Getting Real about Virtual:
Throwing the Web 2.0 baby out with the Educational Bath Water

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ABSTRACT

Educational research suggests social constructivist approaches as a way to "reach" students. Historically though, this has been difficult to implement. Now for the first time the confluence of the way we approach learning (social constructivism), available platforms (Web 2.0), and generation of students (GenY) provides an opportunity to align appropriate teaching paradigms and the vehicle for educational delivery in a way that suits learners.

To investigate the impact of this confluence on student motivation a study took place within the Computer Mediated Communication course delivered to 4th year BCom Hons (IS&T) students (February to May 2008). Activities included a mock television panel interview, communication via a social learning network (SLN) and an extended development in Second Life. Student motivation was measured through two IMMS motivational surveys, the first conducted after their initial experience in the SLN and the second after an immersive experience in Second Life. Further qualitative data was gathered from students' review of the course.

The first survey showed that while tasks initially appeared intimidating, the students were highly motivated and their sense of achievement on completion was high. The second survey conducted at the conclusion of the virtual world project indicated a drop off in most of the ARCS motivation factors. However, an analysis of the qualitative data revealed that many of the factors causing a decrease in motivation can be classified as "normal learning challenges" and have little to do with the Web 2.0 environment and learning approach. This highlights that a real danger exists in confusing the challenges associated with learning, such as teamwork, effort required and communication, with the impacts of the platform and/or pedagogical approach.

Keywords: teaching, Gen Y, web 2.0, social computing, active learning, constructivism, constructionism, motivation, ARCS, NextEd

1. INTRODUCTION

The illusive silver bullet of education appears to be hidden within the mysterious realm of student motivation; the "primary factor in teaching and learning" (Reeves, 1995, p224; Malone, 1984). Achieving student motivation continues to be a quest that educators strive for in an attempt to make the process of learning as effective as possible. For many years educationalists have extolled the virtues of adopting alternative teaching paradigms as part of the approach to improving learning (Gulati, 2004). Much has been written about the benefits of adopting a constructivist or social constructivist approach to teaching and learning (Brent, 1996; Gulati, 2004; Marguerativity, 2007). Yet despite this, most Higher Education institutes continue to use Instructivist style approaches (Gulati, 2004). Part of the reason for this may be the generational mindset of the educators; the vast majority have been schooled in an instructivist style. Another reason may be the difficulty of adjusting to the new approach when the institution itself, with its quiet libraries and lecture theatres, is not designed to support this style of learning. It is only recently that technology has started to provide platforms that appear to be able to support a social constructivist learning style. Not only do these platforms appear suitable for an alternate learning style, but they are also platforms with which the students are familiar.

Currently, technology and business models relating to computer mediated communication (CMC) are dominated by what is called Web 2.0 (O'Reilly, 2005). These technologies seek to empower the individual user(s), as the creators and publishers of content, while also allowing them to draw the information to themselves. Communities and networks are socially constructed with greater emphasis being placed on

sharing; working together and communal resources (open source platforms and developments).

Parameswaran and Whinston (2007, p763) challenge Information Systems (IS) researchers to take the lead in social computing research: "Social computing will impact numerous academic disciplines due to its pervasive influence and is thus a rich area for research; an area in which it is important for information systems researchers to take the lead". This challenge is especially appropriate for IS academics as the potential exists for them to consider these platforms from two perspectives: Firstly, a pure research basis (interest in the platform itself) as well as from a scholarship of teaching and learning perspective (the vehicle employed for learning). The problem statement of this research aims to take up this challenge:

The problem that forms the focus of the study is the impact, on student motivation, of implementing a social constructivist learning pedagogy through a computer mediated environment. In addition, the extent to which technology is used to mediate learning, and the nature of the technology employed is seen as an important part of the problem.

2. LITERATURE REVIEW

The area of focus for this paper is the intersection that falls between how the real world operates and our theoretical understanding of facilitating the learning process and hence improving student motivation. The convergence of Web 2.0 technologies, social constructivist pedagogies, and a generation of students comfortable with the technology, provides many interesting opportunities to explore ways of improving student motivation. This section will consider some of the previous work that has been done on learning theory, the generational characteristics of our students and Social Computing. With this as a basis the approach we undertake will be presented as we attempt to explore the gap that lies between theory and practice in this educational context.

2.1 Learning Theory
Theories of knowledge and learning as participative and social experiences are already documented. The basic precepts required for this discussion have already been highlighted: Learning is defined as "the act, process or experience of gaining knowledge or skill" (Barnhart & Barnhart, 1990); The style of teaching has been shown to significantly impact learning (Webster & Hackley, 1997); extracts from Cook and Cook's (1998) Student Retention of Learning Table highlight that "Students retain…50% of what they see and hear, 70% of what they discuss with others, 80% of personal experience, 90% of what they say as they do it, 95% of what they teach". It is the doing and recreating that assists dramatically in retention of learning.

Educationalists have over the years postulated a wide 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 constructivism 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.

2.2 The "Next" Generation
Generation Y students (the current generation of students in tertiary institutions) are the millennial, NET, MySpace or Next generation. Access to information and data processing power has given children a different way of interacting with information compared with previous generations (Jones, 2002, Weiler, 2005).

Generation Y are socially and community oriented, with the ability to spread their focus by harnessing a variety of technology platforms. Their learning preferences include visual information, working in teams, experiential activities and use of technology (Codrington, 1999). Their strengths include multitasking and collaboration (Oblinger, 2003, Weiler, 2005). For these students the creation of knowledge is a natural, social, active process (Weiler, 2005). This has been largely misunderstood by older generations who attempt to force them into the older methods of linear processing (Codrington, 1999).

In addition we need to consider the profile of the faculty who are expected to teach them: By and large the faculty consist of (Baby) Boomers and generation Xers who are individualistic, have a weak sense of community and use linear methods of processing (Weiler, 2005). Clear contradictions are evident.

We are not trying to suggest this is the only valid approach to fostering and encouraging learning, but rather suggest that while classes will always consist of learners exhibiting a variety of preferred learning styles (Felder & Silverman, 1998) we are likely to see an increase in the number of students who prefer a variety of visual media that can be engaged using a constructivist approach.

2.3 Social Computing
A confluence of the elements of educational theory and the nature of the learners entering the educational system is clear. The third element that has now also converged, is the supporting (or integrated) technologies that have become

available. Most notable among these are developments within Social Computing. Central to its definition is the idea of social computing as social interaction through information systems: not just as a platform or application but as a system where the information system is used as a "place" for interaction as well as a "space" for information storage, manipulation and use (Forrester,2006; IBM, 2008; Mandel, 2008 and PA Consulting, 2008).

These tools include both the hardware and the software which have become associated with the Web 2.0 phenomenon (Alexander, 2006). Examples include social networks, business networks, wikis, blogs, virtual worlds, social bookmarking and photo/video sharing sites. Unlike social networks, blogs etc, virtual worlds bring with them the added elements of "situatedness" (being in a virtual space and time (Smith, Maher, Gero, 2003)) and "immersiveness" (experiencing a sense of reality within the virtual (Wiederhold, Davis, Wiederhold, 1998)).

Virtual Worlds such as Second Life (SL) have provided many opportunities for educators to explore. Bowers, Ragas & Needy's (2009) 2008 survey indicates that both educator satisfaction in terms of the use of SL and perceived student learning are high for SL use across all adopter categories. On a 7 point Likert scale with 3.5 being the mid-point, the educator satisfaction mean is at 4.76 (68%) and perceived student learning at 4.86 (69%). This study however relates to educators' perceptions of student learning rather than self-reported experiences. In addition, this study concludes that the more SL is integrated into the class structure and the more immersive the experience, the better the experience is likely to be; and the greater the likelihood of satisfaction and success. The most influential factors impacting educator adoption appear to be personal interest categories, followed by infrastructural issues such as the access to hardware and software. They argue that future use may be influenced by interpersonal factors and institutional support factors.

Gulati (2004) also raises key issues affecting the online educator-learner dynamics: elements relating to "trust, rapport, confidence and power discourses that affect a truly open discourse" cannot be ignored. There is a clear need for informal and open learning spaces but the management and nature of participation in these spaces should be explicitly considered.

2.4 Motivation

The problem statement introduced at the outset deals with the effect on student motivation, of aligning current technologies with appropriate learning techniques. Reeves (2008) points out that many of the fourteen factors that can affect learning are ultimately under the control of the developer of the learning programme, with few reflecting the ability of the learner to impact their learning experience e.g. student motivation. It is accepted that student motivation has a positive effect on learning. Motivation affects retention, and is therefore critical to learning success (Kumarawadu, 2001, Weiler, 2005). "If students are intrinsically motivated to learn something, they may spend more time and effort learning, feel better about what they learn, and use it more in the future" (Malone, 1984).

Felder and Silverman (1988) in their seminal paper on learning styles argue that student motivation can be enhanced through active learning. This changes the focus: "Instead of fonts of information, the lecturers can become sites at which students gather to hear advice on what to do" (Brent, 1996). In addition, Gen Y students experience and view technology as such an integrated part of social and educational life, it is no longer a "platform" (Brent, 1996); it is life. It is this convergence that has the potential to alter the educational landscape in a way never seen before.

While much has been written about the value of alternative learning approaches, and much is currently being done in the application of Web 2.0 technologies to teaching, the impact of this convergence on student motivation is still not clear. While Gen Y students are comfortable in many of the Web 2.0 environments the very nature of Web 2.0 is transient resulting in many possible implementations and approaches. This in itself raises questions as to which of the multitude of technologies will be effective in supporting the learning experience of students. To this end this paper seeks to answer the questions;

What is the effect on student motivation of implementing social constructivist learning techniques via a Web 2.0 environment?

What is the impact on student motivation of using a variety of Web 2.0 environments within the same course?

3. RESEARCH METHODOLOGY

The research design focuses on using a triangulated, or a mixed-mode, methodology. The study uses an adapted form of the IMMS survey (Keller, 1983) to gain quantitative descriptive results relating to student motivation. A brief introduction to the IMMS survey and the related ARCS factors is provided, along with an introduction to the course activities reviewed, the supportive social learning network implemented and the data collected. Insights gained from a course review will be used to explore explanations for the results of the motivation survey. This includes both quantitative and qualitative feedback.

3.1 Measuring Motivation: IMMS

Keller introduced the ARCS Model to measure the effectiveness of educational material in motivating students in 1987 (Margueratt, 2007; Weiler, 2005). The ARCS model suggests that in order to motivate a student four specific conditions must be met namely, Attention, Relevance, Confidence and Satisfaction: Attention is concerned with the aspects of the course that arouse and sustain the students' curiosity and interest; Relevance is concerned with strategies that have been implemented to help link the course content to the students' needs, interests and motives; Confidence relates to the strategies that are implemented to help the students develop a positive expectation for success in the course; and finally Satisfaction helps to reinforce the motivation that is developed through the other elements. Essentially satisfaction is to do with strategies that provide extrinsic and intrinsic reinforcement for effort (Keller, 1983).

In order to determine the level of motivation using the ARCS model Keller developed the Instructional Materials Motivational Survey (IMMS) which is applied in this study.

3.2 Course Activities Under Review

This study deals with an elective course Computer Mediated Communication (CMC) formally ISTN730 and ISTN430 run during the first semester of 2008. The course is part of the Information Systems & Technology Honours (4th year) full-time programme offered at the University of KwaZulu-Natal, Westville Campus, Durban, South Africa. Of the 17 registered Honours' students, 13 students selected this course. The purpose of the course is to provide students with the theoretical and practical knowledge to use Web 2.0 technologies and to evaluate and develop Web 2.0 business models.

While the underlying pedagogy of the overall course was based on social constructivism, the course was designed around two parts. Part 1 made use of a number of learning environments that can be classified as a blended learning approach, while Part 2 made use entirely of a virtual world and can be classified as a full virtual learning approach.

3.2.1 Part 1: Blended Learning

Part 1 of the course took place over the first two weeks of the semester. It involved a combination of approaches. It included 2 formal sessions (named Session 1.0 and Session 2.0), a self-study activity undertaken between the 2 formal sessions (Session 1.5), and an assessment (assessment 1.0) submitted roughly 3 weeks later.

Session 1.0, an instructivist-style introductory lecture also introduced the channels of delivery and modes of assessment which would be used. Session 1.5 was the self-study period between Session 1 and Session 2. This "session" adopted a scaffolded learning approach (Rose *et al.*, 2003) which is a supportive approach to reading and writing; and thus consisted of brief introductory ideas to topics, followed by a few seed questions to stimulate discussion and to guide the students' initial focus. Starter references were provided but students were encouraged to read outside these limited options in search of the answer to the starter questions (and those they chose to pose as their discussions developed). The students were required to be self-motivated in their assimilation of the plethora of literature and other material (podcasts, images, youtube links etc) on Web 2.0 and CMC.

Session 2.0, a recorded panel discussion in a formal TV studio on campus, was designed to encourage the students by means of extrinsic motivation (pressure of the formal TV studio) to engage thoroughly with the material. The panel discussion session consisted of four 15 minute panel discussions in which students role-played experts in particular Web 2.0 areas and the lecturers took on the role of the panel host. Furthermore the objective was to try and improve student retention of this key material by encouraging them to be able to "explain" their field of expertise (Cook and Cook, 1998). Their introduction into a highly professional environment was considered an additional learning opportunity. The mock expert panel

discussion was not assessed but was recorded. Students were required to complete a post-session assessment where they constructively critiqued each of the panel discussions. They were required to suggest the strengths and the weaknesses in answers provided and to propose how they thought the question could best have been fielded.

While Part 1 consisted of an instructivist-style lecture and a panel discussion it made use of a wide range of Web 2.0 type material in the form of podcasts, youtube videos, wiki entries etc. Furthermore it was supported by a social learning network (SLN) called University 2.0 established in Ning (www.ning.com). As part of the blended approach of Part 1 of the course the students were required to access material through the SLN, post regular blogs, and respond to discussion forums on a weekly basis. The purpose of this was to allow students to engage their learning material in a manner that is both compatible with their generational characteristics and is engaging. Each student was also able to set up their own "space" where their personal tools, comments and interactions could be stored as a subset of the University 2.0 network.

3.2.2 Part 2: Virtual Learning

The second part of the course started approximately a month after the first. Students were placed in teams of approximately 5. Student teams were tasked with developing a virtual university space in Second Life (SL). Three teams were each tasked with focusing on different facets of potential use of the VW environment to meet educational, business and entertainment needs. Student teams were required to collaborate sufficiently to allow an integrated space to develop that would meet all the needs suggested.

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). An initial report had to provide insight into existing business models for SL, the model they felt would be most viable to implement for their specific build as well as the functional requirements of the development. This document also had to suggest an initial design. On completion of the implementation students were required to provide a report reviewing their development in the light of their original proposal, as well as provide an in-world presentation/ tour allowing the context to be experienced. Assessment included the two reports, the presentation in the virtual world as well as an assessment of the virtual university space they created.

The student experience in SL involved a presentation by a representative from IBM in the first week, and then followed up with several in world meetings, and finally concluded with the in-world presentation. This meant that the entire engagement process and most of the assessment process was based inside the virtual world, thus creating a complete virtual learning experience for Part 2.

3.3. Data Collection

The ARCS model and an adapted version of the 1993 IMMS questionnaire were used for data collection. The questionnaire consists of 36 questions (Margueratt, 2007). Questions were uploaded to the Survey Monkey website (March and May 2008) to allow for automatic data capture (http://www.surveymonkey.com). The survey was run at the conclusion of Part 1 of the course and a total of 11 out of the 13 class members responded. The survey was run again at the conclusion of Part 2 of the course and a total of 9 of the 13 class members responded. As the data set is small only descriptive statistics are available and results are not generalisable.

To gather qualitative data a course review questionnaire was conducted at the end of the course. This survey consisted of 10 open-ended questions and dealt with the overall nature of the course and explored issues the students may have faced or ways they felt the course could be improved. Using these open-ended questions gave the students more latitude (than the IMMS questionnaire) to air issues and provided an opportunity for the researchers to identify other possible dimensions to consider in the design of computer mediated social constructivist environments.

4. RESULTS & DISCUSSION

The course was designed to gradually introduce students to the use of Web 2.0 platforms: Part 1 made use of participative learning techniques, such as the Panel Discussion and technology delivery channels such as the Social Learning Network. This served the purpose of slowly moving the students into a Web 2.0 enabled engagement environment that supported the social constructivist learning paradigm. Part 2 of the course was delivered entirely through teams operating together in a virtual world, so immersing the students in both the technological platform and the learning paradigm. The results below present the student motivation, as measured by the IMMS survey for both parts of the course. Thereafter we explore possible reasons for the difference in motivation levels polled in the surveys.

4.1. Part 1 - Blended Learning

The following is an analysis of the results for Part 1 using the IMMS survey to measure Attention, Confidence, Relevance and Satisfaction.

4.1.1 Attention Overall, 87% of the students felt that the course held their attention. One of the biggest challenges with a course of this nature is the volume of new material that students are required to read in a relatively short space of time. Pre-reading is vital if students are to engage in the course in a meaningful way, however it is often not done because it is perceived as boring. As such it is worth noting that in response to the statement - *The variety of readings, videos, audio clips, etc., helped keep my attention on the material*- 100% of the respondents said that it was true. The combination of active learning techniques such as the Panel Discussion and the rich and diverse technological mediums used had a big impact on student attention.

4.1.2 Relevance Overall, 80% of the students found the material to be relevant to them. Session 2.0 (the Panel discussion) was seen as the most powerful way of making the material relevant to the students. Rather than simply having to learn the material, students were now able to role play talking about the material they were learning, as if it really was a real part of their lives. All students saw the content of the panel discussion as relevant. Furthermore, in response to the statement - *The videos and other AV material helped show how the issues are used and important to people*, 91% of the students found this to be Mostly True or True. While this same material could have been delivered simply through textbooks and other traditional media, the use of various Web 2.0 channels seems to have highly impacted the students' perception of the relevance of the learning material.

4.1.3 Confidence Overall, 68% of the students were confident about their learning experience. This is lower than the percentages for Attention and Relevance, but again this is not unexpected. A course of this nature deals with emerging technologies and trends and thus the concepts and theory appear almost "fluid" in nature to students who are most familiar with highly defined topic areas within the discipline. In addition, the huge initial reading load and expectation of performance on the panel discussion is somewhat intimidating in nature, no matter one's level of knowledge in the area. However with nearly 70% showing high confidence it suggests it is possible to use participatory techniques to imbue confidence despite mitigating factors.

One of the points at which confidence was at its lowest was at the release of the Panel Discussion (Session 1.5) with 73% of students expecting it would not be easy. However, after working through the CMC learning material 63% felt they would perform well on the Panel Discussion. This showed that, as was expected, the initial task seemed daunting, but their confidence increased as they engaged the material.

4.1.4 Satisfaction Overall, 77% of the students felt satisfied with their learning experience. Satisfaction goes beyond confidence and relevance by measuring how much students would want to further pursue their learning in this area. For example, in response to the question - *I enjoyed the learning material so much that I would like to know more about this topic,* 82% said this was Mostly True of True for them.

4.1.5 Overall Overall motivation (for all 4 ARCS factors) shows that 77% of the class responded to the various elements of motivation either that it was Very True (46%) or Mostly True (31%) (see Figure 1).
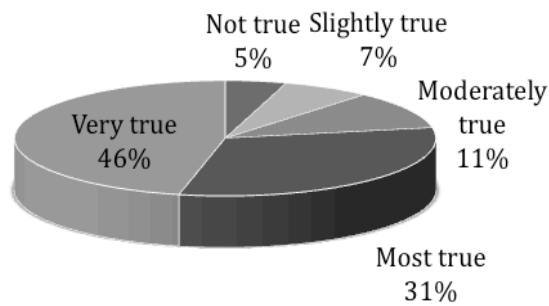
Figure 1: ARCS Overall Measure of Motivation – Part 1

Initial reading loads and complexity of material had the students somewhat apprehensive, as is often the case in higher level courses. The first part of the course also consisted of several tight deadlines that increased the pressure to perform and deliver high quality material timeously.

Furthermore the conscious effort to implement the factors of the ARCS motivation model into the SLN, also seems to have helped with overall levels of motivation for Part 1 of the course. The welcome blog post (from the lecturers) illustrates this (see Figure 2 below).

Also, from a motivational point of view the students' blogging activity can be seen to address all aspects of the ARCS categories: It gained their attention as they chose it for study; They highlighted why and how they saw it as being relevant both in terms of "computer mediated communication" (with the broadest possible definition being applied) and their current or future context; It built their confidence as they were able to speak about something which they felt comfortable with or knowledgeable about; and It provided them a sense of satisfaction as they successfully met a criterion of the course by exercising the freedom to select material that showcases their ability to contribute constructively. While this is intended to contribute to their intrinsic motivation it also aims to equalize the power between the educator and the student. According to Gulati (2004) this is an important aspect of social constructivist approaches that is often ignored during activity development.

At this point, the end of Part 1, it does however appear that an appropriately aligned pedagogical course combined with supporting rich media has enabled the students to successfully navigate the course material while maintaining high levels of motivation.

Figure 2: Welcome Blog post highlighting motivation elements

4.2. Part 2 - Immersive 3D Virtual Learning Environment

Part 2 of the course saw the students immersed in the Virtual World of Second Life. The University 2.0 social learning network and Skype (chat and voice) were used to support the SL activities. Once more the students were placed into an environment that was unfamiliar to them, and immediately required to deliver according to stringent course deadlines. The motivation results as measured by the IMMS survey are presented below.

4.2.1 Attention Attention for Part 2 decreased from 87% (Part 1) down to 76%. While this reflects a decrease of nearly 11%, an attention rating of 76% is still high especially considering the increased level of challenges the students encountered in this part of the course.

Further examination reveals that the following question scored the lowest for Attention:
"The variety of experiences (Chuck Hamilton tour, VW Report, In-world Virtual Tours, Building, In-world presentations etc) helped keep my attention on the material."

Only 66% said this was "Very True" or "Mostly True" while the remaining 34% felt this was "Moderately True", "Slightly True" or "Not True". While a large portion of the students' time was focused on an in-world virtual build project, there were a number of other activities in the world. However, rather than improving motivation, it appears that this in fact reduces motivation. One possible reason for this could be Attention Deficit Trait (ADT).

Dr. Edward Hallowell (Hallowell, 2005), a psychiatrist who studied attention deficit disorder (ADD) for more than a decade, identified a trait called Attention Deficit Trait (ADT). While it has similar symptoms to ADD, people are not born with this disorder, rather it results from our modern environment where people are surrounded by the continuous and relentless "noise" and interruptions coming from computers, phones and other high tech devices. In an attempt to get everything done, we become less and less efficient, and this leads to underachievement and deteriorating performance (Hallowell, 2005).

While keeping Attention is key to Motivation, it is important to be aware of the number of distractions that technological mediated environments bring with them that can impede attention and hence reduce motivation.

4.2.2 Relevance Relevance exhibited a huge drop off from 80% (for Part 1) down to 59%. As mentioned earlier, Relevance is important as it helps improve motivation by allowing students to anchor their learning experience to either real-world experiences or to their expectation of their future careers.

The question that scored the lowest for Relevance was;
"I could relate the content of what I was doing in Second Life to things I have seen, done, or thought about in my own life."

Only 11% of students said this was "Very True" or "Mostly True" while the remaining 89% felt this was "Moderately True", "Slightly True" or "Not True".

This is quite different to the response to relevance that was obtained regarding the Panel Discussion in Part 1. This is not surprising as the Panel Discussion was directly around real companies and their Web 2.0 offerings. However the Virtual World activity required the students to develop a Virtual University that included aspects relating to Business, Social and Educational activities. While students are obviously familiar with a real-world university, they are not familiar with a virtual University, or virtual business of this kind. While it is not surprising to see this result it does underscore the need to ensure that students are aware of the future landscape of education and business. Equally as importantly we suspect from these responses the students have not fully grasped the practical potential of the environment and thus are not making the connection to how they can be applied in their working environments in the future. The challenge for us as the educators is to make content choices which provide sufficient time for the potential of the platform to be realized as well as for the students to gain practical system development skills within that context.

4.2.3 Confidence As with Part 1, Confidence is the lowest ARCS factor, however for Part 2 it only scored 55% as compared to 68% for Part 1. While there were some hurdles in the first part of the course, students were, for the most part, on familiar ground: The Panel Discussion and the Social Learning Network were not totally foreign to the students, as most of them had watched TV panel discussions and worked in social network environments such as Facebook. However, for most of the class, the use of a Virtual World was a new experience. This brought with it challenges both in terms of accepting the environment as a communication medium for education, plus the challenge of learning how to undertake tasks.

Confidence for this part of the course started very low after the publication of the requirements for Part 2. Only 11% said that the following question was "Mostly True" while 78% said it was "Not True".
"When I first read the Virtual World Project document (covering Part 1 and Part 2), I had the impression that it would be easy for me."

Even after completing the initial elements of Part 2 the students' confidence was still low, only increasing slightly. The students were asked;
"After working through the virtual tours and planning document feedback, I was confident that I would perform well in the VW build and presentation"

The response indicated that 22% felt that this was "Mostly True" while an equal 22% said this was "Slightly True" or "Not True" with the remainder indicating it as "Moderately True". This shows that despite the students having spent a significant amount of time in the environment up until this stage, they were still uncertain of their ability to

adequately perform the tasks that were still to come. While this is an improvement on their initial level of confidence at the start of Part 2, it still does indicate the need to be cognizant of the impact that unfamiliarity has on Confidence and hence Motivation.

4.2.4 Satisfaction 78% of the students indicated that it was "Very True" or "Mostly True" that they were satisfied with their learning experience in Part 2. This is very interesting as not only is it the highest rated factor of the ARCS measures of motivation for Part 2, but it is slightly higher than the 77% Satisfaction score for Part 1.

Questions such as;
"I felt good about successfully getting through the learning experience and completing the build and final presentation, saw 78% of the respondents indicating that this was "Very True", and

"I found learning in a virtual environment dry and unappealing." saw 78% of the respondents rating this as "Not True".

This indicates that although their levels of Attention, Relevance and Confidence were down, for various reasons, their Satisfaction was still nonetheless high. This therefore begs the question as to why student Satisfaction can remain high even though the other three factors of the ARCS motivation measure decreased.

4.2.5 Overall While Overall Motivation (for all four ARCS factors) was at 78% for Part 1, this reduced to 67% for Part 2 (see Figure 3 below).
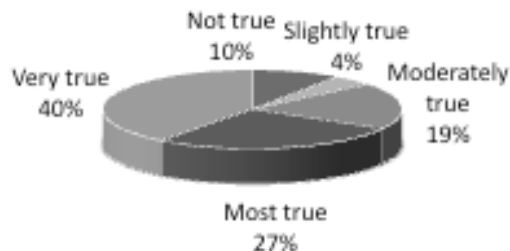
Figure 3: ARCS Overall Measure of Motivation – Part 2

This level still indicates that most of the class was positively motivated however it does require further examination to discover why there has been a decrease in motivation. This, and other issues will be explored below through examination of the qualitative course review data.

4.3. Course Review Survey results

The final part of the analysis is based on an analysis of the students' comments in the Course Review survey that allowed the students to make qualitative comments on the course. The students were encouraged to express themselves and the following questions were used to stimulate their assessment of the course.

1. What aspect(s) of this approach to teaching & learning did you find suited you best?
2. What suggestions do you have as to how this course can be improved?
3. Any other comments?

19 comments were made, and an analysis of these identified 7 themes. The first 4 themes are to do with Motivation (Attention, Relevance, Confidence, Satisfaction) and the remaining 3 are about Learning Style, Learning Environment and Teams.

There are only 6 references in the comments that mention factors relating to Motivation. An example from each of the ARCS categories is indicated below;

Attention – "We were thrown into the deep end, and learnt a lot by finding our feet"
Relevance – "It was a new experience and it gave us insight on how businesses are using virtual environments to conduct their processes."
Confidence (negative) – "I think lecturers should understand that different students have different computer & IT background, therefore should not always think/ assume we are at same level. Should try to understand/accommodate them. We are all here to learn."
Satisfaction – "Enjoyed it very much"

The vast majority of the comments (20 references in the comments) relate to Learning Style, Learning Environment and Teams. The comments relating to Learning Style and the Learning Environment are not unexpected, as the implemented convergent approach of Social Constructivism within a Web 2.0 environment was a major focus for the course. Below is a sample of some of the comments relating to the Learning Style and the Learning Environment.

Learning Style
"The fact that you do most of the work yourself."
"independently constructing my information (initial) and talking (learning) from others in the class"
"The fact that we could learn anytime, even after/ outside normal lecture hours, and participate and be part of what others are doing."

Environment
"The use of computer environment to deliver material"
"The virtual environment allowed me to express myself easier and more freely"
"I enjoyed working in the virtual environment. It was a new experience and it gave us insight on how businesses are using virtual environments to conduct their processes."

These indicate high levels of satisfaction with both the social constructivist paradigm and the Web 2.0 platform used to implement the learning. As such this does little to help identify why there was a decrease in overall Motivation for Part 2.

As was discussed earlier, the overall level of Motivation decreased from Part 1 to Part 2, however the level of

Satisfaction increased. While a possible reason for the decrease in the Attention factor was identified as the result of too many types of activities within the Virtual World, there were no strong indicators as to why Confidence and Relevance decreased.

It was suggested that Confidence may have decreased because the students were not as familiar with this virtual environment as they were with the environment used for Part 1. This is supported by one student's comment – "I think lecturers should understand that different students have different computer & IT background, therefore should not always think/ assume we are at same level." However many more students indicated that they enjoyed the environment (as indicated above). The decrease in Relevance is also not supported by the comments as no negative comments were made in this regard. In fact, one student even highlighted this as a positive factor – "it gave us insight on how businesses are using virtual environments to conduct their processes".

However, what is surprising (at first glance) is the number of comments relating to Team work. 9 references in the comments are to do with working individually or in teams. In fact, nearly every comment made some reference to this issue. Below are some examples.

"I think the course is just fine except, where groups are allocated - friends shouldn't be in the same groups (at least that what I think)"
"Allow group members to be chosen by the class. This aspect impacted quite negatively for me. I found it hard to work with students who could not take initiative to take up a task or think of ideas."
"Monitoring of contributions"
"Working in groups that we could not choose was a bit undesirable. Certain group members were present but the value of their contributions were not adequate. I think individual work should be introduced in the future."
"I think individual work or smaller groups (may be groups of 2- in which students are allowed to choose their group members) should be introduced for CMC"

This reveals a very important factor that may be an indicator as to why motivation declined. Team work is an issue that students need to deal with whether working in a real-world environment or in a virtual environment. Its impact on motivation is well documented (Thompson, 2004) and needs to be taken into account when trying to measure the effectiveness of a virtual course on student motivation. It is vital that the issues related to team work, which is a standard educational experience, not be confused with the implementation environment. Negative team experiences will result in decreased motivation whether the course is virtual or not.

In Part 1, while students were encouraged to use the SLN as a mechanism for socially constructing and hence broadening their knowledge, the panel discussion and subsequent review based assessment were individual based. During Part 2 the majority of activities were team-based. While students were required to develop personal navigation and building skills in SL, the tasks and assessments were based on team work. In addition timelines for deliverables were more rigidly controlled. The VW build was a more protracted activity lasting for approximately a month, making it difficult to totally ignore one's team members and/or to succeed in isolation. In general the learning experience could have appeared less "friendly" to an individual student participant. The power which the individual student felt they had over the educational process was clearly reduced: While student teams could determine functional requirements, individuals could only influence this process if they could achieve buy-in from their team. Power relationships between individual students thus became an element for consideration in the learning experience. Gulati (2004) in her discussion of power relationships in the social constructivist approach warns that imbalances in power relationships will negatively impact the potential of learning success. While she discusses this in terms of the power play between student and educator it equally applies amongst peers.

Added to this is the challenge of learning how to manage and measure team members' contributions, on the part of both students and lecturers. Students may not be physically present in a computer LAN with their classmates if they have access from off-campus, and in fact may not even be virtually present in the virtual world at the same time as one of their team members. A percentage contribution form was used to allow team members to determine each member's contribution to a task (marked out of a "fair share" of 100%). In each case a single form was completed, including all team members, reflecting each individual's contribution and signed by each student. While students did penalize team members who had freeloaded (one student received 40% when a pass mark is considered to be 50%), this would not necessarily correct the imbalance in the amount or quality of work which is imposed by someone who abdicates responsibility. In addition, it requires team members to be able to provide concrete reasons for penalties- which may not always be easy to quantify or prove.

Challenges arose for the class as a whole when three days prior to their assessment they exceeded the prim limit (number of primitive shapes allowed for building in SL) and were almost evicted from the corporate land on which temporary building space had been provided. Thankfully strong relations with the corporate and their offices on two other continents who shared the space, allowed for in-world and Skype discussions between us, our students and our corporate hosts. Thankfully this was resolved in a very acceptable manner but clearly, as demonstrated from this vignette, the second Part's complexity far outweighed the former. Part 2 challenges were complicated as it moved from an individual to a team and inter-team basis as teams needed to ensure their team-build integrated into a single campus structure; the content of the course was no longer only theoretical and at least partially familiar but had become theoretical and skill-based requiring new engagement skills (using SL) as well as new development skills (building in SL). In addition, rather than a single supportive Web 2.0 platform (SLN), the platforms increased in diversity and complexity to include a fully immersive VW (SL), SLN, Skype text and voice chat. Even though complexity

increased, students clearly enjoyed the Web 2.0 interfaces with only 1 student (in each case) responding neutrally, and none negatively, to the following two questions:

"I found working in a computer mediated environment like Second Life encouraged me to learn"
"I found that the University 2.0 site encouraged me to learn"

Care should thus be taken not to implicate the approach and the environment as a problematic component when the challenges being experienced relate to undertaking team projects, which is itself often an educational imperative. However, it does highlight the fact that lecturers should be aware of the multiple facets of the educational interaction space. An important lesson can be learnt from this experience for when we venture down this path again:

4. CONCLUSIONS

This research set out to determine what effect a social constructivist learning paradigm implemented in a computer mediated environment has on student motivation. In order to explore this, the course was implemented in 2 parts. The two dimensions that were adjusted (and hence expected to impact levels of motivation) were the move from Real World to a full Virtual Environment and the move from Instructivist to Social Constructivist. However 2 unexpected dimensions that appear to have impacted motivation were the increasing levels of engagement experiences between Part 1 and Part 2, and its negative impact on Attention, and the increasing teamwork requirement.

Figure 4 below depicts these 4 key dimensions and how they can be mapped for Part 1 and Part 2 of the course.

While Part 1 and Part 2 showed positive motivation results, there was a drop off in levels of motivation between Part 1 and Part 2. This seemed to indicate that the move towards a Virtual environment, from a Blended environment did not have a positive impact on motivation. However, closer examination of the results revealed the anomalous situation that while overall levels for Attention, Relevance and Confidence decreased for Part 2, the level of Satisfaction was higher for Part 2. Further analysis of the qualitative data revealed that the major issue raised by students was the impact of teamwork on their learning experience.

Despite the virtual environment providing several advantages for interaction, including time flexibility, levels of anonymity, greater flexibility in communication with lecturers, playfulness etc, it still does not obviate the real world team issues. The change in engagement environment from real world to virtual does not negate the team dynamics that are faced by teams. In some ways these issues can be exacerbated, as team members cannot be available when they are required to be or may even use technology as an excuse for their inability to perform.

Returning to the research questions;

What is the effect on student motivation of implementing social constructivist learning techniques via a Web 2.0 environment?

Both IMMS surveys revealed that student motivation was high when engaging them with a generationally aligned technological learning environment and appropriate learning approach.

What is the impact on student motivation of using a variety of Web 2.0 environments within the same course?

While student motivation was high for all types of Web 2.0 environments, it was apparent that using too many Web 2.0 technologies can negatively impact Attention. However the biggest risk to motivation is not the Web 2.0 environment but rather the real world teamwork issues that persist even within the virtual space. These issues arise often as a result of trying to achieve secondary learning objectives (such as teamwork, communication skills etc.) for the course. While helping students learn about teamwork is valuable, this may negatively impact the effect of the convergence of an appropriate constructivist learning style and Web 2.0 learning environment with generationally aligned students.
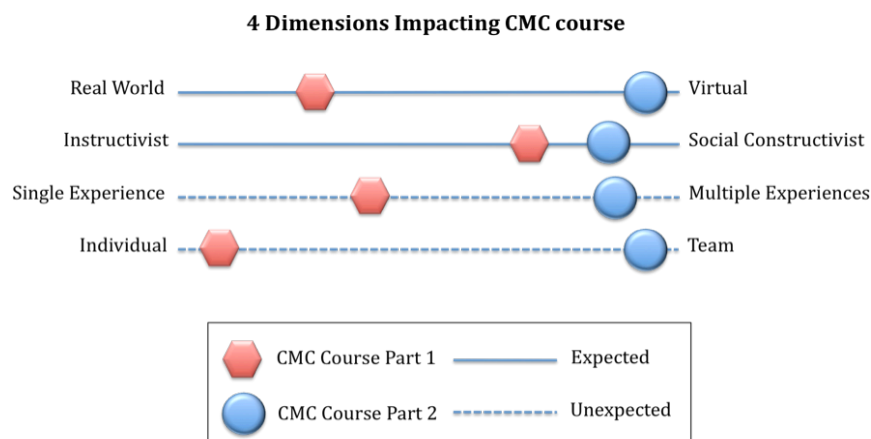
Figure 4: CMC Course Dimensions

5. RECOMMENDATIONS

Two primary recommendations emerge from this research. The first is the impact on Attention and Confidence (and ultimately motivation) of overloading the students in the virtual experience. Once one engages in an active learning approach there will be an overhead price to pay in terms of the amount of content that can be covered (Bonwell & EIson, 1991). When attempting to stimulate motivation and learning by using Web 2.0 platforms it is imperative that the educator is highly cognizant of the skill level (on these platforms) of the students. Do not attempt to use too many platforms and create unnecessary complexity in terms of the platforms used, switching costs incurred and the potential issue of attention deficit- due to attention being spread to thinly.

Secondly it is important to have a clear understanding of the course outcomes, not only in terms of the primary learning outcomes but also in terms of the ancillary skills that might be seen as desirable secondary outcomes. This is particularly the case for so-called soft-skills in Information Systems, including team skills, project management, interpersonal skills, writing skills etc. This study has highlighted that attempting to also meet these secondary objectives added complexity to the learning experience and impacted the ability of a students to achieve the primary and most critical learning outcomes.

Brown and Adler (2008) suggest that "it makes sense for colleges and universities to consider how they can leverage these new connections through the variety of social software platforms that are being established for other reasons". How much more is this true for Information Systems and Technology faculty members who can explore this not only in terms of a teaching tool but also the content of their discipline?

In the light of this call to action, it is anticipated that our focus will remain on studying emerging social computing platforms and their potential application in the educational sector. The objective is to use these platforms as a means of leveraging social constructivist pedagogy and meeting our students, at least partially, in their social (and learning) comfort zone.

6. ACKNOWLEDGEMENTS

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