Student Challenges in a Virtual Collaborative Learning Course Spanning Multiple Countries

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Abstract

Web 2.0 technologies have been instrumental in the development of a new collaborative learning space called Virtual Learning Environments. There are a variety of challenges in virtual learning environments, including team issues, technological problems and pedagogical practices. However these challenges can be broadly grouped into student challenges and lecturer challenges. Virtual Worlds such as Second Life (SL) and Social Learning Networks have provided many opportunities for lecturers to explore these challenges and ways of overcoming them. This study focuses on student challenges in these environments.

In terms of the findings of this study, student responses were generally positive, with 77% of students finding international collaboration on their project beneficial. In addition, they report spending more time on the course and exerting more mental effort. They are satisfied with the organization and scaffolding of their learning but are still overwhelmingly dependent on campus computing resources, which is a limitation. The limitation points to the potential value of a beta-mindset approach supported by scaffolded learning. This research reports on the experiences and lessons learned during a virtual collaborative learning experience in an Honours module involving fourth year Information Systems and Technology students at both the University of KwaZulu-Natal in South Africa, and Applied

Computer Science fourth year students from Daystar University in Kenya. The research was conducted in March and April 2010. This paper explores the academic, operational and technological challenges, from a student perspective.

Keywords: Collaborative learning, virtual learning environments, virtual worlds, multiple-country, Gen Y, beta-mindset, scaffolded learning, Second Life

Introduction

A virtual learning environment is a system where educational interactions are managed in an online environment (Dillenbourg 2000). Technology has the capability of bringing together individuals who are geographically dispersed in both educational and organisational contexts (Dickenson, Pedler & Burgoyne 2009). Students in a virtual team can be geographically spread, work in different time zones, and may possibly never meet face-to-face. Virtual teams depend on asynchronous collaboration tools such as fora and email as well as synchronous collaboration tools which include video-conferencing, chat and other interactive technologies tools to support interaction between team members (Lam *et al*. 2005).

In addition to allowing for collaborative learning engagements, virtual learning environments provide an ideal platform to implement alternative educational pedagogies. Educationalists have over the years postulated a range of educational pedagogies. The two points of reference against which a variety of other theories can be positioned are Instructivism and Constructivism . Instructivism, the classical approach used in the classroom, is based on an objectivist theory of knowledge (Reeves 2008). In this mode of teaching the instructor provides some form of formal instruction to a class while the learners remain largely passive (Gulati 2004). The other end of the scale is characterized by the constructivist paradigm: students are placed at the centre of the learning activity, where they construct the knowledge themselves (Gulati 2004). Constructivism is based on the premise that we all construct our own perspective of the world, through individual experiences and schema. Constructivism involves the use of more active forms of classroom interaction that engage the student in the process of learning (Gulati 2004). Further studies highlight the role of social

constructivism. Brown and Adler (2008) found that one of the strongest indicators of students' success in higher education is their ability to form, or participate in, small study groups and hence socially construct their knowledge. Traditional learning environments are, however, often not suited to implementing social constructivist approaches (Quilling & Blewett 2009). Virtual learning environments, and in particular 3D virtual worlds, seem to provide an ideal constructivist platform. This is possible because such environments impose few limits on students' possible learning experiences.

In addition to removing the limitations of physical time and space, virtual learning environments can be transformative learning spaces as they allow students to set aside those elements of their culture and context, which they may find constraining. This can include physical characteristics such as race and gender as well as cultural norms of behaviour, such as exhibiting deference to those in positions of authority and only speaking when formally addressed. Lecturers find it challenging to provide this opportunity to students, as it requires a space that provides a highly immersed experience, not just a virtual- or blended- learning experience. The opportunity to work in an immersive medium as well as working with lecturers and students from another university allows for even greater anonymity as well as greater student- context- and content diversity.

These perceived potential benefits have resulted in a project called NextEd, which has been running at the University of KwaZulu-Natal over the past 3 years. With the support of funding from the Association of African Universities (AAU), the project sought to investigate how Web 2.0 social computing communities could be used to support learning in Africa. A number of virtual courses were run involving staff and Honours (fourth year) students from the School of Information Systems and Technology at the University of KwaZulu-Natal, Westville, South Africa, and Applied Computer Science Honours students from Daystar University, Nairobi, Kenya. During the four phases of the project (each phase lasting one semester), the project attempted to develop both a model and supporting principles for effective engagement. The project resulted in policy briefs relating to the institution, the lecturers, and the students. This paper focuses on issues relating to the students, in terms of academic, operational and technological challenges.

Literature

The implementation of social constructivist pedagogies through technologically mediated platforms is still in its infancy. The lack of understanding and application of this pedagogy is intensified by a lack of experience and training in using new technologies to support new approaches (Dickenson, Pedler & Burgoyne 2009). Educational research suggests social constructivist approaches as a way to 'reach' students. Historically though, this has been difficult to implement. However, the current confluence of the way we approach learning (social constructivism), available platforms (Web 2.0), and the generational profile of students (Gen Y) provides an opportunity to align appropriate teaching paradigms and the vehicle for educational delivery in a way that would appear to suit learners (Quilling & Blewett 2009).

The challenges of working in virtual environments (VE) can be divided into those experienced by the lecturers and those experienced by the students. However, many of the challenges are experienced by both lecturers and students, the perspectives and approaches to these challenges can be vastly different. The key challenges experienced by students can be loosely grouped into those relating to academic, operational and technology issues (Blewett & Quilling 2010). These challenges are introduced in the following section.

1. Student Academic Constraints

Academic challenges relate to those issues that impact on the students learning experience, such as adjustment to the adopted pedagogy, learning to cope in an academic virtual environment, and the challenges of working in virtual teams.

1.1 Learning Curve

The first academic challenge is that there is a steep learning curve for most of the participants. While students are often familiar with Web 2.0 technologies, the environments and implementation of these environments to teaching are new to most students. It is important for the students to be made to feel as comfortable as early as possible in the virtual environment. This

allows them to be more focused on the learning objectives and experience, rather than focusing on the platform on which they are engaging. This requires time to be spent in 'orientation' sessions with the students, before the formal course content begins. This approach is supported by Zhang (2009) who reports a steep learning curve in Second Life. Adequate time for orientation sessions may not always be available, as the timing of content needs to meet the time tables of all the institutions involved Additionally, students may not have the notional study hours available to allow them extended periods of orientation for foundational elements that are not related directly to the course content (Blewett & Quilling 2010).

1.2 Team Issues

Central to the student experience is their involvement in team-based work in the virtual environment. For the majority of students, experiencing cross-cultural virtual groups and the associated dynamics presents a challenge of its own. As the group size starts to increase (beyond five members) so too do issues with individuals not performing as they should. While this may also be true in real world groups, the frustration experienced by group members who cannot contact non-performing members creates additional tension in the group (Blewett & Quilling 2010).

According to Rayner (1997) there are three key challenges in virtual teams: incomplete communication, limited ability to build relationships and the complexity associated with distant interactions. The first challenge is that there is incomplete communication. While all teams (both real world and virtual) suffer from communication challenges, the problem is often worse in virtual teams. This is because in virtual teams most of the communication is non-verbal and mediated through digital channels, leading to an increased likelihood of misinterpretation.

Secondly, there is limited ability to build relationships. A major factor that divides members of a virtual team from traditional team members is that with the former it is harder to get to know other members on a personal basis. Virtual teams lack the informal communication that exists among traditional team members. Among traditional teams significant statistical relationships have been shown to exist between measures of academic performance and factors relating to friendship and advice (Yang & Tang 2003).

The third challenge faced by international virtual teams is the added complexity of distant interactions. For instance, with a traditional team, setting up a meeting is reasonably easy, as the members tend to be within reasonably close physical proximity. With a virtual team, setting up the same meeting could be a great deal more difficult owing to time zone differences and other localized demands and challenges.

2. Operational Constraints

In addition to the academic challenges experienced there are operational constraints, which relate to the timing of collaboration based in different institutions, countries or time zones even. Project management of the course itself and the interactions with, and among students may also prove challenging (Shea *et al*. 2010).

2.1 Time Investment

One of the key operational challenges is the time investment required by all parties involved in this type of collaboration. This is linked to the academic constraints outlined above. In order to become comfortable with this new form of collaboration, any collaborator (both lecturer and student) will of necessity have to invest time in addition to their normal workload, or notional study hours. The time constraints are often exacerbated by differing semester calendars and requisite commitments of the students from the participating institutions. Another aspect that creates complexities is when the participating institutions are located in vastly different time zones. This not only creates team issues but can make the management of team work and submissions more complex for students (Blewett & Quilling 2010).

2.2 Number of Students

Another challenge faced in virtual environments is the number of students that need to be dealt with simultaneously. Due to the relative ease with which collaborations between multiple institutions can be established, the collaborative virtual course could easily involve 40 or more students. The size alone creates issues of management, in addition to the technological issues discussed later. This is equally challenging for lecturer and student alike.

3. Student Technology Challenges

While academic and operational challenges faced by students tend to complicate the virtual engagement, technological challenges can, if not addressed, completely stall or stop the virtual course.

The basic underlying premise of the NextEd project is that leading edge technologies centered on Web 2.0 will form the basis of education in future. Besides, such technologies are also key to helping address the digital divide. However, while these cutting edge technologies offer many exciting solutions to problems, they also bring numerous challenges.

Research conducted by Yiong (2008) found that e-learning acceptance by students was higher when the virtual environment experienced minimal technical issues. As such, attempting to launch a course in a stable virtual environment is deemed highly desirable for the perceived success of the course. However, this flies in the face of one of the underlying tenets of Web 2.0: its beta nature (O'Reilly 2007). Web 2.0 technologies are in a constant beta state as they are continuously being developed, evolving to meet new user demands. This means that users need to have the ability to adjust to unstable, changing environments and approaches (Rollett *et al.* 2007).

While stable platforms may appear to be desirable for perceived student acceptance, nevertheless it is assumed within a Web 2.0 environment that there is a high likelihood of technological challenges being experienced. Therefore, rather than building rigidly structured courses on stable and well-established platforms, fluid and adaptive courses need to be developed on shifting and advancing technological platforms. Tools are employed to support collaboration based on both current and prior experience. If the tools are found to be flawed, they should be replaced. Each engagement is seen as an opportunity to build on prior interactions, and where critical challenges arise, alternative routes and mechanisms are explored in subsequent iterations. Thus, each engagement with a specific technology is not cast in stone. Rather, the decisions about which technology to employ, and potentially changing the technology employed during the running of a course, are embraced as part of the model of engagement.

NextEd collaborations occur between parties who have self-identified their technological readiness and the potential platforms which they feel they are able to sustain on the behalf of students and lecturers alike,

for the duration of the shared project. However, despite such collaboration, technological challenges are still anticipated and experienced.

Previous NextEd projects (Blewett & Quilling 2010) have recorded student complaints regarding lack of Internet connectivity and technology barriers. This included projects in 2008 and 2009, as well as for students in African and American contexts. These responses appear likely to recur, as the nature of this type of course is highly reliant on the web2.0 technology being implemented, and students' ability to accept the less stable nature of such platforms. From an academic perspective, however, it is hoped that students' benefits from such contexts are greater than the challenges experienced. If this proves not to be the case then perhaps this approach could be seen to be academically flawed.

Research Questions

Based on the outcomes of prior studies, both within the NextEd project collaboration and within the literature, the research questions posed in this paper are:

- What challenges do students experience in a collaborative, multi-country virtual learning environment?
- How do students perceive the impact of a collaborative, multi-country virtual learning environment on their learning experience?

These issues are explored specifically in terms of potential academic, operational and technological challenges.

Research Methodology

The paper deals with the 2010 collaboration between IS&T Honours students on the Computer Mediated Communication (CMC) module at the University of KwaZulu-Natal (UKZN), South Africa, and the Applied Computer Science Honours students on a Human-Computer Interaction (HCI) module at the University of Daystar, Nairobi, Kenya. The collaboration centered on a single topic within the modules and related to working within Second Life. The objective was for students to develop and explore the relevance of

various HCI-related issues in education, business and entertainment within Second Life. The collaboration covered a four-week period, running from 18 March 2010 to 19 April 2010.

Overall 44 students were involved in the collaboration. Of these, 28 were based at UKZN and divided between the two campuses on which the module is offered: 18 on Westville campus and 10 on Pietermaritzburg campus. The remaining 16 were from Daystar, Kenya. Due to practical constraints within the Second Life environment, many teams could not be supported on the NextEd Island. As a large number of students needed to be accommodated, they were placed in teams of six or seven members. Team members from three different sites were split roughly as follows in an attempt to create teams with roughly similar geographic memberships: two students from Westville (UKZN), 1 from Pietermaritzburg (UKZN) and three from DayStar.

Two virtual platforms were used for the course. The first was Second Life and the second a Social Learning Network (NextEd Ubun2.0) implemented through Ning (http://www.ning.com). Second Life was used as a 3D virtual space for students to engage in real-time collaboration while experiencing issues relating to communication and development in a virtual world. NextEd Ubun2.0 was a social learning network that was set up for the students to establish a virtual presence on their own page, besides sharing their learning through such means as blogs and discussion fora.

The teams were each tasked with focusing on theoretically and practically exploring the process of developing in a 3D environment (Second Life). This included reflecting on their individual experience in relation to the theoretical positions presented in the literature they initially explored. Student teams were required to build communes in Second Life. Team members developed individual spaces but were also required to collaborate sufficiently to allow an integrated space to develop, with the hope that it would meet all the needs suggested. To this end blogs on individual progress reports were posted in NextEd Ubun2.0, together with course-related discussions with lecturers and tutors.

Contrary to a conventional development project, students were not required to formally elicit requirements from a client. Instead, in order to allow them a measure of flexibility, they were allowed to determine the functional requirements they felt would be important, with input from the

class and lecturers. The construction of communes allowed students to actively experience the virtual environment in accordance with constructionism pedagogies (Resnick 1996). This experience was then described in individual reports, with reference to the blog posts they had published. Assessment included the two reports and the marking of the communes in the virtual world. These assessments included individual, group and participation elements.

As part of the review of the collaboration a survey was run from the May 3 2010 to the June 4 2010. Of the 44 course participants, 31 students responded to the online survey. The questionnaire that was used included questions relating to student motivation adapted from the IMMS survey (Keller 1983) as well as questions relating to technology acceptance. However, only those questions that provide insight into the challenges experienced by students are considered for discussion here.

Results and Discussion

This discussion will provide some demographic introduction to the student group. The discussion will also focus on challenges faced by students in the context of the issues highlighted in the literature review, namely, academic, operational and technological challenges.

Fifty eight percent of respondents were younger than 23 years, while all students were under 27 years. This identifies all students as being Generation Y or Net generation students, as they were born from 1982 onwards (Oblinger 2003). In addition, 71% of the sample was male while 29% was female. This was by no means unexpected, and indicates that IST is a largely male-dominated discipline. By way of an example that supports this problem with diversity, in 2005 only 22% of US undergraduate computer science degrees were earned by women (Klawe *et al*. 2009).

1. Student Academic Challenges

As mentioned earlier, academic issues are where most of the challenges are faced by students engaging in this new learning environment. Next we discuss our findings relating to academic issues experienced by students, viz. Learning Curve, and Virtual Collaboration/ Team Issues.

1.1 Learning Curve

Yiong (2008) found that stable environments where students are comfortable improves student acceptance of the course. However, as was argued earlier, the beta nature of Web 2.0 environments requires students to learn to adapt to new environments. Figure 1 indicates that students seemed to easily adapt to the online environments, despite this being their first experience with such a learning environment. At least 87% of students agreed or strongly agreed that it is easy for them to remember how to perform tasks in the social learning network (NextEd Ubun2.0) used during the collaboration.

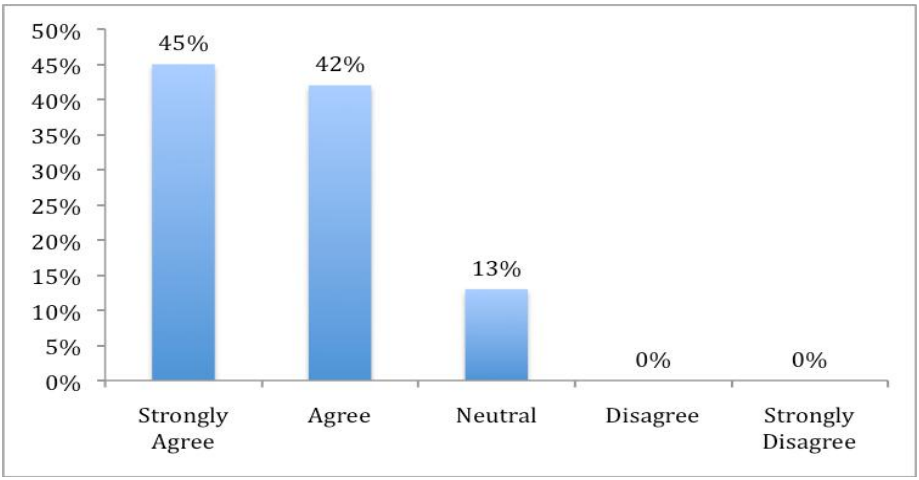

Figure 1: It is easy to remember how to perform tasks in the social learning network

Generation Y students are typically characterized by their ability to adapt to changing situations and to learn by discovery (Oblinger 2003). As such it is not surprising that students were easily able to learn how to perform tasks in the new environment. Additionally the Social Learning Network has many similarities to social networks such as Facebook. As was expected, this too contributed to the students 'comfort' with the learning environment. In addition, one could reasonably assume these students are studying in a computing discipline and are more familiar with and can adapt

more easily to various computing contexts. However, the fact that they are quite young and studying in a computing discipline would not automatically ensure that they would find this 'easy' as they are still out of their learning comfort zone. This extremely positive result is thus of interest and can serve as a comparative basis for lecturers in other disciplines engaging in similar activities.

1.2 Virtual Collaboration

A key perceived benefit from the lecturer's perspective is the richness and experiences gained from international collaborations. However, what is unknown is how students perceive virtual collaborations involving students from different countries.

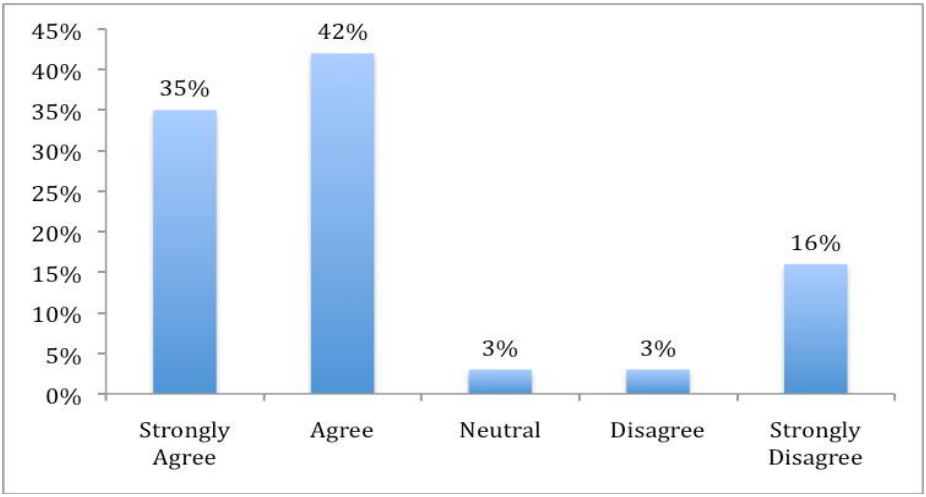

Figure 2: It was beneficial having international collaboration

Figure 2 above indicates that most students (77%) agreed that having international collaboration was beneficial in that working with team members from another country enriched their learning experience.

A study by Wallin, Hildebrandt and Malik (2008) also reports that international collaboration is enriching for the students involved. A small percentage (19%) of our research cohort appeared not to see this instance of

international collaboration as beneficial. Such a perspective, however, may be symptomatic of issues relating to teams and operational challenges, discussed below. This may also be a reflection of personal learning styles and students' preferences for specific pedagogical approaches. Interestingly, the responses are somewhat bimodal in distribution, reflecting that students will either enjoy or not enjoy international collaboration. This points to the likelihood that the responses are impacted by students comfortable with team learning.

When students were asked whether the international collaboration enriched their learning experience (Figure 3), 61% agreed or strongly agreed. Once more, this demonstrates that from the student perspective, even though team and other challenges are intensified in virtual environments, the perceived benefits are also greater.

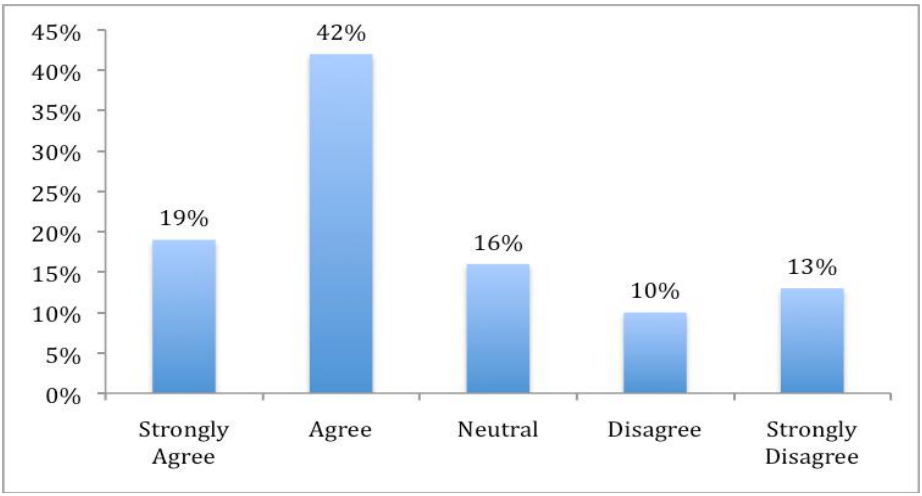

Figure 3: Working with team members from another country enriched my learning experience

When the students were required to make a judgment on the impact of collaboration on their learning it is apparent that there is a better spread of responses in Figure 3 than in Figure 2. Other factors may account for this, such as how much effort team members put into the work, or perceptions regarding the value of team members. These additional factors, not

surprisingly, have prompted some students to be more cautious in their assessment of collaboration.

As has been mentioned, it is likely that underlying personal preferences about group work are being reflected in these results. Students were questioned about this issue in an attempt to assess their underlying preferences about group work. Students were asked to respond to the following statement: 'I feel there should be more individual work and less group work.' The results were not conclusive about whether students preferred group work or working individually: about 48% preferred individual work, 16% were neutral and 35% supported group work (Figure 4). Numerous factors could influence student opinion in this regard and it is possible the mechanism used to select groups played a significant role. In this case, students were grouped according to how much they participated in weekly activities. Students who participated a great deal were grouped together with equally active students, and those that did not participate were

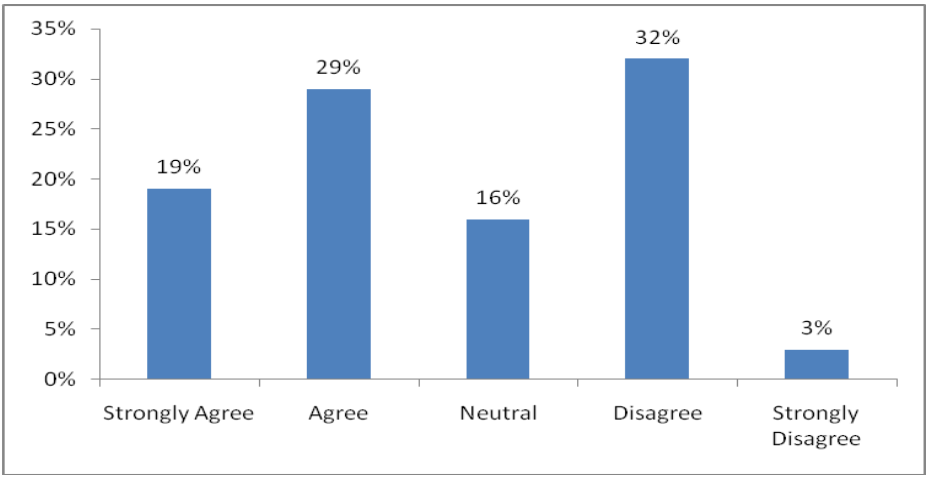

Figure 4: I feel there should be more individual work and less group work

grouped together with inactive students. While activity may be an indicator of a student's level of engagement with the course, it cannot be seen as an indicator of content skills or team skills.

Some students did experience challenges working in virtual teams, as highlighted by some of the comments made (as shown below)[1]:

> I would suggest that any group should not exceed three guys. Another issue was working with people you could not see. I would always try to imagine the character of each of my group members and especially ones from UKZN. Communicating always using texts to me was even worse. In normal circumstances i prefer talking over the phone than using texts. I tried to cope because this came as the only cost effective way to communicate. In addition, communicating and at the same time you are building something is multitasking. OOh my gosh i'm poor in this. However i will continue in this and see how it works for me.

> The collaboration aspect to it went very well but was challenging because text is not the easiest thing to use when trying to give instructions. It was very interesting to see that people could collaborate and understand each other without having to see each other face to fce (sic.).

Overall, while there was a spread of opinions regarding the impact of collaboration on student learning, it did appear that students are keen to engage via online environments and explore potential collaborations. While cognisance must be taken of the learning styles, providing students with opportunities to engage in collaboration brings multiple other benefits such as those related to internationalisation (Quilling & Blewett 2010).

2. Operational Challenges

As mentioned earlier, operational challenges include the time requirements of the module, which are closely linked to academic challenges. Another key challenge was the perceived organization of the module, from the students' perspective.

[1] All student comments are extracted, unedited, from source transcripts.

2.1 Time

While virtual courses provide many benefits and can engage students at a deeper level, there is no doubt they typically involve a greater time commitment from both lecturers and students. However, what is interesting, as depicted in Figure 5 below, is that 68% of students agreed or strongly agreed that they voluntarily spent more time on this course than they would have if it were a face-to-face course.

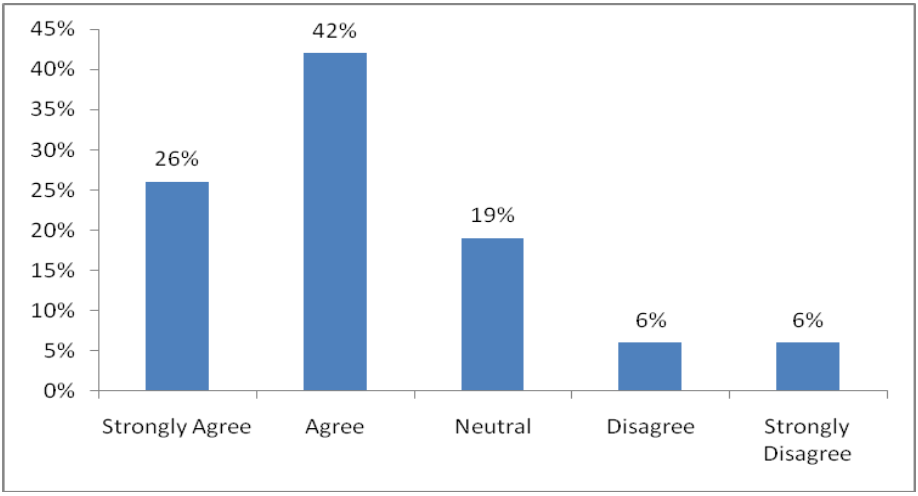

Figure 5: I voluntarily spent more time on this course than I would if it had been face-to-face

One clue to the reason students willingly spent more time in the online environment may have to do with their interest in it. Figure 6 shows that 67% of students agree or strongly agree that the online course stimulated their interest in learning. Oblinger (2003) suggests that Gen Y are very directed towards visual and kinesthetic learning and that they crave interactivity. This may explain why lecturers are seeing their willingness to spend more time on things which they perceive to be actively engaging.

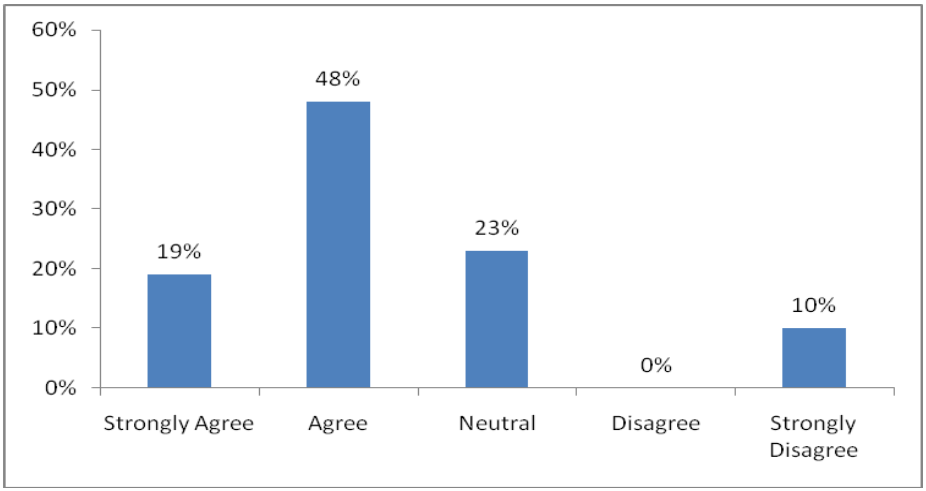

Figure 6: Active participation during online activities stimulated my learning interest

Consistently, however, there are some who disagree that this social constructivist approach is educationally beneficial; in this case it is 10%. This may relate to individual's learning preferences, or educational approaches that they feel most comfortable with, or which they find more familiar.

2.2 Perceived Organisation

Coupled with the beta nature of Web 2.0 technology, the more inductive nature of constuctivist (and constructionist) pedagogies and the new nature of the entire learning experience, it is not surprising that students may expect (and fear) that the module may be badly organized. Figure 7, while showing that 68% of students found the course well organized, indicates that there are some 33% who are either neutral or disagree.

As mentioned earlier, the unstable, changing nature of Web 2.0 platforms requires a course design that is fluid and constantly evolving. However, as Weller (2006:104) states, 'The notion of 'perpetual beta' does not sit very well with some of the support and quality requirements of Higher Education'.

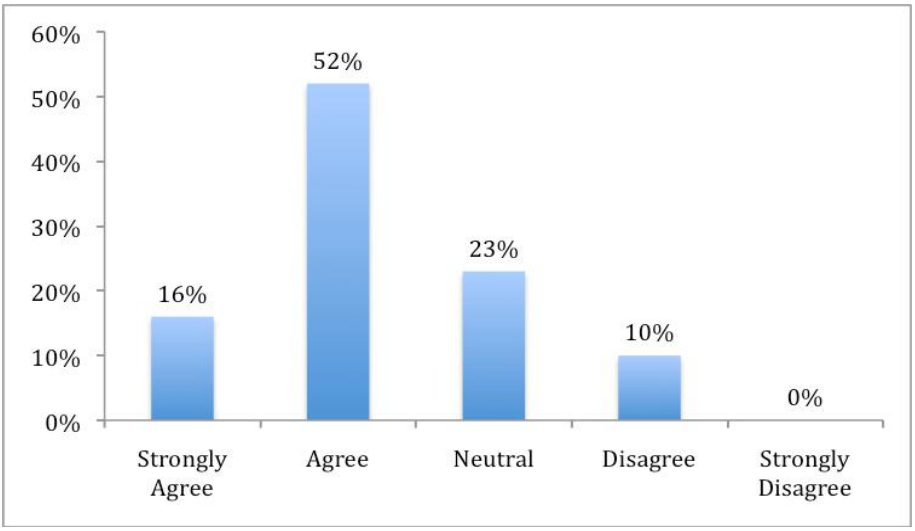

Figure 7: The module is well organized

Key to ensuring that the students perceive the course as being well organized is the principle of making contingency plans early on. Additionally students need to be warned up front about the need for both them and the course to adapt to changing situations. Adequate preparation and communication with students can result in improved perceptions of the course. This may be particularly true when one considers that one of the characteristics of these Gen Y students is the fact that they are seen to be achievement focused and prefer structure to ambiguity (Oblinger 2003). This may appear to be in conflict with the fact that they enjoy active exploration and are experiential by nature. These results also provide some insights into the issues that lecturers should consider when planning.

While the challenges related to maintaining a well-organised course increase in a virtual environment, so too does the potential for the development of problem-solving skills by the students. At least 61% of students agreed or strongly agreed that they had developed problem-solving skills during the course, as depicted in Figure 8 below.

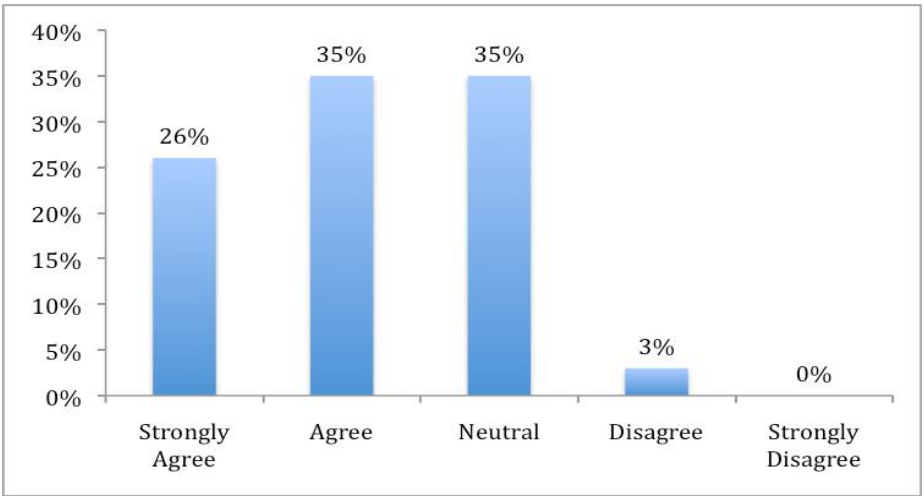

Figure 8: I learnt problem solving skills

While technology can pose a challenge, most students, typical of GenY, rose above the challenges by seeking ways to resolve the issues.

Students did experience challenges in Second Life, including an incident where a hacker came onto the NextEd Island. Included below are four illustrative students' comments:

> O yah or house disappeared twice..... AAAAARRRRRGHHH !!!!!!!!!!! Whenever I set out on a shopping trip I could not seem to get back Nexted Island.

> We sorted out majority of the communal areas as a group , things were going well until the house objects automatically moved around ,some were in the air , some disappeared ….. kinda annoying espically when you put a lot of effort into that object…and to add to this the electricity went of on campus…

> So, we got into it...<student name> (aka <avatar name>) found the perfect house and we found a way to duplicate that house such that we could expand it sideways and upwards. Awesome right?! ;) So we

started with that, and everyone started pimping out the place when, all of a sudden, the mountain engulfs our commune!!! Disaster!

However there was one problem, our house was inside a mountain. Confusing I know. But then the mountain disappeared and our house was now flying.....ya I know, don't ask.....So we have decided to build our floating house further and once the island becomes more stable we will land the beast. But for the time being we are going ahead with construction. Please feel free to visit our construction site and see it for yourself.

The last comment highlights the fact that students find innovative ways of resolving the issues associated with technology. In addition, this solution also exploits the very nature of the virtual learning environment (floating/flying objects); an option not available in a conventional learning situation. This scenario also demonstrates the extent to which students have immersed themselves in the environment as a programming/development environment: this is an aspect that relates to the disciplinary content of the module in which the study is situated.

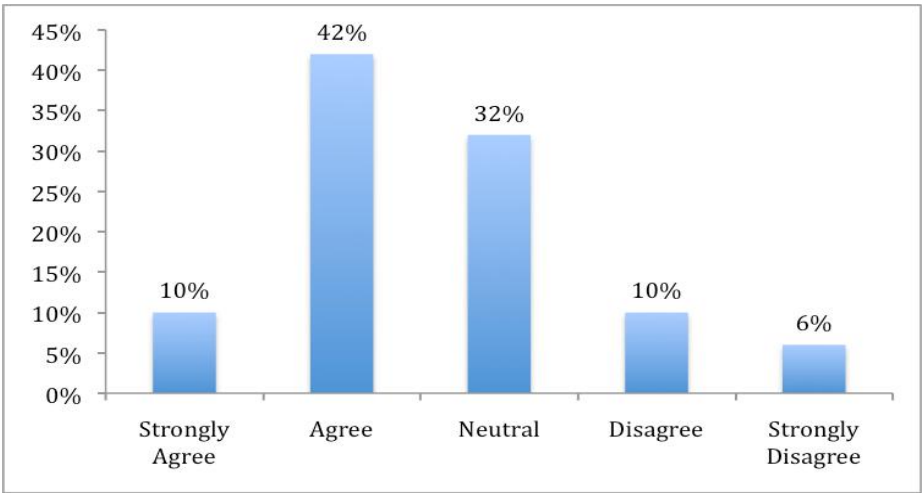

Figure 9: I exert more mental effort when learning in the online environment

Equally positive was the fact that students reported 'exerting more mental effort' in online environments as compared to traditional environments. So while the challenges presented by virtual courses result in students having to solve more problems, they see this as beneficial and acknowledge that it results in a concomitant increase in mental application. Figure 9 below indicates that 52% of students felt that they expended more mental effort in this environment. Only 16% suggest that they did not expend more mental effort.

However, enabling students to solve problems in a viscous beta environment requires careful support for the overall approach to the learning engagement. A more formally scaffolded learning approach (Rose *et al.* 2003), providing opportunities for students to progressively build on their achievements while participating in authentic tasks (Reeves 2008), was adopted in 2010. This seems to have resulted in students feeling more confident about their learning experience as is depicted below (Figure 10).

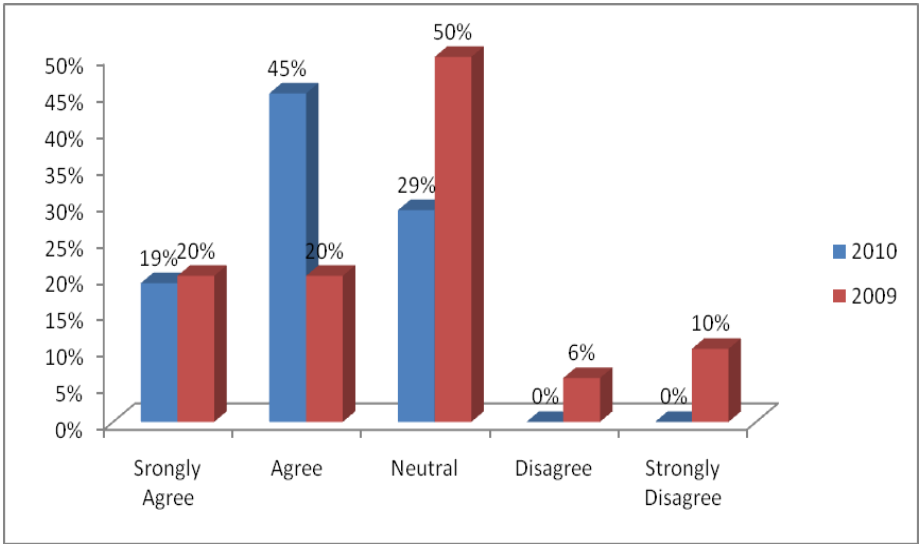

Figure 10: I was given sufficient guidance throughout the module (Results for 2009 & 2010)

The majority (64%) were positive about their support and guidance through the course. This is an improvement over the 2009 course where only 40% were positive about the support provided.

The 2009 iteration of the course did provide support and guidance but had a less scaffolded approach than implemented in 2010. In 2009 students were left to work their way through both technological issues and develop the requisite support skills in the environment via more personal exploration. While it may seem desirable for students to learn to solve problems, care needs to be taken to provide adequate support structures and to scaffold learning. Such provisions ensure that environmental issues like technology or pedagogy don't detract from the actual content knowledge that needs to be acquired.

Drawing on the Cognitive Load Theory (Artino 2008), there are 3 types of cognitive load, *viz.* intrinsic cognitive load, extraneous cognitive load, and germane cognitive load. Intrinsic cognitive load refers to complexity of the material being learned. Extraneous cognitive load refers to impact of instructional techniques or spaces. Germane cognitive load refers to the use of abstractions and elaborations to contribute to learning. One of the key issues with the use of a virtual environment is the impact on the extraneous cognitive load. The Second Life environment, while immersive and engaging, required students to develop skills in navigation, building and communication. This increased, at least initially, the extraneous cognitive load. Hence, during the second iteration of the module in 2010, a scaffolded approach was adopted. This approach enabled students to become familiar with the environment first before engaging them with the actual learning material. The increase in guidance reflects a decrease in the extraneous cognitive load experienced by the students. Issues relating to the overall project management from the lecturers' perspectives may well have impacted at this level also, and will be explored in a future paper.

From an operational perspective students are thus reporting that they voluntarily spend more time on the module and find the active participation useful. They are mostly happy with the structure of the module and the guidance they receive to navigate through it. In addition they self-report improved problem solving skills and that they have exerted 'more mental effort' during the module.

Operational challenges are not unique to technology environments, but are often exacerbated by the introduction of technology to the learning experience. However, despite the challenges, it is encouraging to see that students are prepared to invest more time and are developing their problem solving skills within these environments. By correctly scaffolding the learning process to minimise the impact of the environment on the extraneous cognitive load, it is possible to increase the germane cognitive load and so improve the students' capacity for learning.

3. Technology Challenges

The final area of student challenges relates to technological issues. The potential for technological challenges are great in beta-workspaces and thus we encourage students to see them as part of their education experience. This is an academically sound position in our case, as technology is not only the vehicle for delivery for students, but is also their area of specialization. As a result, students learn much in terms of project management of IT resources, and contingency planning, among other aspects, in addition to the core content of the module. Even in non-technology disciplines, encouraging students to see the technology challenges as part of their learning experience could be supported by using the challenges to help students learn problem solving, project management and other related skills.

Nonetheless, it is important to realize that technology challenges can present a major impediment to students success in courses such as this. Of importance to the planning of the module is the fact that the vast majority of students are still heavily reliant on campus–based resources (see Figure 11).

As a result, student computer facilities become central to students success and so their complaints tend to be related to their feelings of being at the mercy of the campus facilities managements. These challenges need to be addressed at the institutional level as there should be no reason why these facilities should not be more readily accessible to students on a permanent basis.

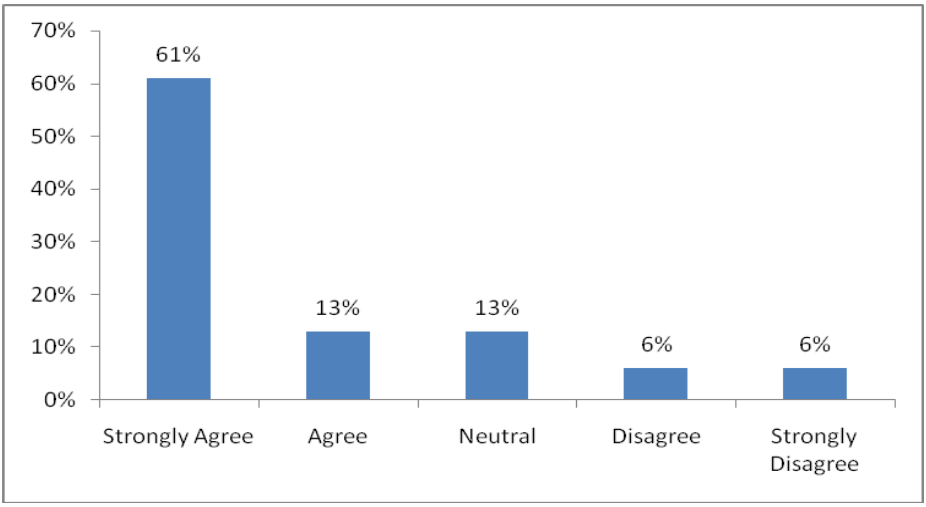

Figure 11: I mainly used on-campus facilities for this course

The following comments by students clearly illustrate their frustration:

> The apple Lan should be available 24 hours because online means to be able to access anything without the limitation of place and time.'
>
> The Lan access was a problem, we couldn't get to be on the world whenever we want, it was not 24/7 but it was just 8 hours a day.
>
> The building experience on Second Life was a mixed experience. Sometimes exciting, sometimes annoying but mostly very frustrating on PMB campus because of the lag and slow PC's.

Conclusion

This research project set out to determine what challenges students in multi-country virtual collaborative learning environments experience. It focused on a month-long collaboration between a South African and a Kenyan Honours

class addressing human computer interaction issues as they occur in 3D virtual worlds, from both the developers' and users' perspectives.

Students felt positive about working in a virtual environment. From an academic perspective, students also felt able to adapt to the virtual platforms and felt enriched by participating in international collaborations and saw them as a valuable part of their learning. From an operational perspective, students spent more time on the module, commenting positively about the structure and scaffolding of the module content. They also suggest that their problem-solving skills have been enhanced and that they have exerted more mental effort during the module. From a technological perspective they are reliant on campus resources and have expressed the need for greater access.

The students' comments would seem to be consistent with what could be expected of a group of GenY students participating in a postgraduate computing–related module. Clearly though, they are providing signals about their reactions to a module which in many ways typifies the beta-mindset of the web 2.0 environment. In addition, it is clear that students reacted more positively with a more scaffolded approach.

In a course of this nature the platforms, content and operational conditions are likely to be fundamentally unstable and subject to change. While the students show signs of being able to adapt to these shortcomings, and to some extent even appear to embrace them and be able to identify the value they have gained, this pilot study does not show a sufficiently detailed picture for the results to be considered conclusive.

While this paper has focused on the student challenges, it is also useful to reflect on the process from a lecturer perspective. A 'debriefing' meeting, specifically to reflect on the virtual collaborative learning course, took place between the lecturers from both institutions on 13 April 2011.

While overall the sentiment was one of optimism, there were certain key areas where concerns were expressed. The first had to do with the enthusiasm of staff to engage in this type of collaboration. Numerous attempts were made by both parties to involve other collaborators in the project, but these were largely unsuccessful. It was felt that high workloads, no obvious reward, and demanding research requirements, contributed negatively to finding potential collaborators. This means that the future success of these projects may well be student-driven rather than lecturer-led.

The results and comments from students in this study are encouraging, however, some form of College commitment will be vital if future collaborations are to be effective.

The second concern was the readiness of the institution to meet the technology requirements of the platforms. This was particularly true for Second Life, which revises the minimum technical specifications regularly in order to provide increasingly richer user experiences. Even if the institution has the correct platforms one year, it is vital to check platforms, ISP bandwidth specifications, and other requirements each time a course is launched.

The final area of concern is student preparation for the environment. While we have already mentioned issues relating to scaffolding when using the environment, it is equally important to ensure that students have the appropriate prerequisite knowledge. Some of the students were not technologically ready, so despite the scaffolding provided in the environment they were still finding it difficult to use Second Life.

In conclusion, it could be observed that the strength of these environments is that they are suited to implementing pedagogically sound social constructivist methods across multiple sites. Notwithstanding the potential challenges this can pose, the study demonstrated two affirmative prospects for the future. The first is that by developing fluid, adaptive courses on shifting, advancing technological platforms, various challenges could be minimized. Secondly, the obvious strengths of virtual learning environments could be maximized in ways that students can embrace, especially as they feel that they stand to benefit ultimately.

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