory. This song starts out with a very quiet introduction, but suddenly changes to a very fast moving loud piece of music. The dynamics varied a lot in this song.

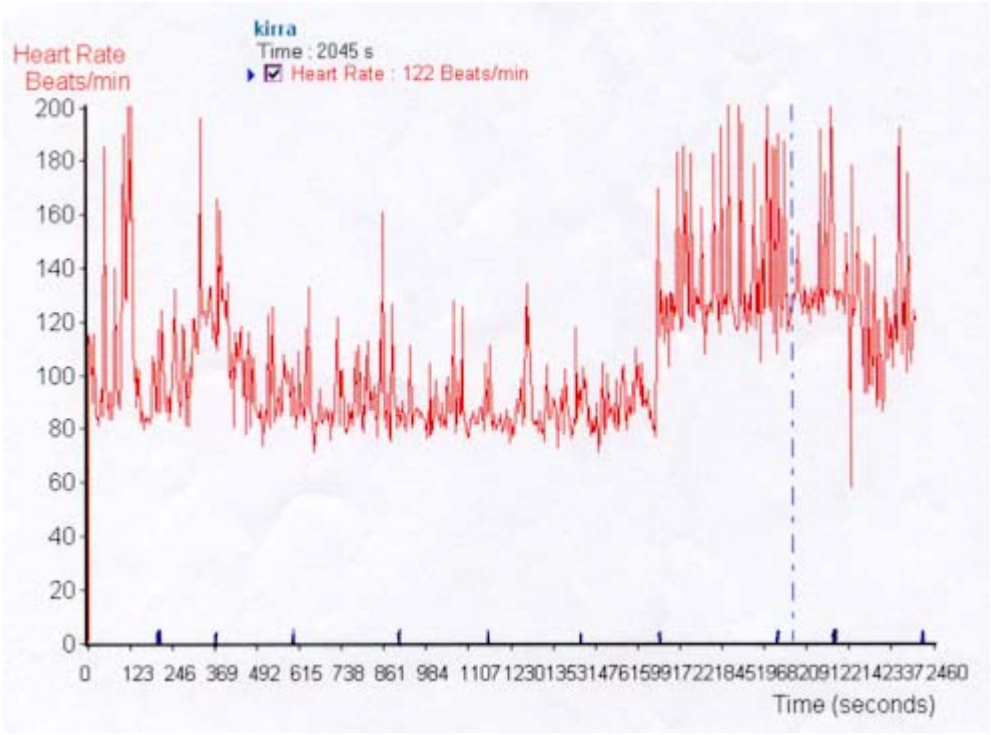

Figure 1. Kirra's heart rate trace.

The final obvious change in heart rate was when the last few songs were played, which were extremely heavy and were very sudden. No introduction, just straight into loud guitars and banging drums. Throughout the whole experiment, looking at the overall chart, it is obvious that Kirra's heart rate is gradually increasing.

Conclusion

It is obvious that Kirra's heart rate changed while she listened to different kinds of music. With the research I have done, the experiment would suggest that music definitely affects your mood.

However, an increase in heart rate can mean many different emotions, such as happiness, anger, surprise, etc. Therefore, although I have discovered that music affects your heart rate, I have not successfully found out what I intended. I do not have evidence to support the theory that music affects people's mood. For instance, some people believe that music induces suicidal tendencies, and somehow makes kids take semi-automatic weapons to school.

My own opinion is that music may affect your mood, but your mood can also select the kind of music you listen to. I personally believe that music cannot induce evil acts, such as massacres; it seems a little too far fetched for me. People enjoy the music they listen to because of how it makes them feel, that's all there is to it.

Student Assessment

To improve my experiment, I would use only 15 minutes of music. The first 10 minutes would be quiet and gentle music (giving 5 minutes for the student to relax). Then I would finish with a sudden change to 5 minutes of loud music. I also think it is important to use music that the students like. So, if I did this with adults I would use music that suits them. I would also like to test lots of males and females to see if gender and age influence the outcomes. Otherwise I was very pleased with the outcome of my research.

Teacher Reflection on Pip's Experiment

Clearly Pip has a basic understanding of scientific methodology. He had a hypothesis he wanted to test. He carried out a literature review to see if anyone else had done something similar and could help with his experimental design, then he planned and carried out his experiment.

From his results, he reflected on his original hypothesis, finding some merit in his knowledge claim and ways in which he could improve his methodology. However, he also has many gaps in his understanding of how to use scientific methods. Pip has only been able to measure one subject. Therefore he cannot claim to have supported or refuted his hypothesis (although he does). He has also confused emotional mood with the physiological response of heart rate to stimulus. To his credit, Pip recognises this in his discussion. This inability to link emotional mood and heart rate displayed a flawed literature review, and may have been overcome had I been more concerned with the scientific knowledge outcomes of the research, rather than the scientific process skills.

Pip had to overcome a number of problems. The first was working out how to use the heart rate monitor successfully. With my help, the assistance of our laboratory manager, a willing friend and some tinkering, this took a couple of classes to sort out. His next step was to select music that was different in emotional effect, could be easily obtained and then burnt on to a CD. This took some time. One mistake he made was to make the CD very long and the individual tracks were also quite long. By the time he had this sorted out Pip was left with time to only test one research participant, which required about 40 minutes. Pip recognises this aspect in his discussion, realising that he needed to use more subjects. He also suggests that age and gender may be variables to explore in the future with this technique.

To improve his project he could have collected baseline data of the heart rate of his subject, although Pip did leave time for the subject to settle at the beginning of his trace. Clearly he should have many subjects. He attempted to control variables, but he failed to establish the link between mood and heart rate either with his experiment or from his literature review. Due to these failings, Pip was left with opinions for his conclusion rather than evidenced-based observations to discuss.

However, Pip displayed great tenacity and worked out all his research design problems to produce a workable model. Using a lap top computer, it is possible to play music through headphones and simultaneously measure heart rate with a readily available heart rate monitor. He conducted his one

test in the Balance Room free from other distractions - a decision he made himself to control variables. The trace that was recorded by Pip supported his hypothesis. The heart rate changed in response to the music. Clearly the test of repeatability has not been applied and the link between emotional mood and heart rate has not been made, but the experiment displays great merit and could easily be adapted and used in class by students.

Teacher Reflection on the Pedagogy

Pip's experiment was successful for a number of reasons. He was able to learn a great deal about the manner in which Science is conducted, by first carrying out an experiment that he had planned for himself and then reflecting on the success of that experiment. He had successfully gained greater appreciation of the process of science, if not a better knowledge of the scientific concepts he was studying.

The group of students studying the cores of buildings never completed their experiment. They ran out of time. To be able to conduct their experiment they needed to construct two buildings with different cores and develop a process by which they could deliver a great deal of fuel to the core of the building safely. Again they learnt a great deal about the manner in which scientific research is conducted and a great deal about materials and energy. The girls who studied the emotional responses to September 11 and the girls who studied the psychology of fashion learnt very little about their topics, but they too developed a heightened appreciation for the process of science. So, my intervention can be described as highly successful in that sense. The group examining the trajectory of golf balls developed an excellent video demonstrating the trajectory achieved by different golf balls and clearly appreciated the manner in which scientific methodology is applied to research. My aerodynamics engineers made an aerodynamically sound model motor vehicle for use in a wind tunnel and investigated wind tunnels, learning much about the design and testing of motor vehicles along the way.

However, my two groups of disengaged students remained disengaged. The best these two groups could come up with was the construction of model volcanos, which they then caused to erupt (using safe materials). Neither group produced models that were representative of any particular type of volcano and their reports were satisfactory without being outstanding. But they did complete a project of their own design - a report on volcanoes with working model. They were engaged in an activity. I don't believe that they gained much from the conversation regarding scientific process, as they were unable to answer my direct questions in a satisfactory manner.

The teaching intervention was successful. I had engaged the majority of the students in tasks that were meaningful and interesting to them and they had gained an appreciation and understanding of the process of science – my aim for this project. However, some students were still less successful, not engaging themselves meaningfully in the task and therefore not gaining the improved appreciation and understanding of the process of science that I had desired. Northfield (1996) suggests that this is a common outcome for a successful teaching intervention. He feels the outcomes for learners are usually more diverse rather than less diverse following successful attempts to involve students in the process of teaching and learning.

Reflections on Crossing the Cultural Divide

As Aikenhead (2000) describes, there is some disagreement about whether I have successfully *encultured* or *accultured* my students into the western tradition of science. I understand enculturation as involving the teacher in seeking to cause the learner to accept the culture of the

society (in this case the tradition of Western Science), in contrast with acculturation whereby the teacher assists the learner to select aspects of the culture of the society that are of benefit to the learner. Aikenhead suggests that acculturation is more harmonious with an attempt to be inclusive of learners, whereas enculturation is successful with students who possess cultural identities that harmonise with the culture of Western Science. At the time, my desire was for my students to take their naïve constructions of scientific knowledge and the scientific process and reconstruct these in light of their experiences, and their conversations with peers and teacher about those experiences. I had hoped for an enculturation into the way of doing western science. But, now, I feel that what I have attempted to achieve is in fact an acculturation. I hope that my students have been able to assimilate a part of the western tradition of science (the process of doing science) with their personal constructions of science. I believe, from the success of the majority of my students, that I have encouraged them to cross the divide between their constructions of science into my construction of science (as a representative of the western tradition of science). I have also crossed the divide from the traditional teacher, as knower in charge of the learning experience, to teacher as co-learner sharing with my students in the exploration of new knowledge. Whether or not they have been encultured into a western tradition of science, or rather they have been accultured and assimilated an improved appreciation of the process of science I cannot tell. Either way, the pedagogy has been successful in engaging students in scientific research.

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