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Exploring virtual world innovations and design through learner voices

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Student voice has played a big role in shaping the development and measure of success/failure of virtual worlds in education. Data on past and ongoing educational uses and contexts of use of virtual worlds and associated student feedback was gathered via a survey of educational researchers specialising in virtual worlds. Introduced are a range of specific uses that provide the source of and context for student feedback. Ten major themes emerged from student voices that highlight strengths and weakness and point the way forward for both educators and the students themselves. Positive feedback highlighted experiences of both pedagogical design and the ability of the technology to support it. Negative feedback revolved around technical problems, seen as hampering the effectiveness of student learning experiences. Student voice regarding virtual worlds is both positive and rewarding, and commending of staff who have dedicated their time and effort to transform the learning experience.

Keywords: Virtual worlds, Second Life, student voice, learning design, lifelong learning

Introduction and background

In 2009, the Australian and New Zealand Virtual Worlds Working Group (VWWG) was formed. Members of the VWWG have written papers for ASCILITE conferences since 2010 to update the community on the use of virtual worlds in education across the two countries. This year, members of the VWWG are concentrating on student perceptions of their learning in virtual worlds. While there is much attention given to educator perceptions about using virtual worlds for teaching (for example, see Gregory et al., 2015), there is less focus on student voices. This is the focus of this paper, authored by VWWG members. A survey was sent to members of which 20 provided feedback in relation to past and current educational uses of virtual worlds and student perceptions of their learning in these virtual worlds from 17 different institutions across the two continents.

Past papers by VWWG members for ASCILITE have focused on global audiences (2015 - 30 authors), critical perspectives on educational technologies (2014 - 32 authors), past, present and future (2013 - 52 authors), sustaining the future through virtual worlds (2012 - 46 authors), how the VWWG are contributing to change (2011 - 47 authors), and transforming the future through virtual worlds (2010 -21 authors). This paper is timely in that members of the VWWG are now considering what their students have to say about their experiences in using a virtual world for learning.

The paper sets the context for analysis of student voices. We offer a definition of virtual worlds that includes a brief look at a range of technologies and educational uses associated with virtual worlds from the broader perspective. This is followed by a brief description of specific use cases of contributors to the paper to establish the disciplinary breadth from which data is drawn. These use cases are described in more detail later in the paper to provide a greater depth of context for the student voices analysed in this paper. The literature review then presents discussion of a theoretical framework to conceptually contextualise student feedback. Further, a range of literature on student voice and its role in informing the design of technology-assisted learning and indeed in transforming students' own attitudes towards learning facilitated by technology is canvassed and discussed.

In the Method we describe how the data was collected and analysed. In Findings we provide an in depth look at the specific use cases from which student feedback has been drawn, including looking at the types of activities students are engaging in and the disciplines involved. Against this background we then present specific examples of student voices grouped into key themes that emerged from our theme-based analysis of student feedback.

Literature review

Virtual worlds represent a range of technologies and software platforms that are internet based, user created 3D worlds that are used for education, business and government (Dass, Dabbagh, & Clark, 2011). These virtual world technologies and platforms support a range of interaction modes including: interaction in the 3D environment solely via a graphical avatar (e.g. Second Life, OpenSim, Kitely, etc); blended synchronous interaction (combing face-to-face class with participants in a virtual world); and the use of video avatars (e.g. iSee) (Bower, Lee, & Dalgarno, 2016). Each of the technologies has strengths that are suited to specific learning objectives. One of the main purposes of using virtual worlds is that they are a great scalable way of connecting people across campuses, states, country or worldwide (Gregory, Jacka, Hillier, & Grant, 2015).

The authors have contributed substantially to literature on the design of virtual worlds. This includes work by Grant who designed a simulation of a small Chinese township with a number of authentic venues that provide the background and context for specific language and culture-focused task-based activities that are representative of a range of activities that one would encounter when visiting or living in China or are part of the regular Chinese cultural calendar. Work by McDonald involved the design and construction of a virtual multidisciplinary health care facility. Students engage in a range of focused role-play activities as they work their way through a library of tutorials. A small campus environment designed by O'Connell was used to accommodate a range of activities such as conference presentations, group discussion, display areas, and tutorial nooks. A grand hall and outdoor area was crafted by Nikolic in order to create a conference venue environment facilitating multiple simultaneous presentations and social discussion for non-co-located participants. Gregory created a virtual environment designed to provide pre-service teachers with opportunities to undertake situated role play that enabled them to gain classroom management skills, lesson design and implementation experience. A virtual world environment designed to teach New Zealand native flora and fauna through designing 'Koru' (a spiral shape based on a new unfurling silver fern frond and symbolising new life, growth, strength and peace – Wikipedia, n.d.) was carried out by Gaukrodger. These worlds showcase the wide and diverse possible learning experiences available to students. However, greater understanding is needed about the student experience with virtual learning environments and how this is expressed through the student voice (Howitt & Wilson 2015).

User voice is undeniably shaped by experience and the constructs of user acceptance. In 2003 Venkatesh, Morris, Davis and Davis presented the Unified Theory of Acceptance and Use of Technology (UTAUT) model. It identified four key constructs of user acceptance: performance expectancy, effort expectancy, social influence, and facilitating conditions. Performance expectancy is the extent to which technology will benefit users when performing certain activities. Effort expectancy is the user-friendliness of the technology being utilised. Social influence relates to the degree to which users perceive that important others feel they should use the technology in question (e.g. classmates, teacher). Facilitating conditions refers to a user's perceptions of the resources and support provided to perform a behavior (Vankatesh et al., 2012, p. 159). Significant moderating influences of experience, voluntariness, gender, and age were also confirmed as integral features of individual acceptance of information technology (Venkatesh et. al., 2003). "Voluntariness" is described as a spectrum ranging from behavior that is absolutely mandatory through to completely voluntary.

In 2012 Venkatesh, Thong and Xu, updated this research in the form of the UTAUT2, incorporating a wider view of consumer use that included several new constructs (hedonic motivation, price and habit) and removing "voluntariness" as a moderating influence (Venkatesh et al., 2012, p. 159). As the UTAUT2 attempts to explain the acceptance of consumers who, unlike students, have "no organisational mandate and thus, most...behaviours are completely voluntary" (Venkatesh et al, 2012, p. 159), the concept of "voluntariness" was found to not be relevant. In this regard UTAUT better encapsulates the prescribed nature of learning design.

Hedonic motivation, in the context of this paper, has been defined as "the fun or pleasure derived from using technology" (Venkatesh et al., 2012, p. 161). This helps us understand and place into context many of the learner views that are expressed in feedback from learning tasks or projects involving virtual worlds in learning. The comments from students presented herewith reflect that hedonic factors should be considered when adopting and adapting a virtual world for educational use, and that it would be of great use for further research to report such modifying factors such as age, gender etc. McDonald et al. (2012) warn that much of the dissatisfaction of students regarding virtual worlds can be due to the level of the students' digital literacy (experience). Thus hedonic motivations may be marred by misdirected frustration with the technology.

Another key concept in the UTAUT2 relevant to understanding student feedback is the more direct relationship between 'facilitating conditions' and behavioral intention it postulates. Venkatesh et al. (2012) argue that organisational environments will often have freely available facilitation conditions, e.g. accommodating training framework and resources, that are 'fairly invariant' across users. They argue that in an organisational environment (e.g. a classroom), facilitating conditions can serve as the proxy for actual behavioural control and influence behaviour directly, i.e. users' actual intentions have little impact in the use of technology provided by the organisation. In contrast, the facilitating conditions available to consumers can be variable and more complex and as a consequence so are consumer intentions and behavior. Gregory et al. (2015) demonstrated that, from an educator's point of view, educational institutions were not uniform in their support, training and infrastructure (i.e. facilitating conditions). Perhaps within a single institution or project this may be true or even intentionally controlled. The authors of this paper would remind the reader that the success of virtual worlds entering into the educational mainstream is dependent on predicable deployment independent of location.

Brew (2008) consistently found that, student feedback (voice) was reliable and valuable for improving a blended learning course. The technology was quite modest and did not require much student participation. MacFadyen et al. (2015) warn that student evaluation of teaching will be heavily influenced by the characteristics of the students. They go further to say that this does not invalidate such feedback, but rather that these characteristics should be considered in context with the feedback. Brooman, Darwent and Pimor (2015) report a case where the student voice played a vital role in directly informing educational design. Temptation to apply this to virtual world educational projects must be considered at the level of the students' understanding and experience.

The notion of regulatory fit (Higgins, 2005) should be considered when designing any educational program and certainly holds true for use of virtual worlds in education. Students place value on something if they feel good about it, if it feels right to them. Oyserman, Bybee and Terry (2006) discuss the role of regulatory fit and the use of a 'possible self' where the student finds meaning and context in projecting forward. However, they also state that for this to work, an underpinning and authenticity is required. Oyserman, Destin and Novin (2015) put further context to this stating that the 'possible self' framework will be a positive motivator if the experience paints the students in a positive future self. It shows how projection to a 'possible self' can act as a motivator for learning and provide context for regulatory fit (Bennett, Roberts & Creagh, 2016). It would follow that by using the student's voice to their own benefit, there is a possible avenue to mitigate some of the concerns and difficulties expressed by students while working with virtual worlds in education. To engage the type of cohorts that may be resistant or see difficulty, having the students project how this may be relevant to their graduated selves and to have them reflect on this, may give them context and motivation to move past constraints.

Method

An online survey was distributed to members of the VWWG requesting participation focussed on information about their use of virtual worlds by themselves at their institution and student responses (i.e. student voice) to their learning in those virtual worlds. The small cohort of 20 survey completions is considered to represent experts within this field drawn from an already specialist group of educational researchers. A series of eleven open-ended questions were asked, with room for additional comment at the end. Six questions related to description of the virtual worlds and their use. Three questions related to demographics, including discipline and audiences taught (student, staff or other). Two questions focused specifically on student feedback, one relating to how feedback was collected, and the other asking for sample quotes. The survey data was manually coded into themes and these are presented herewith. These themes include: linking with industry and the professional world; communication; engagement; community of practice; flexibility, safety; reflection on learning; role-play; gamification (bringing game features to the virtual environment); value; and technical and other issues/beliefs. There were also some general comments. The findings from the study are reported in the following section.

Findings

This section synthesises the information provided by the VWWG members. It outlines the makeup of activities; the learning students undertake in their virtual world; and their feedback and perceptions of their learning.

What are students doing in the virtual world?

VWWG members were asked to describe activities/tasks that the students in higher education were asked to perform when in a virtual world. Virtual tours (15%), machinima (in-world video) (13%), role-plays (13%) and a place/space for discussions (11%) are the major uses. These are followed with simulations (8%), virtual lectures (6%), virtual guest lectures (6%), research (8%), presentations (6%), other (6%), creative arts 4%), game design (2%) and career planning (2%)

The respondents noted in detail how they were using the virtual world with their students. They were being used for tours, web quests, role plays, building, scripting, guest lecturers, excursions, exploring, purchasing, sharing items (web objects), interacting with bots (non-player characters), honing their communication skills and participating in global challenges. Others focused on sharing the best elements of physical and online learning experiences to both spaces. Others used the virtual world to interact with alumni, other members from industry and students from other campuses. Respondents believe that using a virtual world is about improving project ideas, gaining a global context and developing networking and communication skills (Jarmon, Traphagan, Mayrath & Trivedi 2009).

The disciplines in which members of the VWWG are using virtual worlds for their teaching are education (25%), health (16%), social and behavioural studies (10%), science (7%) languages, visual and performing arts, engineering, and sociology (all 6% each), other (6%), construction, law, art, business (all 3% each). While there is a great diversity in the use of virtual worlds, Education and Health are the two largest disciplines represented utilising virtual worlds for teaching, accounting for 41% of the total respondents.

Description of innovative uses of virtual worlds

Members of the VWWG described a number of innovative uses of virtual worlds – role-plays, virtual tours, curriculum knowledge, communication, cross between school and university learning, blended learning and wearable technologies, and exploration (outlined further below). These innovative reasons are why there are so many student voices in relation to students learning in virtual worlds. These voices follow this section.

Role-plays were used by several members of the VWWG. They were used to demonstrate a point or concept. Many were unscripted providing a transformative learning experience. Students had to participate in the role-play requiring them to reframe the knowledge gained from their training. Another innovative use was the active or passive interdisciplinary interaction. At times this was designed as part of the interaction, while at other times learners would learn from students of other disciplines. Also used is the ability to move seamlessly from one avatar to another, such as a woman with cystitis to someone who is pregnant through the click of a button. Developing people and technical skills through simulated role plays with virtual characters where trainers can devise conversation trees that deploy a library of avatar responses to questions were also used.

Virtual tours were utilised by respondents so students could see places without expense and that other experts could participate inworld to impart specialist information through live virtual lectures. Another benefit was for students to be taken to places that others have created, therefore removing the need for replication of spaces.

Curriculum knowledge learning was undertaken in a variety of ways. One respondent had students compare commerce transactions and information exchange in three different environments, i.e., real world, online (2D) and virtual world (3D). Students were able to see the transaction footprint - information exchanged, types of web-objects/goods, legal issues, features of the environment and ease of use. They could appreciate different environments and how digitisation of goods and relevant technology could help businesses remodel their operations. This involved tracking of users and web objects/goods. Another respondent stated that while the students' tasks have remained essentially unchanged, they have continuously reviewed and revised the way lesson and task instructions were presented to increase clarity and pedagogical effectiveness as much as possible for an eclectic mix of students with a wide range of different motivations and abilities for studying.

A number of *designs* incorporated the use of mediating tools specially designed to facilitate student interaction with the virtual environment and the curriculum content contained therein. On a technological level, while there is no control over, for example, the proprietary interface, some academics have continued to optimise these mediating tools to improve their pedagogical effectiveness. Much of this optimisation centers on the user-friendliness and functionality of the tools. In one example, a heads-up display (HUD) was developed to enable learners to click on objects within the environment and receive linguistic and audio feedback about the objects to facilitate vocabulary learning. Also a new HUD for displaying the content of Chinese character-based conversations between students and non-player characters more clearly on-screen and to facilitate review of that content was developed. On the class management side, a new communication tool was developed for educators working in the Second Life/OpenSim virtual environment with non-co-located students that enables a teacher leading a class to attract the attention of a remote student easily and conveniently without the use of audio.

Communication has been made easier for learner collaboration across different time zones and continents. Through the utilisation of a virtual world, effective learning spaces for students have been provided to facilitate learners' practice of communication skills in an environment that is safe and conducive to learning. The ability to use text or audio provides a benefit that is difficult to replicate in other spaces. Students often use the virtual world to meet and communicate with each other as, for them, it is a more authentic learning and communication environment. They feel like they are really there with the other person (i.e., face-to-face with them).

The cross between pre-service teaching and school student learning/teaching is an important aspect of the use of a virtual world where there is intense interest and engagement by K-12 students and sometimes reluctance of pre-service teachers to develop skills in utilising virtual worlds. A way to overcome this is to utilise the work that K-12 students create in the virtual world of Sim-on-a-Stick (SoaS) in order to demonstrate to the pre-service teachers that the virtual world can be effective with their future audience. SoaS offers a safe, closed environment where work can be transferred to an online space so that the pre-service teacher can visit and explore the spaces. Innovation has played a significant part in finding ways to work around the restrictions to access to virtual worlds in both the K-12 schools and in the university through an educational download of SoaS.

Blended learning environments combine machinima and simulated documentation to contextualise student's study and provide them with the opportunity to visualise ideas and concepts. Through a project that transforms the traditional didactic approach to legal education, with its emphasis on abstracted content and the learning of rules of law, students are immersed in a series of blended learning environments (de Freitas, Rebolledo-Mendez, Liarokapis, Magoulas, & Poulovassilis, 2010) across an undergraduate degree. The project leverages students' familiarity with the continuing storylines and recurring characters featured in the machinima as a means of exploring areas of law that would otherwise be difficult to comprehend in the abstract (Matthew & Butler, 2016). In this way, bridges are built between subject areas, and students understand and address the complexities of the real world professional practice of the law in which clients are likely to have needs involving more than one area of law. The learning environments involve students in complex and challenging tasks similar to those undertaken by real world legal professionals and they are engaged and inspired to learn because their learning is situated in real world contexts (Laurillard, 2012; Karagiorgi & Symeou, 2005).

Accessibility is demonstrated through conducting events such as art and film festivals in a virtual world environment where individuals, who self-identified as having a disability or chronic illness, were asked to create an artwork/film/piece of writing demonstrating how virtual worlds gave them 'freedom'. A virtual world provides students who have a disability a means to work with their peers on a level playing field – particularly when the other users don't know of their disability. They are able to do their work without the hindrance of their disability and/or discrimination. Students have met with a community of virtual world users all of whom have some sort of mobility disability in real life. The discussion with students were eye-opening. Students developed an understanding of what it was like to have a mobility disability, how to develop and maintain a positive therapeutic relationship, and, what the virtual world experience means to the disabled.

Gamification of disciplinary content through the use of a virtual world has proved popular with students. Game spaces are rezzed (brought into play) as they are needed and then de-rezzed once level completed. This allows multiple players to proceed through the game at the same time and multiple levels to be played simultaneously.

The player is confined to the part of the game to which he/she has progressed in terms of mastering the relevant learning content, and is not able to access higher levels of play until skills are demonstrated and a certain level of proficiency achieved. In one literacy game, there are several challenges where a correct sentence has to be constructed from a given bank of words, or a sentence corrected. When a student types the correct sentence, the level is continued. Once all challenges are met, the player obtains a reward to assist achieving the ultimate objective on the final level.

Exploration - students are tasked with randomly visiting a range of virtual regions and reviewing them. The students form groups and then chose the regions to be visited. When writing their review, the groups can highlight any virtual region they have visited as part of their review.

Student voices

Over the years, members of the VWWG have been asking their students "What did you think about the lesson/your learning?" Following are representative responses to this question from students. A number of key themes emerged from the data and are presented below. These comments come from a variety of students across several institutions studying a range of disciplines, comprising of both undergraduate and postgraduate students. Student voices have been categorised into UTAUT categories indicating Performance Expectancy (PE), Hedonic Motivation (HM) and negative Effort Expectancy (-EE).

General comments (These comments did not fit into one of the themes, but provide an overview of what students felt about their learning).

- *Best part of the unit was the use of Second life as part of teaching.*
- *I did enjoy this unit, but I easily regressed back to being a floater who didn't particularly feel engaged once the SL sessions ceased.*
- *It gave me a sense of familiarity with the characters and encouraged me to understand their new problems.*
- *The continuity in storyline and characters from … was valuable because we didn't have to focus as much on who was who and could instead concentrate on the issues.*
- *I felt like I developed a personal connection with some characters. I could understand where they were coming from.*
- *It provides a focus for those interested in creating virtual world art, and a platform for those artists to be viewed and to hopefully meet each other.*
- *Need to ask specific questions in order to complete the task is very beneficial to my learning.*
- *It's fun and interesting. (HM)*

Communication (Often seen as one of the major affordances of learning in a virtual world as it is so easy to do with peers and with the lecturer, particularly for those students who are studying from afar).

- *I believe that Second Life has the potential to be an effective learning tool, one that will enhance communication and enable the sharing of knowledge between all. (PE)*
- *I liked the extra text talking today, especially the bit where we ask directions. (HM)*
- *Really good to consolidate new words, and learn new words too.*
- *It was a good chance to practice written conversation skills. It made me think about how to ask questions and answer. I feel that I have a better understanding of how to buy and sell in another … language. It was also fun.*
- *I feel like it's one of the best method of online conferencing. (PE)*
- *You can go around the platform and talk to whomever you want to talk. (PE)*
- *It was amazing to talk to someone virtually but it gives a real time talking. (PE)*

Engagement in their learning (Due to the immersive nature of learning in a virtual world, students often feel engaged in their learning).

- *I thought it was great way to bring everyone together in an efficient and engaging way. It almost felt like you were really there. (PE)*
- *[The] creation of an avatar to portray myself as a qualified [professional] was definitely an engaging method for developing interdisciplinary interactions and patient communications. (HM)*
- *It was very interactive and you got to talk to non-player characters and do problem solving. (PE)*
- *The best thing is the level of engagement with the arts community. (HM)*

Community of Practice (Students interacted with each other and from the wider virtual world audience)*).*

- *Brings community together in one place. We can see the many pieces of work.*
- *Aside from raising awareness of possibility and inspiring creativity to push their limits, probably the greatest merit of university challenges is that it has drawn people of a kind together in a friendly, diverse and vibrant environment from which has grown community. Community, yes, that's it! (HM)*
- *… offers a great experience through competition as well as the opportunity to experience all types of different artistic expression through the display of the artwork. It's also about community. Artists stagnate in a void and … challenges provide a way to connect and convene with artists from all over the world through our creative work.*

Linking with industry and the professional world (This comment demonstrates the diversity in which students used the virtual world for their learning).

- *Great way to catch up with other alumni and meet people as well as give back to university*

Flexibility of learning (A virtual world provides flexibility in many different aspects – time, space, place, accessibility, etc).

- *I would rate the ability to complete the activities at my own convenience very high. It means I can complete tasks in my own time and practice the role-play as much as I would like to (PE).*
- *The ability to work on tasks at one's own time is valuable. (PE)*

Safe learning environment (Due to the anonymity of a virtual world, students felt that they can 'be themselves' without threat of being ridiculed and were able to voice their opinions).

- *Use of an avatar gave me confidence to portray my knowledge and abilities without feeling insecure. (PE)*

Reflecting on their learning (A major benefit of a student's learning is reflection – through a virtual world).

- *The activities make me rely on words more than body language while interacting. (PE)*
- *The use of audio-visual helped with communicating on a more realistic level. (PE)*
- *I loved the continuity ... It seemed as though the program was advancing with me and my skills. It also just made the whole thing more fun. (PE + HM)*
- *I personally learnt a whole lot about myself and my capabilities through her creative and interactive lessons. I particularly enjoyed our virtual assessment where we researched a medical condition and discussed it with a virtual patient from America. It was really fun and an innovative way to assess students' capacity to communicate in a stress free environment. (PE + HM)*

Role-play (Role-plays provide authentic ways in which students can learn a concept).

- *I liked the way you can talk with someone that you don't know in person [in a role-play activity] but you can help the kind of sickness they had. I learnt how to deal with a patient and the different situation they have. (PE + HM)*
- *The best part was getting to chat to a person from around the world to experience the role playing activity. (PE + HM)*
- *I enjoyed the ability to impart my WISDOM (lol) and my research upon my patient. It made me feel useful. (HM)*

Gamification (Incorporating game like characteristics in the student's learning. An immersive way in which to engage students where, typically, the concept is difficult to get across).

- *I thoroughly enjoyed playing ... The game helped me a lot…What I liked most about the game was the way we not only learned how to write and punctuate sentences correctly, but we also learned several Maori legends…I was very disappointed when I had reached the end of the game. I really wanted to keep playing and learning more. (PE + HM)*
- *When … [academic] first spoke about the game at the very beginning at our first week of course I thought that this game was a waste of time. Little did I know that this game helped me out quite a bit… I love a good challenge and I am quite competitive… Another thing I liked about the game were the graphics, it made playing the game really fun. It wasn't boring. The game helped me with my grammar and where to put speech marks and other things like that. One other thing I enjoyed about this game was how it was based on Maori myth/legend stories. (PE + HM)*
- *I found the literacy game exciting. At first it seemed like a challenge that I wanted to participate in and I had a little rush of adrenalin especially with my classmates next to me. I was trying to stay ahead of everyone. I would often get frustrated when I got the answer wrong… The literacy game made me feel a bit more confident. I felt as though it was an easier way to understand grammar. The game challenged me in many ways. (PE)*

Understanding the learning value (Students got a sense of how useful a virtual world for their learning).

- *All in all, the Second Life exercise has been a valuable experience, via listening to ourselves [and] others conduct [a] history on the same patient has allowed [me] to identify key [mistakes] which I have made, and to see how others do the same thing and pick up on areas in which I can improve, and to give and get reflection on the task is invaluable. (PE)*
- *It made me think more about the patient's point of view, i.e. a good exercise in empathy. (PE)*
- *The learning activity of Second Life which included blog, reflecting, presentation and role play as a radiographer and as a patient enhanced my understanding about the topics as well as knowledge about the role of other disciplines.*

Students were also asked "What did you dislike about the lesson/their learning?" Some of the variety of responses are as follows:

- *I found a couple of places hard to find but most of the time that was because I didn't pay enough attention to a particular instruction or didn't notice a particular sign.*
- *Quite complicated steps, not clear enough.*
- *Everything. It makes my eyes hurt because we have to move around so much and it gives me a headache. (-EE + HM)*
- *Way too much lag! The program is frustrating slow and I am less inclined to complete the tasks properly because everything is so slow. Maybe the program is too busy or it's not a good program. (-EE + HM)*
- *Took too long.*
- *Having to make up the phrases to say.*
- *Maybe in some places too many new words.*
- *There were many characters we had not learnt which the waitress used to respond to us and thus it was difficult to breakdown her response.*
- *I find the … island a bit difficult to navigate... (-EE)*
- *…it has been quite stressful trying to get it all working. (-EE + HM)*
- *Technical aspects of virtual world: There were both pluses and minuses*
- *The drawback of virtual world i.e. lack of body language enabled student to focus on their verbal communication. (-EE + HM)*

Despite attempts, students were distracted when they encountered technical difficulties (Technical difficulties has often been a major area of frustration for students when learning through the use of a virtual world)

- *I was asking them for help rather than engaging in other more meaningful discussions about it. (-EE)*
- *Made learning frustrating. (HM)*

Discussion

Overall, the feedback from students (student voices) about their perceptions of their learning is very positive. Within the category of General Comments, students articulated a number of key elements that enhanced their learning experience such as having a sense of community, having a feeling empathy with the characters that they interacted with, and overall feeling safe within the learning environment. Indeed, for one student, there is even a sense of grievance at the loss of engagement with learning once the virtual world learning experience finished. Some of these elements also came up in a number of the other major themes, especially the sense of community and sharing of knowledge and experience. Among the other major themes, additional key elements voiced by students included proactive engagement with and the student focus of learning, problem solving, visualising the ideal self (in a specific context), flexibility and self-paced learning, enactment of knowledge, self-discovery, and the symbiosis of playing and learning. In some ways these are fundamental elements in all types of learning, so it is not surprising that in designing the virtual environments and the tasks described here, the responsible educators drew on their existing rich experience of teaching in other, more traditional, environments. Much of the positive feedback revolved around pedagogical and task design, in some ways separate from but also facilitated by the technology being used. Many of the student voices reflecting positive experiences also reflect a positive experience of the technology (in combination with the pedagogy and content), particularly in relation to performance expectancy and hedonic motivation. The themes and key elements that have emerged from the collective student voice reflected in our data both highlight existing strengths and weaknesses and point the way for the strengthening of existing pedagogical designs. In terms of the technology, the prominence of performance expectancy and hedonic motivation in student comments also point the way for future optimisation, design and the importance of ensuring that students perceive that the technology will benefit them and that it actually does (by facilitating and enhancing the delivery of the pedagogical content).

As with all learning designs, there are always factors that detract from the learning experience, some of which are within the control of the implementing educator and thus can be ameliorated and improved, some of which lie under the control of students. Students voiced these factors in the data, with negative comments usually revolving around technical difficulties (mainly as a result of negative effort expectancy and thus negative hedonic motivation). In voicing these difficulties, students are pointing the way for future improvement. Many of the virtual world learning scenarios described in this paper involve an ongoing process of iteration, with each new iteration addressing issues raised by students and observed by the implementing educators. Such improvements occur both at the lesson and virtual environment design level, for example making lessons and tasks less technically demanding, and on the platform level, with many of the platforms used to support the virtual world learning environments described here being continuously upgraded by their proprietors. At the same time, there were other frustrations that could be attributed to the students themselves, for example not paying as much attention to instructions as they should have. Some students voiced the fact that they felt the virtual world was either complicated to learn, possibly pointing to a limited knowledge of, or familiarity with, computer/internet/gaming), or frustrating (for those who possibly came from a gaming background and therefore were used to high-end graphics and speed – possibly a combination of unrealised performance expectancy and effort expectancy, thus creating negative hedonic motivation).

Overall, students outlined a variety of ways in which the virtual world did provide a unique and positive learning environment for them. While the student voices here are a small representative sample and cannot purport to represent the experience of all students engaged in learning in virtual worlds, as noted, these students were from a variety of contexts, studying both undergraduate and postgraduate studies and were using the virtual world for a vast array of contexts. It can be concluded from the student voices outlined here that a virtual world is indeed an authentic and enjoyable place in which to learn.

Conclusions

Members of the VWWG have demonstrated how virtual worlds continue to evolve into innovative and creative learning experiences to enhance student engagement. Centered on communication and connecting students and staff across any distance, students have enjoyed the benefits of role play, building relationships with other students, staff and industry, and reflecting on their learning in a safe and flexible game-like environment. While technical problems and logistics can hamper the effectiveness of their experiences, these need to be considered in light of the level of student digital literacy. In general, this paper has shown that the student voice regarding virtual worlds is both positive and rewarding, and commending staff who have dedicated their time and effort to transform the learning experience.

Age, gender and experience may alter the student voice regarding virtual worlds in education. Reliable predictions may be made for a heterogeneous cohort of students. This does apply though if the students form a diverse cohort. Thus, in most educational circumstances, the notion of novelty and other hedonic modifiers should be specifically considered and used for planning. Student voice regarding 'possible selves' can be encouraged and reflected back to them to enhance regulatory fit and student engagement.

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