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Interactive music video games and children's musical development

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Interactive music video games are a readily available, mainstream technology but they are not generally seen as educative tools. Nor are they established within school teaching and learning environments. This study investigated children's use of these games from a music education perspective. Nine children, aged 9–11 years, and two specialist music teachers each participated in an individual semi-structured interview. The child participants were drawn from four metropolitan schools and the teachers were from different metropolitan schools. Results indicate that the games may help to develop some music skills and knowledge and that the games are of high interest and importance to students. The music teachers acknowledged the potential of interactive music video games to be incorporated into traditional music curriculum but they each expressed a belief that ideally the technology needs further development, including a greater capacity to compose and create using the programs. These findings suggest that, based on constructivist learning theories, there may be a place for these games in music education.

Background

We are living in an increasingly digital age where video games have become a key element of child and youth culture (Seel, 2001; Aarsand, 2007; Gee, 2007). Playing video games is an engaging practice that allows children to be active participants rather than being passive viewers, such as with television (Seel, 2001). However, as with many cultural changes, this trend has not been universally applauded and there has been much research into the perceived risks of video games on children. Young Media Australia (2003) argues that video games can become addictive, expose children to violence, and develop or reinforce negative stereotypes. In contrast, some authorities in the field such as Gee (2004) argue that video games are not a waste of time, and in fact good video games incorporate many effective principles of learning. Gee (2007) goes so far as to suggest that humans have an innate desire to learn and, when video games are pleasurable, the learning that occurs while playing is often of a much greater depth than the learning that occurs in schools today.

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A feature of video games is that they tend to have progressive levels of difficulty and rewards for success and persistence. This relates to principles of motivation. Motivation theory defines motivation as 'an internal state that instigates, directs and maintains behaviour' (McInerney & McInerney, 2006, p. 207). One of the key factors for motivation is an appropriate level of difficulty. If a task is too easy one becomes bored; if a task is too hard one becomes frustrated and there is a tendency to give up. Brophy (1987, cited in McInerney & McInerney, 2006) calls this 'level of challenge'. Other key factors in motivation theory that can be identified within good video games include curiosity and a sense of autonomy or control over the learning that is occurring.

The playing of video games is now so commonplace that it could be considered a fundamental literacy in its own right. In an increasingly digital age, 'digital literacy' is now being considered the 'fourth cultural technique' alongside reading, writing and mathematics (Aarsand, 2007) and this has implications for school education. Educators in all areas of the curriculum are now being challenged to incorporate many more technologies into their lessons and become more flexible and comprehensive in their teaching agenda as modern technologies are in a constant state of flux (Durrant & Green, 2000). The New London Group (2000) argues that literacy learning in schools needs to shift from a focus on reading print text to teaching children to interpret a range of multimodal texts. That is, children need to learn to interpret more than one way of meaning-making including linguistic, audio, visual, gestural and spatial modes as well as a combination of all of the above.

The impact of the 'digital revolution' has been particularly strong with regard to music. It has changed the way that young people experience music. CDs have become almost redundant as internet downloads, MP3 players, *iPods* and *YouTube* have become the media through which music is heard. The way young people perceive music and music making has changed, and is continuing to change dramatically with the rise of new technologies (Stalhammar, 2004). It is possible that as music-related technology becomes more and more prevalent in today's society there may be an associated decline of interest in 'traditional' music learning (Goble, 2009). For instance, in 2004 only 4% of young Australians studied music as a subject in their final year at secondary school (Dillon, 2004). One possible explanation for this situation is that there may be a disjuncture between what music educators consider meaningful and relevant musical practices and what is actually meaningful and relevant to children and young people today. This view is supported in a significant Australian document, the National Review of School Music Education by the Department of Education, Science and Training (DEST, 2005), which argues that, among a number of other contributing factors, the decline of young people participating in school music is affected by a sometimes inappropriately narrow music curriculum, lacking relevance for the students.

Webb (2007) argues that school students' immersion in a rich entertainment media environment has implications for classroom listening. Webb (2007, p. 147) proposes that formal music education curriculum should take into account the 'screen literacy' and 'screen engagement' of young people, claiming that to do so would result in a deeper and more meaningful musical understanding in students. Webb suggests that using mediums of listening that incorporate aural, visual, spatial and kinaesthetic orientations is the way to move forward and 'reconceptualise' music education (Webb, 2007, p. 147). While

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interactive music video games are not given as a specific example, Webb does mention *YouTube*, music video clips, television commercials, animations and film extracts as ways to incorporate cross-media listening into the music curriculum.

Interactive music video games

Music has been a common element in video games since their inception but typically, music has been in subsidiary roles, rather than being the focus of the games. However, in recent years, video games that are clearly focused on music have emerged as part of everyday popular culture, enabling more people to participate in musical activity. Interactive music video games, also known as 'music games', are video games based upon the players' interaction with a musical soundtrack. Many require some kind of controller interface such as a microphone, electronic drum kit or guitar-shaped controller designed specifically for the game. In order to be classed as interactive the 'controller' must react in real time as with a traditional instrument (Brown, 2007). Common music games available at present include (but are not limited to): rhythm-based games such as *Guitar Hero, Rock Band, Dance Dance Revolution* and *Wii Music*, and pitch-based games such as *SingStar*, *Karaoke Revolution* and *Lips.*

The present research focuses mainly on rhythm games such as *Guitar Hero* and pitch games such as *SingStar. Guitar Hero* is a series of interactive music video games that are designed by *Activision* and are available on a wide variety of gaming platforms. The game is played by using a plastic guitar controller to interact with a musical soundtrack. The interface shows a vertical guitar neck on the screen. As the song progresses, coloured notes scroll towards the player. Once the notes reach the bottom of the screen, the player must hold down the corresponding coloured button on the guitar controller while simultaneously pressing the strum bar of the guitar with the other hand. Points are scored by correctly playing the coloured notes and strumming in time with the song. Notes can be either single notes or two or more notes at one time indicating a chord. More recent versions of the games support the use of 'hammer-on' and 'pull-off' guitar-playing techniques. Extra points can be scored by using the whammy bar on the guitar. The *Guitar Hero World Tour* version of the game introduces the use of drum and microphone controllers in addition to the guitar (Activision, 2009).

SingStar is a karaoke style game developed by *Sony* for their *PlayStation* consoles. Players use USB microphones to sing along to a track while the video clip plays in the background. The pitch that players need to sing is displayed on the screen as horizontal grey bars and the game compares the player's singing with the original track. If players sing the notes correctly then the bars fill with colour and points are scored. The lyrics are displayed at the bottom of the screen and light up to indicate when to sing a particular word. The game can be played using a single player mode, a 'battle' mode where two or more players compete for the highest score, or a 'pass the mic' mode where players take it in turns to sing (Sony Computer Entertainment Inc., 2007).

Both *Guitar Hero* and *SingStar* have released multiple sequels of the games since their inception. The games in question are available on a wide range of gaming platforms including *Sony Playstation 2*, *Sony Playstation 3*, *Xbox*, *Nintendo Wii* and the handheld *Nintendo DS* and have generated record-breaking sales. By January 2008 the *Guitar Hero*

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franchise reached $1 billion worth of sales and 14 million copies had been sold (Alexa, 2008). The year 2009 saw the release of new *Guitar Hero* sequels including *Guitar Hero: Metallica, Guitar Hero* 5 and *Guitar Hero: Greatest Hits* as well as new interactive music video games *DJ Hero*, a rhythm-based game using a turntable simulator, and *Band Hero*, a *Guitar Hero* spin-off focusing on pop rather than rock music genres. There were also new *SingStar* releases in 2009 including discs featuring the music of Motown and R&B as well as the hit band Queen, and downloadable song packs from The Jackson 5, Take That, and the classical group Il Divo. Such rapid growth is testimony to the widespread popularity of this technology.

Interactive music video games and music education

The role of music education can be defined as 'teaching children to love music' (Hargreaves & North, 1997). However, as mentioned above, there is some evidence suggesting that music education is not engaging children and young people as educators may wish (Dillon, 2004; Goble, 2009). Goble (2009) examines this decline of music education in depth and suggests ways by which this situation may be rectified. Among his recommendations is the incorporation of modern technology in the teaching of music, including the use of video games such as *Guitar Hero* and *RockBand.* Green (2006) also recognises a decline in interest in music education. She argues that this may in some part be attributed to the fact that most music incorporated into the formal school curriculum is not a part of most school students' culture. She argues that in order for children to learn how to critically respond to music, they must first be familiar with it. Green therefore recommends the inclusion of pop music into the curriculum, not merely as a way to gain children's attention and then steer them towards more educational 'classical' music, but as an important musical genre in itself. In her research Green (2002, 2006) also found that using informal learning practices, such as free experimentation with instruments and imitation of favourite pop tunes, can be an effective way for students to actively participate in their own learning with authentic educational outcomes.

In general, music education programs tend to have a common focus based on the fundamentals of appreciating, understanding and making music. One typical music education text (Russell-Bowie, 2009) outlines five music elements that need to be learned in order to develop a complete and well-rounded understanding of music, these being: duration, pitch, tone colour, dynamics and structure. It is also suggested that music needs to be actively experienced by children, not just through listening but by making music themselves in a variety of ways (Russell-Bowie, 2009, p. 54).

It could be argued that interactive music video games provide a number of different ways through which the elements of music may be learned. Games such as *Guitar Hero* may enable players to learn about duration (the fundamental aspect of the game), structure (in 'practice' mode players can break songs down into their structural parts such as intro, chorus, verse and so on), and dynamics (playing accented beats louder scores more points). Games such as *SingStar* may teach players about pitch (points are scored based on the accuracy of the players' pitch). Further, it could be argued that interactive music video games allow players to learn about and understand the musical elements through a variety of ways including singing (using *SingStar* and *Guitar Hero World Tour*), playing (using

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instrument-shaped controllers), moving (using *Wii Music*), making (using *Guitar Hero* and *Music* that allow players to create their own songs) and appreciating (through exposure to a wide range of repertoire).

Missingham (2007) compiled a complex report commissioned by Youth Music on interactive music video games. Situated in the UK context, the report was concerned with young people's views of these games and had three target readers in mind: games developers, licensees or owners of intellectual property, and music educators. The data collected for this report was used to draw several interesting conclusions. Firstly it was found that young people believed interactive music video games could potentially provide people from low socio-economic backgrounds with a way to access music and music education. Further, it was concluded that interactive music video games may also be a way for young people to access the music that they love which is often omitted or under-represented in mainstream music curricula. The participants reportedly believed that interactive music video games have an important role to play in educating, inspiring and motivating young people with regard to music. Missingham also concluded that interactive music video games can introduce young people to many musical skills that can then be transferred to playing other (or 'real') musical instruments. Although contestable (Arsenault, 2008), Missingham (2007, p. 12) claims that playing interactive music video games can help to develop dexterity, inter-limb coordination, hand–eye coordination, pitch and rhythm. Interestingly Missingham (2007) also found that most young people do not believe that interactive music gaming is as significant as music making on 'real' instruments and argues that a general societal view of video games as merely play 'inhibits a deeper engagement with music-games' (p. 12). This societal view of video games could be a contributing reason behind the fact that the mainstream music literature does not cover interactive music video games.

In summary, it can be suggested that the use of interactive music video games in music education may in fact be a beneficial inclusion. While there is a dearth of literature on the topic, what little there is suggests that these games may be a meaningful way for students to learn about the elements of music, and may be a way for music educators to breathe life back into a dwindling curriculum. What can be said for certain is that, thus far, the potential uses of interactive music video games have not been realised.

The study

The literature pertaining to video games and children suggests ways in which video games are highly enticing to young players. It also points out the importance of video games and digital media as a multimodal literacy. Further, there are indications that music education needs to be responsive to such changes. In view of this background, research was undertaken that examined interactive music video games, a gaming technology that is sweeping the world. This study aimed to investigate the reasons why young people choose to play interactive music video games and the potential of these games in the learning and literacy of their players. More particularly, the study focused on the educational qualities of the games from a music education perspective and the potential for such games to be incorporated into the musical classroom was explored.

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Method

Design

This research was conducted using a qualitative research design (Patton, 2002) with the intention that the data gathered would provide an in-depth account of the participants' experiences with and views about interactive music video games.

Settings and participants

The participants in this study included nine children aged 11–14 (five male and four female) and two specialist music teachers. The student participants were drawn from four public (state) metropolitan schools covering a spectrum of socio-economic contexts. The student participants had a range of music-making experience, both in their school experience and elsewhere. The two teachers chosen were from different schools to the students. Both music teachers were secondary school music specialist teachers and both had a strong background in music technology (Music Teacher Two was also a specialist media teacher). Purposive sampling was used to select the participants to ensure that the sample best suited the needs for this particular study (Cohen *et al.*, 2000). The students in this study needed to have had previous ongoing access to, and experience with, interactive music video games of some kind (the students' usage of the games ranged between twice a week to once a month). The teachers were required to have some experience with interactive music video games and were sought out specifically for their interest in music education and music technology.

Approval to conduct the project was granted by the University of South Australia Human Research Ethics Committee as well as by the Department of Education and Children's Services. Parental approval was gained for the child participants and they were also assured verbally that they were not under any obligation to participate in the interview.

Instrument and analysis

Individual semi-structured interviews were conducted with each participant to collect data. Interviews with students addressed their existing experiences with and views about interactive music video games, as well as information regarding their own musical backgrounds. Interviews with teachers addressed their experiences with and views about interactive music video games as an education tool as well as information regarding their own teaching backgrounds and experiences with music technology. The interviews were audio taped and full transcriptions were made of the data.

Once transcribed, the data were coded and analysed using content analysis methods (Patton, 2002). The data were allocated, first into major categories that were aligned with themes identified in the reviewed literature, and then into relevant subcategories or subthemes based upon both the interview questions and the information that emerged from the data.

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Validity and reliability

The reliability of this study then can be based upon the fact that although a small number of participants were used, they were a diverse sample and represented a range of different demographics. Firstly, more than one type of participant was used. That is, both teacher and student participants contributed to this study. Any consistency between the results from these two different participant types would suggest reliability. Further, the student participants came from four different schools in three different geographic areas. Again, any consistency between results would indicate reliability. Finally, reliability can be demonstrated through the reliable procedures used throughout the study. That is, the data collection methods were transparent and well documented, the data were reliably recorded and examined, and thorough procedures were used to locate categories, subcategories and to store and use all the information available (Richards, 2005).

Results and discussion

The following section presents selected aspects of the findings. The educational value of interactive music video games is addressed according to two themes: the musical skills gained from playing the games and the musical knowledge gained. Then, the teacher participants' use of interactive music video games in their teaching is presented. This is followed by consideration of implications of the findings for music education and suggestions for further research.

The educational value of interactive music video games

When asked about the musical skills gained from playing interactive music video games, the teacher participants in the study had conflicting opinions. Music Teacher One expressed the opinion that any skills gained from the games are minimal and their transferability to other areas of musical study questionable.

> . . . I really don't think that there's enough musical literacy, musical things that are built up within the programs to make it authentic musically but it certainly enhances aspects of it. (Music Teacher One)

Music Teacher One did acknowledge that some physical coordination skills are involved, but believed that these were 'perhaps no different from any other video game'. He also acknowledged that there is a positive aspect of moving to the beat and rhythm that occurs whilst playing the games but was quick to add that players would be better off moving to traditional musical forms. One aspect of the game discussed by Music Teacher One that was not mentioned by any other participants was the form of scrolling linear notation used in the *Guitar Hero* software. Music Teacher One expressed a belief that the players of the games are gaining the skills to read scrolling forms of notation. He went on to say that this knowledge is useful as it is transferable to other music technology software such as *Sonar* that also uses scrolling forms of notation. However, he was quick to add that this skill is not transferable to the horizontal format of traditional paper music notation. Finally Music

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Teacher One also expressed a belief that interactive music video games teach students some aspects of musical structure and form – of the rock styles at least.

Music Teacher Two differed from Music Teacher One in that he expressed a belief that there is a specific skill set needed to play the games which is most likely transferable to other musical activities.

> . . . the whole debate about whether it's music making, that's a whole other debate, but whether it's developing some across the board generic skills, I'd say yes. (Music Teacher Two)

With regard to coordination skills Music Teacher Two reported the following:

> . . . there's no doubt in my mind that it has a skill level that is certainly more than basic. To play at the higher levels of that game [*Guitar Hero]* requires very high level coordination skills and you're coordinating visually with what you're playing as an instrument. So it's not so different I think physiologically from what a musician does anyway which is to respond to a conductor visually, respond to the music score visually, and then play accordingly to a set tempo, and timing is everything. So, the game is about scoring high scores all based on your capacity to play in time on the right note and what's that sound like? Sounds like music playing to me. (Music Teacher Two)

Other skills involved in playing interactive music video games discussed by Music Teacher Two included rhythm and timing skills. He reported that:

> Yeah I mean if you argue that point that a musician requires split second timing decisions, and if you're playing something like *Guitar Hero* well you need split second timing decisions. And just as challenging as a very rapid piece of musical playing on a conventional instrument, a very rapid piece of sequenced playing on a *Guitar Hero* plastic instrument is very, very challenging, probably more than most adults ever achieve in terms of being able to do well at that particular game because of the coordination required. (Music Teacher Two)

The student participants involved in the study also seemed to share the belief that there is a specific skill set necessary to play interactive music video games successfully. Every student participant in the study reported that they had improved at the game over time and to do so required a development of musical skills. The main skills that the students discussed included coordination, rhythm and dexterity skills for *Guitar Hero* and pitch skills for *SingStar*.

Nathaniel[1] for example reported that, to play *Guitar Hero*, hand–eye coordination skills are needed as well as development of left-hand dexterity. When asked what skills he had improved upon in order to get better at *Guitar Hero* Nathaniel said the following:

Nathaniel	. . . hand–eye coordination I guess, like when I go to 'hard'. Usually on 'medium' I only use four fingers but when I get to 'hard' and 'expert' there's a fifth finger involved. So over the last few months I've been able to get that one.
Researcher	OK, so what does that involve because obviously you don't actually have five fingers? So can you explain what you're doing?

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Nathaniel Um, I guess like when you have to move, instead of the same position all the time, you have to move it down [indicates shifting hand position along the fret board].

When asked the same question of *Guitar Hero*, Lucy responded:

Lucy Well sometimes, like you don't have to look at the buttons as much, because you can just memorise where they are and stuff so yeah I think I've gotten better at that.

And Darcy responded:

Researcher OK, what skills do you think you've improved on?
Darcy Rhythm.
Researcher Yes?
Darcy Because the, it takes a lot of effort to actually strum when it [the notes on screen] comes down so you need to have rhythm to be able to do it.

When asked what skills she had improved on in order to get better at *SingStar* Juliett said the following:

Juliett You learn how to pitch different notes and how it picks up different notes if you sing in certain ways.

So, do interactive music video games teach children about the essential elements of music discussed earlier? Perhaps not all, but they certainly teach some. Duration, pitch, tone colour, dynamics and structure were the five elements of music identified as essential for musical development (Russell-Bowie, 2009). The student participants argued strongly that through playing interactive music video games they had developed their skills and understanding of rhythm and pitch at least, a view supported by Music Teacher Two. Music Teacher One, although somewhat sceptical, did acknowledge some elements of musical structure inherent in the games. Therefore, it can be concluded from the data that, for the participants involved in this study at least, playing interactive music video games appears to help develop some distinct and transferable musical skills.

This study also addressed the educational value of interactive music video games with regard to the gaining of 'musical knowledge'. This term was intended to refer to knowledge *about* music, rather than musical skills, relating particularly to listening to and appreciating music. It is by these processes, listening to and appreciating a wide variety of different music, that children learn about music and are able to analyse elements and styles of music and essentially develop personal musical tastes and preferences (Russell-Bowie, 2009). When asked about the musical knowledge gained from playing interactive music video games, Music Teacher One argued that students gain a definite knowledge of repertoire and the values of contemporary pop rock. He acknowledged the ability of such games to reach out with old rock classics and make a new generation of people appreciate them. Music Teacher Two was less enthusiastic in his responses in regard to musical knowledge:

> I'd say, ah, musical knowledge probably limited. Um, only from my experience of games which are the popular console games . . . Yeah, they tend to skim over musical

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> knowledge and that's probably a deliberate decision from the manufactures to focus on popular culture aspects more than musical learning aspects. (Music Teacher Two)

It is possible that this teacher was considering 'musical knowledge' to mean a more formal learning of the elements of music, rather than appreciation and exposure to repertoire.

All student participants apart from one admitted that playing interactive music video games had broadened their musical tastes. Interestingly, the participants' own musical preferences varied from top 30, heavy metal, trance, rock and hip hop. Some students such as Juliett elaborated on the concept:

> Yeah, so it's like you find out about more songs that you don't know about . . . there's a lot of songs that you don't know about and then you like listen to them and then you get into either like the artist or the type of songs or you just listen to that song and stuff and then you go looking on the net for other songs of that type and stuff, so it opens up a whole lot of stuff. (Juliett)

In summary, overall responses from student participants and from teacher participants indicated that interactive music video games do have some educational value. They offer opportunities for musical skill development, such as development of rhythmic skills, and for development of knowledge about music, perhaps leading to broader and deeper knowledge of aspects of contemporary musical culture.

Interactive music video games in the classroom

During the interview process both teacher participants were asked about their use of music technology and interactive music video games in the classroom, as well as the potential uses of such games in music education. While both teachers were already using these games in their teaching, the way that they were using them was somewhat varied.

When discussing the use of music technology in his teaching, Music Teacher One described mainly using the Mac software and the programs *Garage Band* and *Audacity*. He believes that music technology includes programs for audio recording and editing, as well as other forms of software used to incorporate and manipulate music, such as *PowerPoint* and other multimedia programs. Music Teacher One did refer to *Guitar Hero* in his classroom saying that:

> . . . there's a certain level of sound they hear feeding back to them, that they're actually triggering the notes which is almost playing I 'spose because you're controlling a sound. (Music Teacher One)

Although he does consider interactive music video games to be a music technology he uses them in his teaching only as a tool for enculturation and entertainment. He believes that there is further potential for the games but that at this stage the software is limited. Music Teacher One said that he would consider using the games more in his teaching if the programs are improved so that they have the ability to compose.

> . . . when people come up with the ability to be able to use that interface to create music, I mean expressive music, not just triggering a sound but actually making something that's a reasonable statement . . . (Music Teacher One)

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Music Teacher Two also uses a lot of music technology in his teaching of both music and media. He uses recording facilities with his students as well as computer-based technologies such as *Garage Band* and *Audacity* for recording, sequencing[2], editing and MIDI. Music Teacher Two also included interactive music video games in his definition of music technology. As well as using *Guitar Hero* in his media teaching he has also used an interactive music video game called *Frets on Fire* in his music teaching:

> . . . there's a game for the PC called *Frets on Fire* and it looks on screen very similar to *Guitar Hero,* the same kind of scrolling graphics and you've got to play keys on the key board as opposed to the instrument. But effectively it's the same idea; you get points by playing in time with the music track and visual cues that are happening on screen. Just it's a QWERTY keyboard rather than a guitar keyboard . . . the main reason I introduced it was because I knew that the kids would be engaged and enjoy the experience. . . But I also felt that there's some, we were doing basic drum rock rhythms and that kind of stuff and it fitted in quite nicely with coordination skills. For the same reason that I was saying earlier in the interview that to get good at those games you need to be able to have good hand–eye coordination it certainly fitted the curriculum area that I was working in at the time. (Music Teacher Two)

However, Music Teacher Two also reported believing that the software has some problematic features and the games would have more potential if these flaws were rectified. In particular, he discussed a slight time latency between the interactive drum kit and the response on screen.

> . . . I actually have recently been trying to overcome that problem I was describing with the drum kit, not being as responsive as I wanted it to be. But I'm interested in electronics as well, I've been building electronic interfaces from the [*Guitar Hero* drum kit], to a MIDI module, or *Garage Band* so you're getting a more responsive velocity sensitive feel and playing more like real drums in hopefully real time. (Music Teacher Two)

Overall, the findings revealed that interactive music video games are being used in the two teacher participants' practice: to provide an environmental experience that encourages an understanding of music; to allow humans to produce and understand sounds to express feelings; and to entertain and engage children in a way that coincides with their own culture (Webster, 2002; Webster & Hickey, 2006). It could be argued that such games are of equal relevance to music education as other more traditional forms of music technology used in the classroom. No individual technological resource is all-encompassing. They each have particular affordances, and also have particular limitations. So too do interactive music video games.

Implications for music education

Meaningful learning

Many educational practices today are based upon constructivist teaching theories which state clearly that, for learning to be effective, students must be actively engaged in their own learning in a meaningful way (Marsh, 2004). Constructivism suggests that the curriculum

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should incorporate the interests of the students and impart knowledge in ways that are meaningful for the learner (McInerney & McInerney, 2006). The results of this study show that interactive music video games are exciting and meaningful for young people. Therefore, it could be recommended that teachers, particularly teachers of the arts, take this into consideration and utilise these games to increase the engagement and meaningfulness of children's arts education. This position is in accord with Goble (2009, pp. 80–81) who suggests that the use of new technologies, including *Guitar Hero,* may be a way for teachers to 'reenergise musical life in society, and thus expand the contributions of music to life'.

While all participants acknowledged the potential of the games to broaden the player's musical horizons, the inherent value in children and young people engaging with and learning about the music with which they are already familiar should not be underestimated. As was noted earlier, Green (2006) suggests that, in order for children to develop the ability to critically respond to music, they must be intimately familiar with the style of music first. She also found that using informal music learning in the music curriculum was extremely engaging and beneficial for the students involved. Therefore, the potential of interactive music video games, not just as engagement tools, but as informal tools for music education, as indicated in earlier sections of this paper, should be considered. Precisely how this could be put into practice would be dependent on many contextual factors which would need to be resolved at a local level.

Critical thinking and informed choice

Based on the extensive use of interactive music video games by children and young people (Entertainment Software Association, 2008) there are also implications for the teaching of critical thinking and informed choice. This relates to both music education and to the wider curriculum. In the context of music education 'texts' can be seen not just as written words but as any linguistic, visual, audio, spatial or gestural texts which modern-day students are expected to be able to use and interpret (Cope & Kalantzis, 2000). Mission (1998) argues the importance of teaching children how to be critical users of popular texts. The intention is not to destroy the pleasure of the texts, but to increase the pleasure through analysis and increasing an understanding of why the texts work. Horner and Ryf (2007) support this notion, claiming that children need to be informed users of popular texts, by understanding the context and intentions of the texts. Therefore, there is the potential for interactive music video games to be used in the teaching of critical literacies in the classroom. By doing so the teacher would be bringing the children's interests into the class, making learning relevant and meaningful, while teaching children about the limits of the games (for example the embedded Western values), comparing the games with reality and investigating alternatives (Mission, 1998).

Implications for future research

Renewing interest in music education?

Goble (2009) suggests that the use of new technologies in teaching may help to renew interest in a dwindling music education system. The implications for future research suggest

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the value of a study to investigate whether student interest in music education is influenced by the incorporation of interactive music video games into teaching practice. If further research in the area continues to support this notion then implications for policy and for teacher education may also become evident.

How are interactive music video games being used in the classroom?

The two music teachers who participated in this research both used interactive music video games in their teaching to some degree. Despite a lack of information about interactive music video games in the educational literature, these results suggest that some innovative teachers are already experimenting with this new technology in their classrooms. Further research on how teachers are currently using interactive music video games in their teaching, and the perceived benefits of this, may be of assistance to educators looking for ideas as to how to incorporate these games into their own teaching. As teachers are often called on to justify their pedagogical choices by a range of different stakeholders, having research to back-up teaching decisions is advantageous.

Do interactive music video games really develop musical skills?

The data from the current study and from the Missingham (2007) report both suggest that interactive music video games may be valuable for the development of musical skills. Further research of longitudinal cause-and-effect type study could demonstrate the benefits of the games. This would then underpin the use of interactive music video games in schools and become a matter of consideration by curriculum policy developers.

Conclusion

At present there has been little educational research on interactive music video games yet such games are a readily available, mainstream technology that can be found in the lounge rooms of millions of homes worldwide. It seems remiss then that there is very little literature to inform parents and educators about the role these games play in child and youth culture, whether they are beneficial, whether they are detrimental, or what their potential may be in the musical education of children and young people.

While there are some inherent limitations in this study such as the small number of participants and only one data collection technique being used, the importance of this research lies in providing insight into what is meaningful and important to children and young people at this present time. Technology, like no other phenomenon, has the potential to highlight the 'generation gap'. Video games are often seen as an 'alien' form of entertainment, something that is dangerous, addictive, violent, a waste of time, and certainly not educational (Sanger et al. 1997). The aim of this study has been to shed some light on the popular phenomenon of video games, in particular interactive music video games, and hopefully aid the understanding of parents and teachers about the attraction, importance, attributes and educational potential of these games.

In view of constructivist learning principles, it is crucial for educators to be aware of what is meaningful to students and structure the curriculum to accommodate student

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interests. This research revealed that interactive music video games are in fact something of high interest and importance to students, therefore this should be taken into consideration when developing lessons and curricula. Moreover, the research suggests that interactive music video games may actually be beneficial to young people's musical skills and musical development, something of great relevance to music educators. Music educators must stay abreast of the means by which young people are accessing music (DEST, 2005). There is no doubt that further studies will be needed, however this research has provided some insight into what is, at present, a highly under-represented area in educational research.

Notes

1 Pseudonyms have been used for all the student participants' names.
2 Sequencing refers to the use of a sequencer, 'a programmable electronic device for storing sequences of musical notes, chords, etc., and transmitting them when required to an electronic musical instrument' (*Australian Pocket Oxford Dictionary*, 2007, p. 971).

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