Student challenges in a virtual collaborative learning course spanning multiple countries

Z. Bulbulia, C. Blewett, R. Quilling
(Bulbulia@ukzn.ac.za Blewett@ukzn.ac.za Quillingr@ukzn.ac.za)
Information Systems & Technology, University of KwaZulu-Natal, South Africa
P. Kanyiwamuyu
(pkanyi@daystar.ac.ke)
Computer Science, Daystar University, Kenya

Web 2.0 technologies have been instrumental in the development of a new collaborative learning space called Virtual Learning Environments. These environments provide a virtual space where educational interactions can be engaged and managed. 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 research reports on the experiences and lessons learned during a virtual collaborative learning experience involving Honours (4th year) Information Systems and Technology students at the University of KwaZulu-Natal and Applied Computer Science Honours students from Daystar University in Kenya in March-April 2010. The academic, operational and technological challenges, from a student perspective, are explored in this paper.

Student responses are generally positive: They adapt to the platform, find the international collaborations valuable and self-report improved problem solving skills. In addition they report spending more time on the course and exerting more mental effort. They were satisfied with the organization and scaffolding of their learning but are still overwhelmingly dependent on campus computing resources; which is a limitation. The potential value of a beta-mindset approach supported by scaffolded learning is suggested.

Key words: collaborative learning, virtual learning environments, virtual worlds, multiple-country, Gen Y, beta-mindset, scaffolded learning, Second Life

1. Introduction

A virtual learning environment is a system where educational interactions are managed in an online environment (Dillenbourg, 2000). While virtual learning seems like a fairly new phenomenon, history shows that there is a long history of this type of education. The first venture towards this type of education was as early as March 1728, when Caleb Phillipps posted an advert in the Boston Gazette stating that anyone who wanted to learn shorthand should respond to it and lessons would be sent to them (Bower & Hardy, 2004). Since then technological advances - mainly the development of interactive and social communication technologies - has made virtual working and education much easier (Burgoyne, Dickenson, Pedler, 2008).

Technology now has the capability of bringing together individuals who are geographically dispersed in both educational and organisational contexts (Burgoyne, Dickenson, Pedler, 2008). Students in a virtual team can be geographically spread, work in different time zones, and may possibly never meet face-to-face (Chua, Lam & Williams, 2005). Virtual teams depend on asynchronous collaboration tools such as forums and email as well as synchronous collaboration tools which include video-conferencing, chat and other interactive technologies tools to support interaction between team members (Chua, Lam & Williams, 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 on the one side and Constructivism on the other. Instructivism is the classical approach used in the classroom and is based on an objectivist theory of knowledge (Reeves, 2008). It is characterized by an instructor providing some form of formal instruction to the class, with the learners being passive (Galuti, 2004). One of the main issues is that students tend to use rote learning and then simply regurgitate the information in tests and exams (C-SAP, 2008). 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. Light (2001), discussed in 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. However while traditional learning environments are often not suited to implementing social constructivist approaches (Quilling & Blewett, 2009), virtual learning environments seem to provide an ideal platform.

This paper reports on the experiences and challenges experienced during a virtual collaborative course involving Honours (4th year) Information Systems and Technology students at the University of KwaZulu-Natal, Westville, South Africa and Applied Computer Science Honours students from Daystar University, Nairobi, Kenya. This interaction forms part of the NextEd-Africa project (and hence the NextEd Global Initiative). Challenges experienced academically, operationally and technologically are explored in terms of how students experienced the course and their overall impressions.

2. 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 (Burgoyne, Dickenson, Pedler, 2008).

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 challenges experienced by the lecturers and challenges experienced from a student point of view. While many of the challenges are experienced by both the academic and the student, the perspective and approach 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.

2.1 Student Academic Constraints

Academic challenges relate to those issues that impact the students learning experience such as adjustment to the adopted pedagogy, team issues, etc. The specific academic constraints considered include: learning to cope in an academic virtual environment and the challenges of working in virtual teams.

2.1.1 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 possible in the virtual environment, as soon as possible. This allows them to be more focused on the learning objectives and experience, rather than focusing on the platform in which they are engaging. This requires time to be spent in "orientation" sessions with students, before the formal course content begins. This is also reported in research by Zhang (2009) that reports that students that used Second Life as a Virtual Learning environment experiences a steep learning curve (Zhang, 2009). Adequate time for this may not always be available as the timing of content needs to meet the timetabling of all involved institutions. Additionally students may not have the notional study hours available to allow them extended periods of orientation for foundational elements that are not directly course content-related (Blewett & Quilling, 2010).

2.1.2 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 (5+) so too do issues with individuals not performing. While this may also be true in real world groups, the frustration experienced by group members who cannot contact non-performing members creates additional tensions 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 (real world and virtual) suffer from communication challenges, the problem is often worse in virtual teams due to the fact that most of the communication is non-verbal and mediated through digital channels. This leads to an increased likelihood of misinterpretations in communication. For example one person might read and interpret an e-mail differently from the person that wrote it.

Secondly there is the Limited Ability to Build Relationships. One of the major factors that divide members of a virtual team from traditional team members is that with virtual teams it is harder to get to know other members on a personal basis. With virtual teams, there is not much informal communication that exists between the members of the team. Some might argue that the knowledge of these personal details and relationship formation is immaterial although the facts show that significant statistical relationships exist between measures of academic performance and factors relating to friendship and advice (Yang & Tang, 2003).

The third challenge faced by virtual teams is the added complexity of distant interactions. With a virtual team, things that would be straightforward and easy for a traditional team can be a great deal more difficult. For instance, with a traditional team, setting up a meeting is reasonably easy, as the members tend to live within close physical proximity. With a virtual team, setting up the same meeting is a great deal more difficult due to time zones and other localized demands and challenges.

2.2 Operational Constraints

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

2.2.1 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. Any collaborator (both lecturer and student) will of necessity have to invest time in addition to their normal workload, or notional study hours, to become comfortable with this new form of collaboration. The time constraints are often further exacerbated by differing semester calendars and requisite commitments of the students from the participating institutions. Another aspect that also 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).

2.2.2 Number of Students

Another challenge faced in virtual environments is the number of students that need to be dealt with at one time. 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. This immediately creates issues (in addition to technological ones discussed later) relating to how to manage this number of students. This is equally challenging for lecturer and student alike.

2.3 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 the future. Not only will they form the basis for future education, but they are also key to helping address the digital divide. However, while these cutting edge technologies offer many exciting solutions to our problems, they also bring with them numerous challenges.

Research done 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 on 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. Web 2.0 technologies are in a constant beta state as they are continuously being developed and 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).*

So, while stable platforms may appear to be desirable for perceived student acceptance, 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, well-established platforms, fluid, adaptive courses need to be developed on shifting, advancing technological platforms. Each engagement should try and build on prior interactions, and where critical challenges arise alternative routes and mechanisms should be explored in subsequent iterations. Thus engagements are not cast in stone, but rather change and adaption is embraced as part of the model of engagement- rather than being seen as a sign of a "problem" or "error".

NextEd collaborations occur between parties who have self-identified their technological readiness and the potential platforms which they feel they are able to sustain for students and lecturers alike, for the duration of the shared content. However, despite this, 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 comments appear likely to continue, 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 one would hope that students' benefits from such contexts are greater than the challenges they ultimately present. If this proves not to be the case then perhaps this approach could be seen to be inherently, academically flawed.

2.4 Research Questions

Based on the outcomes of prior studies, both within the NextEd project collaborations and within the literature, the research question thus posed in this paper is:

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

This question is then further explored specifically in terms of potential academic, operational and technological challenges as already discussed.

3. Research Methodology

This paper reports on 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. This 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 various issues relating to HCI as relevant to education, business and entertainment within Second Life. The collaboration covered a 4-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. Students were placed in teams of 6 or 7 members. The teams were large due to the fact that many students were registered for the course this year and in the interest of trying to create teams with roughly similar student membership i.e. based on their geographic location. The team members were from 3 different sites and were split, as follows: 2 students from Westville (UKZN), 1 from Pietermaritzburg (UKZN) and 3 from DayStar, although this varied in some teams due to numbers.

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 (their own page) together with sharing their learning through blogs, discussion forums, etc.

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 that would meet all the

needs suggested. Individual blog posts on their progress 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 the communes allowed the 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 while the build was in progress. 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 03 May2010 to the 07 June 2010. There were 44 participants on the course and 31 students responded to the online survey. The questionnaire 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 which provide insight to the challenges experienced by students are considered for discussion here.

4. Results and Discussion

This discussion will provide some demographic introduction to the student group and will then discuss the challenges faced by students in the context of the issues highlighted during the literature review namely: academic, operational and technological challenges.

The demographics of the participants fall into a relatively narrow age range, with 58% of respondents younger than 23 years old and all students younger than 27 years old. 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 and 29% female. This is not unexpected and is indicative of the largely male-dominated discipline. By way of example, in 2005 only 22% of US undergraduate computer science degrees were earned by women (Klawe *et al*., 2009).

4.1 Student Academic Challenges

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

4.1.1 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. 87% of students agree or strongly agree that it was easy for them to remember how to perform tasks in the social learning network (NextEd Ubun2.0) used during the collaboration;

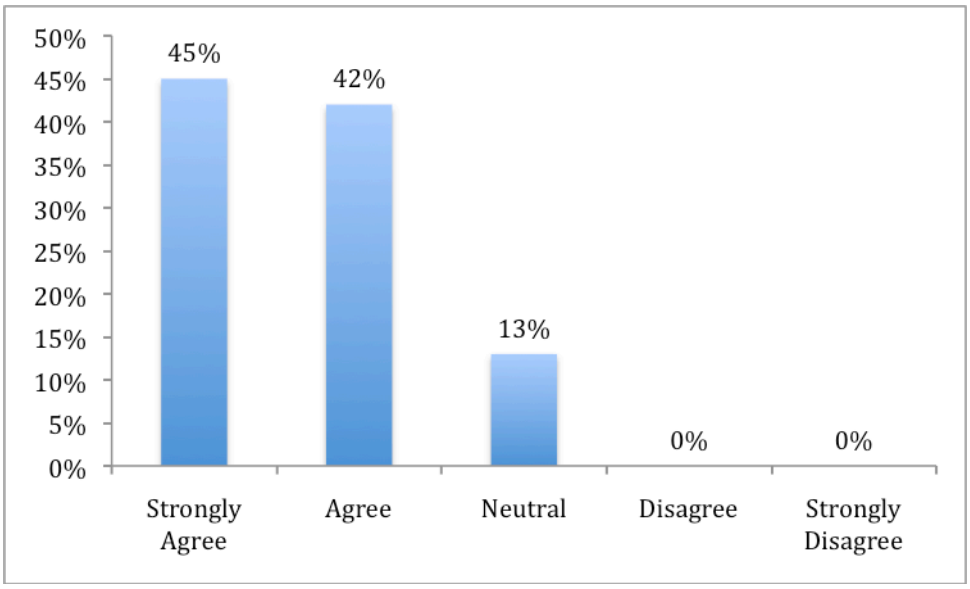

Figure 1: It is easy to remember how to perform tasks in the social learning network

Generation Y students are typically characterized by their ability to adapt to changing situations and to learn by discovery (Oblinger, 2005). As such it is not surprising that students were easily able to learn how to perform tasks in the new environment. It should be noted however that we realise that some of our students may not fit the Gen Y profile which is why this result is of interest.

4.1.2 Virtual Collaboration

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

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

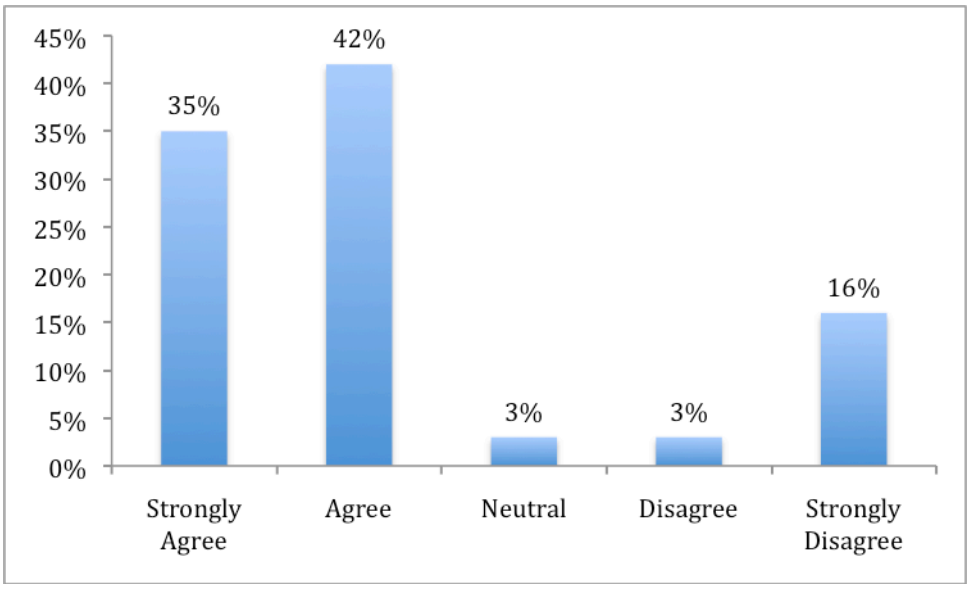

Figure 2: It was beneficial having international collaboration

A study by Wallen *et al.* (2008) also reports that international collaboration is enriching for the students involved. A small percentage (19%) appeared to not see this international collaboration as beneficial; however this 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.

When asked if the students found that 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.

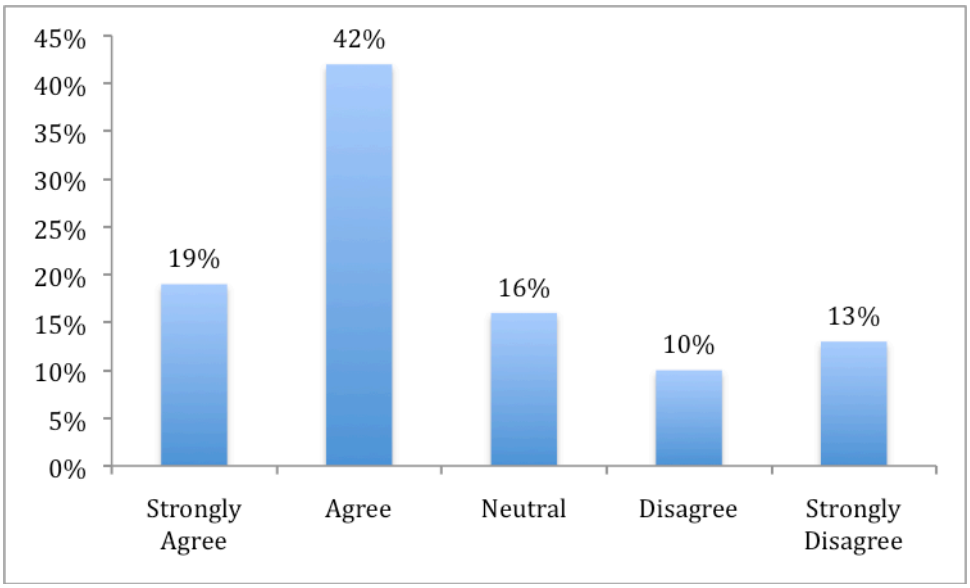

Figure 3: Working with team members from another country enriched my learning experience

It is interesting that there is a discrepancy in these 2 sets of results and one is forced to wonder what the respondents considered the difference to be between these 2 questions. This also suggests that the pilot questionnaire requires refinement and should seek to interrogate what considerations are motivating the responses provided by students.

This analysis suggest that students found the international collaboration a valuable and enriching experience and adapted reasonably easily to the virtual environment. However, it highlights the need to further investigate what aspects the students consider in their assessment of the value of the student collaborations in which they have participated.

Results were spread out in terms of whether students preferred group work to individual work this can be attributed to the fact that students were grouped according to how much they participated, thus the students that participated a great deal were grouped together and those that did not participate were grouped together as well.

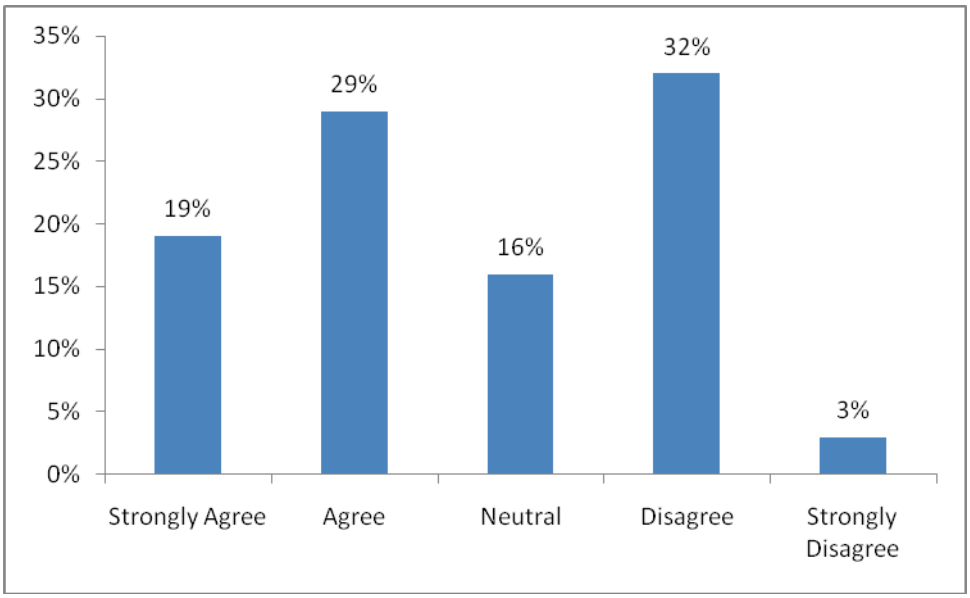

Figure 4: I feel there should be more individual work and less group work

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

"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 collaboratin 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 ither face to fce."

4.2 Operational Challenges

As mentioned earlier, operational challenges include issues relating to the time requirements of the module (closely linked to academic challenges) as well as the perceived organization of the module, from the students' perspective.

4.2.1 Time

While virtual courses provide many benefits and can engage students at a deeper level, there is no doubt that they typically involve a greater time commitment from both academics and students. However, what is interesting, as depicted in figure 4 (below), that 68% of students agreed or strongly agreed that they voluntarily spent more time on this course than they would have if it was a face-to-face course.

This shows that students choose to spend more time on the course. Why this should be the case requires investigation. It could be that they feel more motivated in this environment; have more fun and feel more actively engaged. It could be they feel they gain greater benefits by spending more time in exploring or extending their own learning.

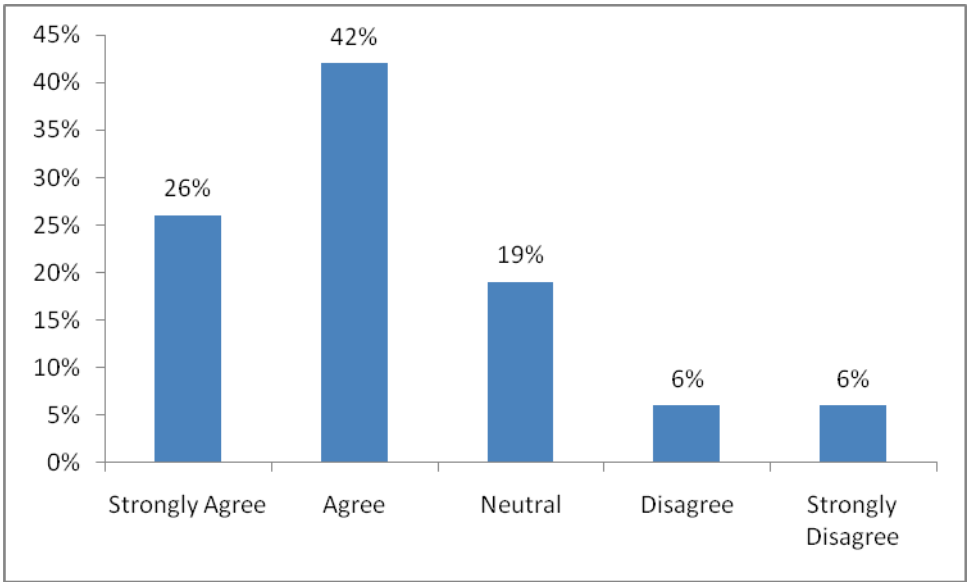

Figure 5: I voluntarily spent more time on this course than I would if it had been face-to-face

One clue to the reason students willing spent more time in the online environment may be to do with their stimulated interest. Figure 5 show 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 we are seeing their willingness to spend more time on things which they perceive to be actively engaging.

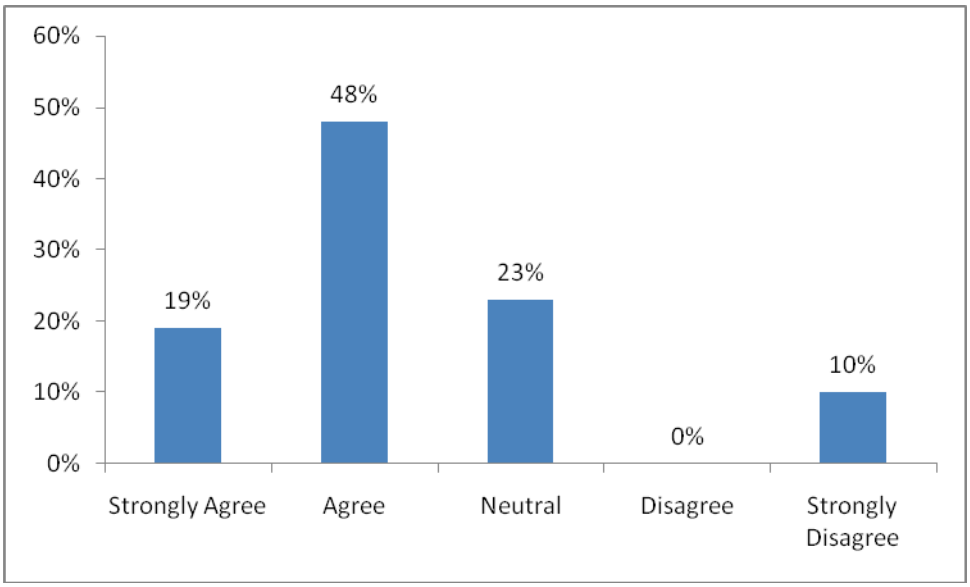

Figure 6: Active participation during online activities stimulated my learning interest

Consistently, however, one can identify a group who disagree that this social constructivist approach is educationally beneficial; in this case 10%. It is intended to explore this group to identify if they are the same people who respond in this way, in each of the questions. This may, again, relate to an individual's learning preferences, or educational approaches with which they feel most comfortable, or are more familiar.

4.2.2 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 appear to be badly organized. Figure 6, while showing that 68% of students found the course well organized, indicates that there are still 33% who are either neutral or disagree.

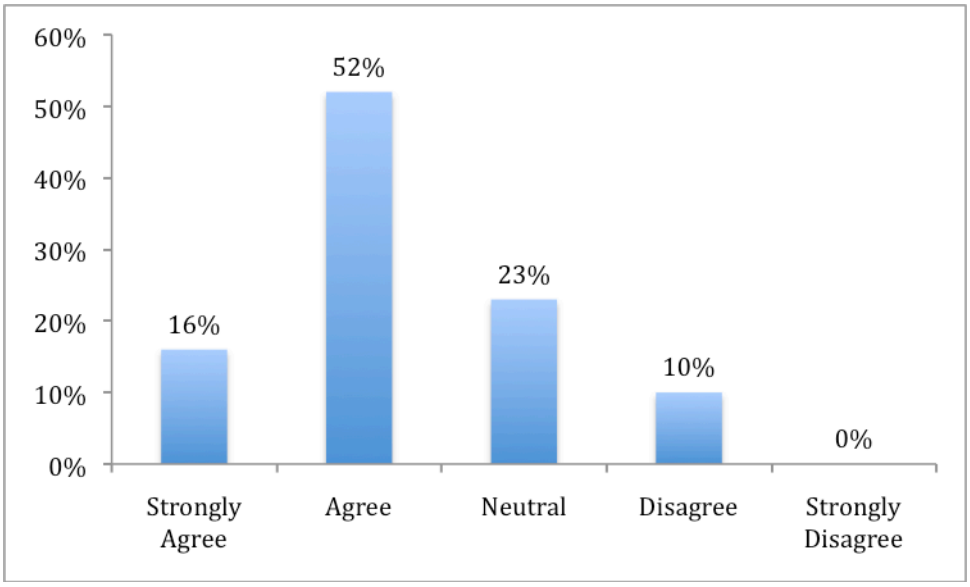

Figure 7: The module is well organized

As mentioned earlier, the unstable, changing nature of Web 2.0 platforms requires a course design that is fluid and constantly evolving. 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 and provides some insight into the issues we, as lecturers, should consider when planning for these students.

However, 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 students. 61% of students agreed or strongly agreed that they had developed problem solving skills during the course, as depicted in Figure 7 below.

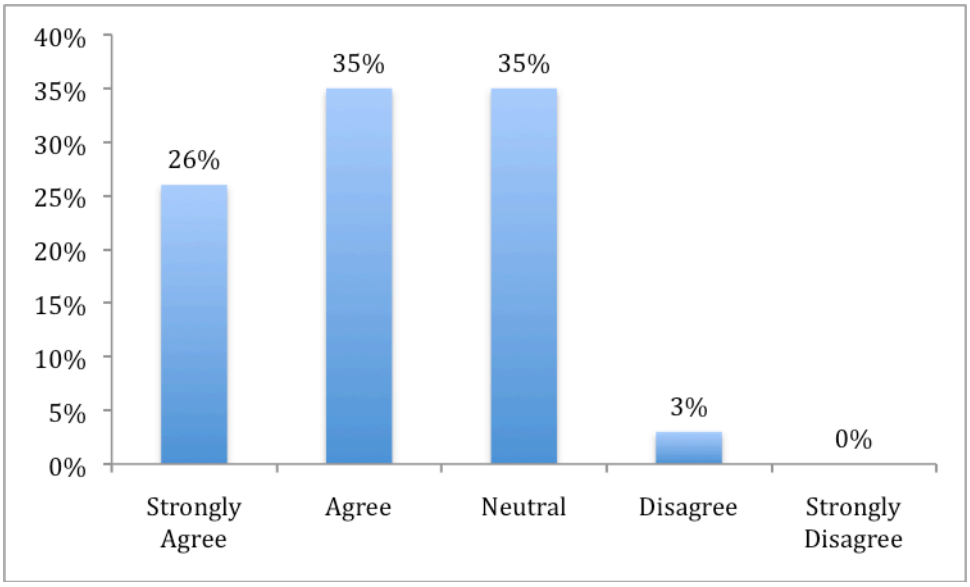

Figure 8: I learnt problem solving skills

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

There was an incident were a hacker came onto the NextEd Island, in Second Life and caused a few issues. Here are some student comments on this, stated verbatim:

"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 ways of resolving the issues associated with technology.

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 it results in a concomitant increase in mental application. Figure 8 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.

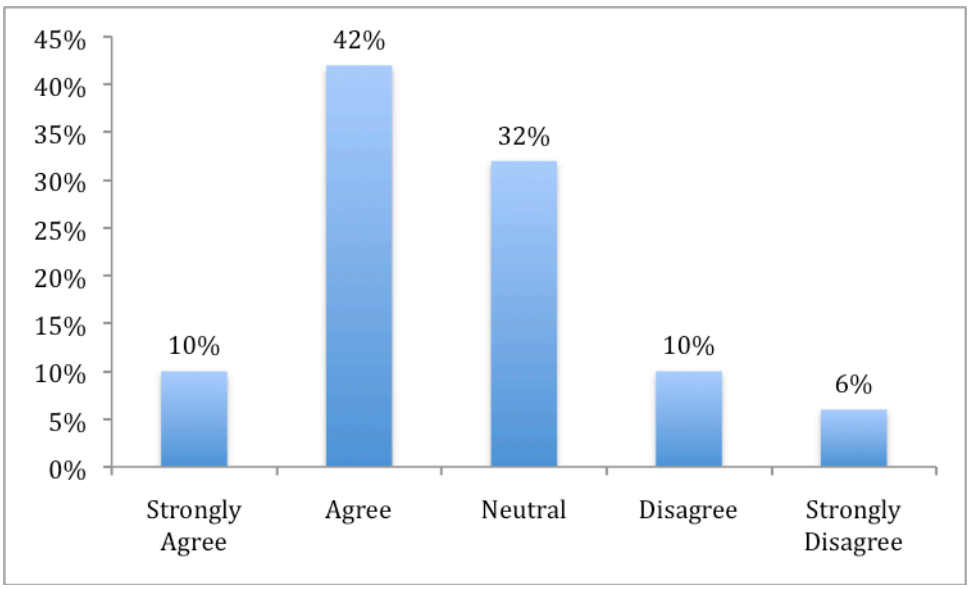

Figure 9: I exert more mental effort when learning in the online environment

However, enabling students to problem solve 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 the opportunity 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 in their learning experience as is depicted below (Figure 9).

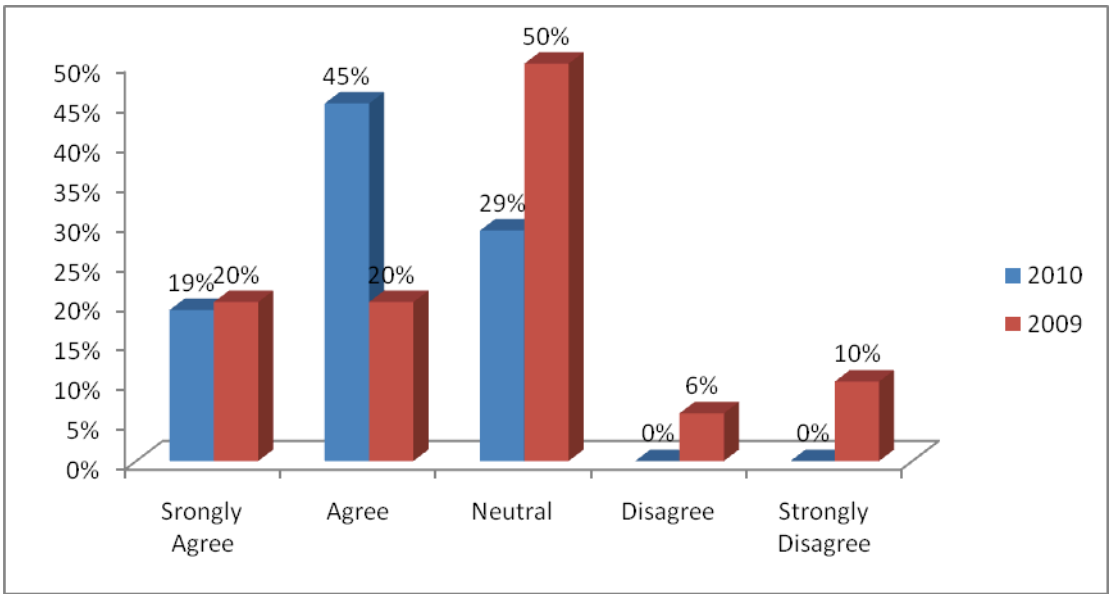

Figure 10: I was given sufficient guidance throughout the module (Results for 2009 & 2010)

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 problem solve, care needs to be taken to provide adequate support structures and scaffolded learning to ensure that the environmental issues (technology, pedagogy etc.) don't detract from the actual content knowledge acquired.

Specifically, in 2010, two additional interventions early in the collaboration, which focused on building skills and acquiring resources in Second Life, appear to have been especially useful. Issues relating to the overall project management from the lecturer perspectives may well also have impacted at this level 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.

It is clear though that while the survey results provide a general perception of their view of the course, we need to explore these matters further in an attempt to discover the detail of what is influencing these comments.

4.3 Technology Challenges

The final area of student challenges relates to technological issues. The potential for technological challenges are great in beta-workspace 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 our students but is also their area of specialization. As a result, students learn much in terms of project management of IT resources, contingency planning etc. 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 student 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 (Figure 10, below).

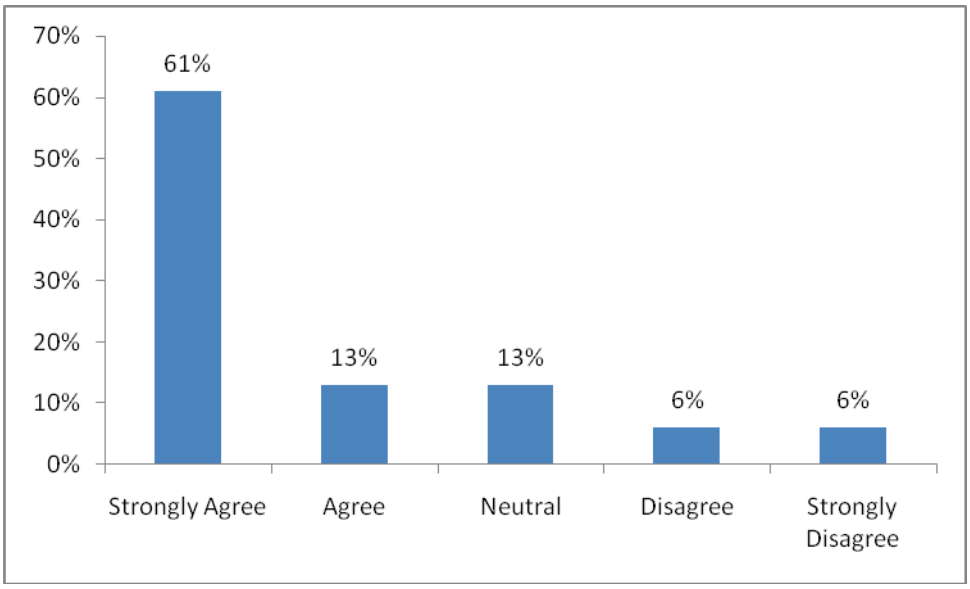

Figure 11: I mainly used on-campus facilities for this course

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

Some 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 P.C's."

5. Conclusion

This research set out to determine what challenges students in multi-country virtual collaborative learning environments face. The specific example discussed refers to a month long collaboration between a South African and Kenyan Honours class, focusing on human computer interaction issues as they occur in 3D virtual worlds considering both the developer's and user's perspectives.

Students felt positive about working in a virtual environment. From an academic perspective, students 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 and comment 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.

Superficially at least, the comments seem to be consistent with what would be expected in terms of a group of Gen Y students participating in a postgraduate computing–related module. Clearly though they are providing signals about their reactions to a module which in many senses 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 this, and in some senses even appear to embrace this and be able to identify the value they have gained as a result, this pilot study does not show a sufficiently detailed picture for us to consider results to be conclusive.

Although this pilot study has helped us to gain a general perception of the students' view of the course, we need to explore these matters further in an attempt to discover the detail of what is influencing these comments. In addition, this research was done solely from the students' perspective, and it would be useful to consider the challenges relating to the course from the lecturers' perspective.

In conclusion: The power 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, it is being demonstrated that by developing fluid, adaptive courses on shifting, advancing technological platforms challenges can be minimized and the obvious strengths of virtual learning environments maximized……and these students embraced it.

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