

The application of ICT in the NZ secondary music classroom (2008-9 and 2012): preliminary findings of a comparative study

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Abstract

Technology integration and the effective use of technology in classrooms are enthusiastically explored in many professional education forums today. It is no longer a question of ‘if’ but ‘how’ best to include educational technologies to improve and support learning outcomes for digital learners in the 21st century. This article is a summary of a longitudinal qualitative study focusing on the application of ICT tools in secondary music classrooms around New Zealand and describes the changes that have occurred over a four-year period (2008-2012). In particular, the study explores how ICT tools are used by secondary school students and teachers in their music programmes. Aspects such as teacher/student skills and perceptions, technical and industry support, perceived difficulties and technology integration are explored. The perspectives of 13 people (teachers and experts) from both music software and educational resource industries were collected through open-ended interviews in 2008 and 2009. Participants also completed a follow-up questionnaire with similar questions five years later during 2012. This article indicates the preliminary findings of the comparative analysis and describes the apparent changes which have occurred over a five-year period.

Keywords

ICT, secondary education, music, music software

Introduction

This article is based on the research and preliminary findings of an investigation into the application of ICT (information and communication technology) in secondary school music classrooms in New Zealand, drawing on the perspectives of 11 teachers and two music industry experts. The main focus of the study is to determine if and how computer technology is used in classrooms and to consider the factors influencing the use of these technologies amongst secondary teachers and students. Three main questions summarise the purpose of the study: what are teachers currently doing, why are they doing it, and how could they be doing it better?

Background

The digital learners of the 21st century need to be taught in a 21st century manner, which implies the integration of educational technologies in classrooms (“Why integrate technology”, 2008). For example, Brown (2011) argues that we are living in a connected world and to disconnect students from this world the moment they walk into a classroom is doing them an injustice.

Professional educational forums such as Musicnet (<http://artsonline.tki.org.nz/Communities/Musicnet>) and Edutopia (www.edutopia.org) explore and discuss the innovative use of technology in the music classroom on a regular basis. Other social networks such as Twitter, and internet blogs dedicated to the use of music technology in the classroom, provide a rich and insightful glimpse into the minds of music educators, their intentions and the daily difficulties that they grapple with around the world. For example, MusTech.Net 2.0 (<http://mustech.net>) and Dr Joseph M. Pisano’s Twitter feed (<https://twitter.com/pisanojm>) are but two examples. Also, the Soundtree website (www.soundtree.com) is a source of information and advice for educators who are aiming to prepare their students for ‘careers that don’t yet exist’.

Effective use of technology can support and enhance different learning styles. As teachers take on the role of facilitator rather than instructor, technology provides the tools to manage and support learners through individualised learning opportunities. To a certain extent, technology integration is now embedded in enhancing skills, performance, composition, creative processes, analytical listening and research in music programmes in New Zealand and other countries such as, the USA (Tobias, 2012), England (Wise, Greenwood, & Davis, 2011), and Australia (Southcott & Crawford, 2011).

Technology can be a strong motivator when students get creative. Working with different modalities and approaches through engaging with these technologies provides students with a variety of ways of arriving at the same end product. Ease of use can speed up tedious tasks, such

as rewriting the same passages, by simply copying and pasting with notation software, as the following comment suggests:

Secondary school pupils can compose freely using ICT in the classroom, easing and ‘democratizing’ the creative process, enabling a high standard for all, regardless of formal musical training (Ward, 2009, p.154).

We are teaching digital learners in the 21st century and as this research demonstrates, technology integration in secondary school classrooms improves outcomes for digital learners. This work creates a connection between the classroom and the world outside the classroom where digital technologies are part of the daily lives and interactions of students. The use of digital music technology in the classroom not only enhances the teaching content and methods, but can “also improve the efficiency and effectiveness of teaching” (Qionggang, 2009, p. 1947).

Methodology

The research was started by posting a short technology survey on the Musicnet listserv in 2007. Respondents had to indicate their availability for a face-to-face interview. From the 33 responses, 13 candidates were identified. The selection criteria included:

- Availability of teacher;
- Decile rating of the school;
- Geographical area of the school; and
- Gender of student body.

The final selection included teachers from girls’, boys’, correspondence and co-educational schools, with a spread of decile ratings from 2 to 10. Wellington, Auckland and Christchurch areas were the best represented but also included were respondents from Hamilton, Palmerston North and Dunedin.

Participants were contacted via e-mail and the interviews were conducted face-to-face, telephonically, or on Skype during 2008 and 2009. All of the interviews were recorded and transcribed, and NVivo was used for the coding of the transcriptions. The four areas of discussion in the open-ended interviews focused on:

- Background;

- Skills and use of technology;
- Use of technology in the music classroom; and
- Future technology use.

These four focus areas were then broken down into the following main themes: governance; inside the music classroom; skills and knowledge of teachers and students; support; and ways forward. Although the interviews contained specific questions, plenty of opportunity was given to participants to elaborate on or clarify certain points where necessary.

The second dataset was collected in 2012. All of the initial interviewees were located and contacted anew to determine their availability for a follow-up survey based on the same research questions. Only one person was completely unavailable, as she had re-located off-shore. Where possible the same person was interviewed or, as was the case with a teacher who had retired in the meantime, the new teacher in the same role was contacted. If the person had moved on to another teaching position, the first choice was to interview that person and not just the replacement teacher in the same role. The transcripts of the first interviews were shared again with all respondents either to refresh their memory, or to give them an idea of their predecessors' thinking and practice.

The follow-up data was collected in a Google form which was sent to the respondents electronically. This technology allows for the responses to be collected and stored in an online Google spreadsheet. The reason for this choice was because of the ease of use and accessibility with this online document. Initially, the forms were sent electronically as a link in an e-mail. Once the teachers completed the form online, the data appeared in a spreadsheet generated by Google. This provided the researcher with data in a format that could be coded immediately, instead of having first to transcribe from audio files. Some respondents replied to a spreadsheet version of the survey if they experienced difficulty in accessing the online version of the form.

Details of the inquiry

The interview questions were designed around a model adapted from a qualitative interview question model, which was published as appendices to the 6th and 7th studies of the EDUCAUSE Centre for Applied Research's (ECAR, 2005/2006). The four main sections as mentioned earlier, focused on technology background; skill and use of technology; use of technology in the music classroom; and future technology use.

The background section collected information about the teacher's technology support role and how that support was provided to students. The 'skills and use' section looked at determining the skill levels of both the teachers and the students. Teachers were asked to be frank about their competence levels and to give their impression of the students' skill levels. The third section moved to the 'how' questions in relation to how technology use in the music classroom. This also included an examination of high-end student users. The final section concluded with prompts to disclose the vision, future goals, and immediate changes that teachers would like to see happening in their respective classrooms. The responses to these questions provided a rich dataset, giving insight into a wide variety of scenarios and challenges.

Longitudinal study

The research design of this study was developed over a period of time. Methodologically, it combined a qualitative approach with elements of a comparative study. The perspectives of 13 teachers and experts from the music software and educational resource industries were collected in 2008 and 2009 through open-ended interviews. The same participants were interviewed four years later in 2012 using the same interview questions. This scenario consequently lent itself to a comparative 'then and now' approach.

The rapid development of mobile technologies over the last five years has made a big difference to how teachers work and how they utilise their leisure time, therefore necessitating an extra question about the use of mobile technologies for the second dataset. The longitudinal aspect of the study provided some stumbling blocks. These included factors such as, panel attrition, the time factor of re-contacting respondents and getting a second response from them, as well as the availability of the respondents, which made the data collection process slightly challenging at times.

Analysis

Qualitative analysis software (Nvivo) provided the platform for creating the set of codes and made it possible to conduct the analysis electronically. All of the data was loaded as internal sources. The audio files were transcribed directly in Nvivo where possible, and respondents were identified as teachers (T1 to T11) and experts (E1 and E2) in the first dataset. As part of the analysis process, tree nodes were created to represent the evolving themes. The coding was then done inside the source documents. This proved to be beneficial and provided a quick way of accessing data coded to the same node, running reports and correcting human error quickly and efficiently. The next step was to start comparing the two datasets to explore any developments

and changes which might have occurred during the five-year interval. Respondents in the second dataset were identified as teachers (T1_2 to T11_2) and experts (E1_2 and E2_2) in order to distinguish them from the first dataset.

Preliminary results

Using the node classification as a starting point, there were three main questions arising regarding the specific use of technology in the music classroom:

- Were there any noticeable changes in teaching practice?
- Were there any new technology trends emerging?
- Was there a shift in the thinking and attitudes of teachers?

In order to answer these questions the five main themes were investigated by comparing the 2008-9 and 2012 results.

Governance

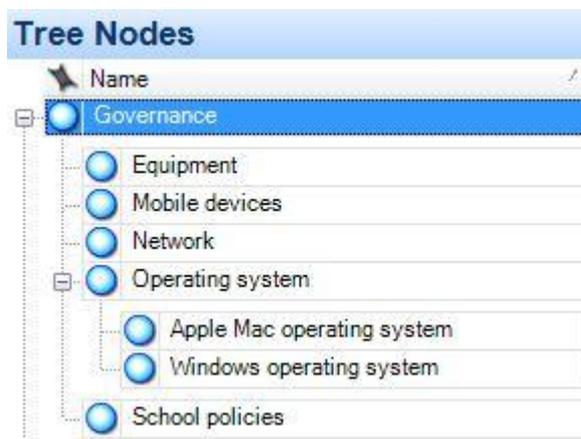


Figure 1: The node structure of the Governance theme

In Figure 1 the structure of the Governance theme is illustrated. School computer networks, preference for operating systems and the application of school policies (E1) provided the richest data for this theme. In 2007-8, the only referral to mobile devices was in terms of phones and how school policies prevented them from being switched on in class (T8), or even confiscated if a student was caught with a mobile phone (E1). The focus in 2012 moved away from this prohibitive practice to being more inclusive of technology, and where one of the main

frustrations being expressed by teachers concerned the difficulties associated with not being able to connect students' smartphones to online networks.

School networks, however, seem to have improved and where previously the computers in the music classrooms were often not connected to the network and had no internet connection (T9), they were now running on wireless networks for printing, internet access and file sharing. The 2012 findings showed a continued preference for running music software on Apple Mac operating systems (T8_2), as it was five years ago (T2, T6, T7, T10). School infrastructure has improved and now there are schools using a combination of Microsoft Windows, Apple Mac and Linux platforms (T10_2).

School policies tend to be more accommodating in terms of device access and even website access. Previously, websites such as YouTube were blocked and devices which did not belong to the school could not be used on the school networks (T7_2). The tendency is now to encourage students to use their own devices as long as they agree to certain rules of engagement (T10_2).

Inside the music classroom

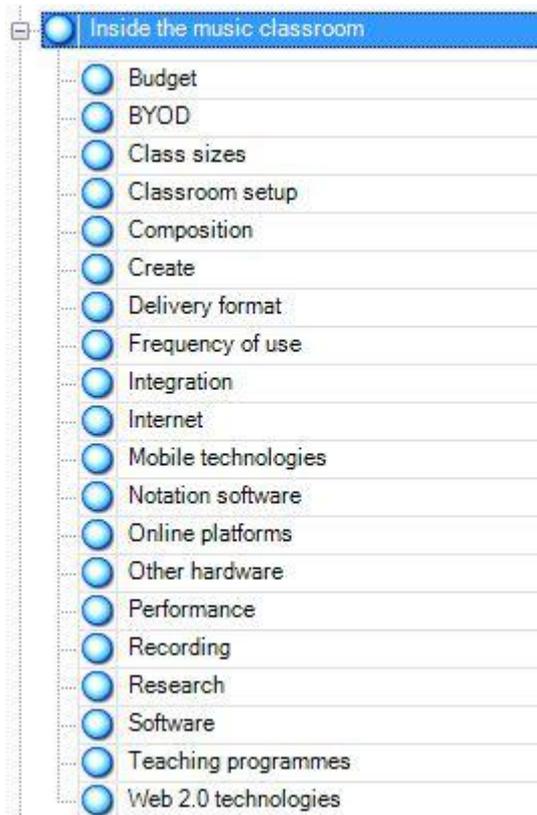


Figure 2: The node structure of the classroom theme

The nodes 'bring your own device' (BYOD), mobile technologies, online platforms, and other hardware, were added for the analysis of the second dataset (See Figure 2). Previously any mention of these concepts were either absent, or so minimal that it did not warrant coding, however, in 2012, ten out of the 13 respondents commented on these.

The notion of schools inviting students to bring their own devices has opened up a range of possibilities. As one teacher (T5_2) describes it:

We are a 'bring your own device' (BYOD) school. We believe that students have a level of familiarity with their own device and can have access to files they create at school wherever they are. Secondly, schools find it a challenge to provide 1:1 ratio of computers to students and this is one way of addressing this problem.

Another comment paints a similar picture: "Students often make use of music apps on their mobile phones and some bring laptops." This highlights how mobile technologies have moved beyond the occasional use of a mobile phone to utilising a mix of iPods, iPads and iPhones (T7_2, T10_2).

The availability of computer technologies in classrooms has increased. For example, where one classroom had three computers reserved for use by senior students only (T8), it is now equipped with Apple Mac computers and students are encouraged to bring their own mobile devices to class (T8_2). This is a good example of a proactive teacher finding new ways to deal with budget constraints and outdated equipment.

Another interesting occurrence is that internet use is still reserved for doing research by accessing information. There is not much mention of the social aspect of online communities and discussion forums, although there is a move towards making asynchronous online support available to students to free-up some classroom time for the teacher (T5_2). "I run a Facebook page for my year 13 Music Technology class. In this forum they can ask me relevant questions and receive timely advice and direction particularly on the weekend when they may be recording at home." For example, one teacher (T8_2) is making use of FirstClass online collaborative software to make resources available for students.

Software use seems to be consistent with what was used five years ago. These include programs such as Sibelius, Garageband, Auralia, Musition, Protools, Band-in-a-Box with the addition of Mixcraft which is the Windows equivalent of Garageband.

Skills and Knowledge



Figure 3: The node structure of the Skills and Knowledge theme

The two main concepts in this theme (Figure 3) focus on the technology skills of both students and teachers, based on the perceptions of the teachers. As illustrated in Figure 3, difficulties and obstacles are two separate nodes. Difficulties were defined as frustrations, and obstacles as factors hindering the use of computer technologies. In 2008-9 the list of difficulties for teachers included:

- Students not wanting to use computers because they hate them (T2);
- Classroom management with limited equipment (T3);
- Sorting out technical problems and maintenance issues;
- Political resistance from management (T4); and
- Log on issues for students because of inactive accounts or forgotten passwords (T9).

In 2012, it seems that students and teachers have moved on from getting stuck on the technical issues. Frustrations now centre around wanting to use, and having the skills to use the technology, but for various reasons the technology is failing. For example, these can include the inconsistent availability of software across departments, trying to make old and new technology work together, such as upgraded computers but old keyboards (T3_2), and students upgrading their personal software versions but having to work with the older versions at school.

Technology skills of students

Based on the perceptions of the interviewees, they all agreed that students are more intuitive than teachers when it comes to interacting with computer technology. Students might not always do things in a conventional way, but they are creative in their approaches to ‘make it work’.

Typically, they are also more comfortable with using several technologies simultaneously to achieve the expected learning outcomes. One teacher described an activity for his junior class making use of Sibelius and Garageband for teaching key signatures (T7_2):

I set up my Year 10s to learn their key signatures. They had to make a 2 minute podcast recording ideas and pitches or just sound. So that was sort of trying to get them comfortable with the (notation) technology and with the Garageband interface.

The NCEA Music Technology Achievement Standards provide a range of opportunities for students to use technology in a variety of innovative ways. Sampling and recording software now make collaboration between students possible when they are creating group compositions.

Technology can be a welcome life saver in an emergency, as the following anecdote describes:

One of my senior bands lost their drummer before going to Rockquest. So, they constructed the drummer's part using a MIDI drum software program. They practiced to the drum track and were allowed to use it at the performance. The drummer changed his mind at the last moment so they did not get to use the drum track, but they had constructed a complex drum part that sounded very close to the real thing (T9_2).

Composition work was mentioned most often when teachers were asked about their students' innovative technology skills in 2008-9. As the following comment shows, it is the refinement of these skills that are now becoming apparent: "I have a student who created a film composition. This would not have been easy without the software being able to superimpose the visual over top of the score ... this enabled her to compose in real-time to the score" (T8_2).

Students perceive technology to be helpful and to aid them in completing tasks quicker than they would in the traditional hand-written way. It no longer takes a student the whole year to finish drafting and rewriting two compositions by hand. Notation software provides a professional result with the added bonus of a playback feature where students can listen while they create:

Music technology enables students to transcend their limited knowledge and experiences, e.g. Sibelius enables students to experience what it is like to compose for a full orchestra which is something they would not be able to experience in real life. Garageband also enables students who have limited music literacy skills to utilise their aural skills to create music beyond their capacity to notate (T4_2).

Technology skills of teachers

Traditionally music teachers teach to their strengths. If a teacher is not comfortable or competent in supporting certain technologies, chances are that these technologies are not made available to students. This being said, teachers have now become more favourably inclined towards the idea of integrating certain computer technologies in the music classroom since 2008-9. What this research shows is a gradual shift by teachers, who are now letting students become the teachers, while they themselves step into the role of facilitator rather than instructor when they do not possess the expertise themselves.

Teachers are eager to become more knowledgeable, yet the reality of time constraints and other demands of the job often derail their best intentions. Acquiring better skills for processing sound recordings seem to be the most urgent need amongst teachers (T2_2, T4_2, T8_2, T11_2). In 2008-9, there was still noticeable resistance around some of the aspects of technology integration. Technology was perceived by some as being more of a hindrance than a help to activities such as composing:

... do all the musical things first and bring out all the ideas from inside of you before you go and sit at a computer because the computer sort of stultifies everything and I think we've got to realise that the computer is just a tool for writing it out. It's not something that's gonna help you compose (T8).

Fortunately, the majority of teachers involved in this study have now adopted a positive 'can do' attitude towards learning new technology skills. Overall, there seems to be a growing awareness of the necessity for professional learning development amongst teachers to enable them to can assist and support their students in a timely and efficient way.

Support

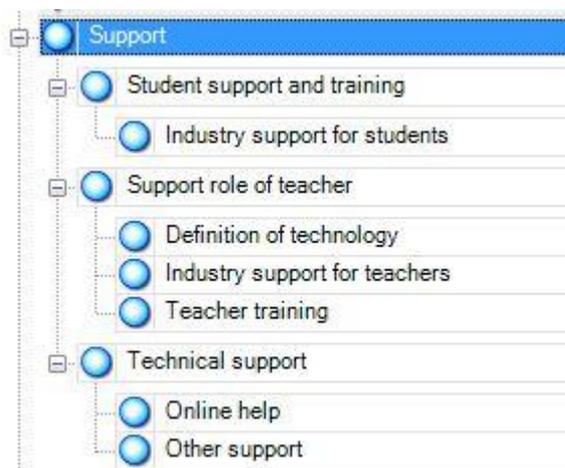


Figure 4: The node structure of the Support theme

Support role of teacher

The support role of the music teacher is varied and demanding. In this theme the nodes refer to the support that teachers provide to students, other staff members and the technical support available to them as teachers (Figure 4).

Music teachers provide their own technical support to the staff and students in secondary music departments. There is no evidence in either datasets that schools provide expert technical support specific to music technologies and software. This consequently has a great influence on the state and level of technology integration in music programmes, which in turn has direct implications for students.

A music department has traditionally been a place where sound equipment and amplifiers are found; therefore, some teachers have had difficulty in making the distinction between sound production and recording technology, and computer technology. For example, when answering the question about the types of technologies used in the music programmes, teachers would often refer to guitar amps and microphones. These electronic devices were, however, not included in the area of focus for the study, however, it does explain why ‘definition of technology’ is one of the focus areas of this theme.

Support from the music industry seems to be available to both teachers and students and has been consistent over the five-year period of the study. However, it is important to note that support has to be sought externally and teachers do not always have time available to attend extra night workshops (T8), or even to ring an expert during class time when the need is at its greatest. Just-in-time support for music software such as the Sibelius products is comprehensive, but an unreliable wireless network can turn this into a challenge all of its own.

Ways forward



Figure 5: The node structure of the Ways Forward theme

It is encouraging to note that the research data supports the inclusion of a vision, specific goals, a wish list, as well as advantages to be included in finding ways to move forward with technology

(Figure 5). The list became quite extensive once teachers started to name the advantages of using computer technologies in their music classrooms. Words such as “inspiration”, “instant gratification”, “enhancement”, “opening horizons”, “enabling”, and “developing” were used to describe the possibilities that new technologies bring. One comment highlighted the shift which has happened since 2008-9 for a specific teacher (T5_2): “The difference would be now that I have more computers and iPads and the software is becoming more intuitive. We are now spending more time making music rather than learning how to make music – it’s a lot more fun!”

Though the list of advantages is long, the wish list exceeds it considerably. What is encouraging, however, is the paradigm shift which has occurred in the current mind-set of teachers. Each one could come up with a vision for future developments in their own departments and spheres of influence. Therefore, findings show that the inclusion and integration of technology is now happening with far less reluctance than at the start of the study.

Conclusion

The aim of this article has been to provide some brief insights into of the results of postgraduate research conducted on the topic of the application of ICT in secondary school music classrooms in New Zealand as part of a PhD thesis. These preliminary results will further inform an in-depth qualitative analysis and be presented as a thematic network consisting of basic theme, organising themes, and culminating three or four global themes. These global themes are yet to be determined, but will form part of the data analysis chapter of the PhD thesis that is currently in progress.

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