Designing and implementing virtual enactive role-play and structured argumentation: Promises and pitfalls

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Abstract

This paper focuses on the design and implementation of an innovative technologically-mediated intervention for argumentation pedagogy in two classes comprising seventeen to eighteen year old students in Singapore. The design research involves integrating the Second Life immersive virtual environment and web-based scaffolding through a customized structured argumentation board into a language-based curriculum at the pre-university level (Grade 12), the General Paper, which emphasizes argumentation and critical thinking. Of specific interest in this paper are the processes and factors which impact both the technical aspects of implementation and pedagogical findings. It discusses the benefits and drawbacks arising from the design, planning and implementation of both platforms of technology into the curriculum. Recommendations to overcome problems identified and suggestions for future research in the field are proposed.

Key words: immersive virtual environments, computer-supported collaborative learning, argumentation, Second Life, design research, design experiment

Introduction

This study is an instantiation of an innovative educational intervention recognized under the movement of 'design experiment', 'design-based research' (Brown, 1992; Collins, 1992) or 'design research' (Cobb, 2001; Collins, Joseph & Bielaczyc, 2004) which has gained currency as a research paradigm since the 1990s. It involves 'close collaboration between designers and practitioners' (Bereiter, 2005/2006, p.17) with the project team fully involved in designing and examining processes, tasks and activities carried out, and in attempting to account for effective pedagogical practices. In this paper, we use the terms 'design experiment' and 'design research' interchangeably. As a research methodology, it involves a detailed implementation and intervention study revolving around specific pedagogical goals in rich, authentic settings. The complexities of real-life classroom teaching are taken into account. Design research is essentially a way 'to carry out formative research to test

and refine educational designs based on principles derived from prior research' (Collins, Joseph & Bielaczyc, 2004, p.15). Both researchers and practitioners would thus benefit from the development of theoretical underpinnings grounded in actual contexts of practice.

It is widely recognized that a basic aim of higher education is to develop in students a critical stance or perspective towards knowledge, including an ability to present well-grounded arguments (Marttunen & Laurinen, 2001; Mitchell & Riddle, 2000; Terenzini, Spinger, Pascarella, & Nora, 1995). Indeed, Kuhn (2005) argues that in the move towards 'educating for thinking', the most enduring and valuable skills that educators can impart to students are the skills of inquiry and argument.

In our paper, argumentation involves 'the ability to present well supported and reasoned arguments as well as to engage with alternative points of view- challenging, critiquing, reinforcing or defending them where appropriate' (Coffin, Painter & Hewings, 2006, p. 465). Argumentation skills are acknowledged as essential to 'assess the strengths and weaknesses of other people's standpoints, and to formulate one's own positions supported with relevant and adequate grounds' (Marttunen & Laurinen, 2001, p. 127-128). Students in our study were put through the process of making claims and providing justification for the claims using evidence (Carr, 1999; Toulmin, 1958).

Our study was an exploratory investigation which involved the explicit teaching of an approach to argumentation enhanced by two parallel forms of technology – the immersive virtual environment of *Second Life* (SL) and a customized, specially designed structured argumentation board, *Voices of Reason* (VoR). An argumentation board is an Internet- based online discussion forum with the appropriate scaffolds designed to guide the argumentation process. In the case of

VoR, web-based scaffolding provided input specifically for the construction and analysis of arguments.

The aim of the technologically-mediated intervention in this study was to enable students to engage more effectively in critical thinking as they explored different perspectives, concretized their arguments, and analyzed the strengths and weaknesses of each other's arguments and underlying assumptions. These are skills required in the subject, General Paper (GP), offered to pre-university students (Grade 12) in Singapore, which provided the context for the study.

The GP is termed a 'Knowledge Skills' subject at Higher 1 (H1) level 'for broadening purposes' for tertiary level studies (Ministry of Education, 2004). Students are expected to 'draw on their knowledge from across disciplines as well as to show an awareness of current, global, and significant local or national issues' (Ho, 2006, p.3) in writing an argumentative 500-800 word essay within one and a half hours. The focus is on the 'ability to convey a sustained and well thought–out argument' (Ho, 2006, p.3), and to display skills involving primarily logical and intellectual argument.

This paper offers a review of studies in the field before delving into the theoretical underpinnings of this study and the pedagogical principles informing the design. This is followed by information on the research design and methodology of the two platforms of technology. The benefits and problems arising from the two parallel forms of technology are then discussed with feedback from both teacher and student participants considered. Pedagogical implications are discussed with recommendations for future research in the field proposed. Awareness of the processes and dynamics involved at critical phases of the study is invaluable in guiding classroom practitioners and project teams to co-design and establish conditions that are conducive for meaningful learning experiences.

Review of studies in the field

Our review begins with available studies in the subject discipline, GP, before turning to work involving immersive virtual environments and technologically-mediated studies in argumentation. Local research on GP argumentation pedagogy (De Costa, 2003; Ho, 1995; Ng, 1999) showed insufficient attention was given to the internal structuring of arguments to build students' awareness of the strengths and weaknesses of arguments, and to enable them to critically evaluate one another's arguments. The need to go beyond current pedagogic practices which focused on understanding the macro rhetorical text structure to promoting analysis and evaluation of arguments from a range of perspectives was clearly evident. This was in line with what was envisaged by the Singapore Ministry of Education (2007) as goals in the general curriculum and the exit competencies of pre-university students, namely, 'to think critically and innovatively', 'to draw on insights from different fields, and to think on (their) feet', in meeting the demands of the rapidly changing world of the twenty-first century. Students were required to examine issues from a range of perspectives, and critically assess the strengths and weaknesses of arguments constructed.

While there were recent, small-scale studies on publicly available, online discussion forums used in GP teaching and learning, these dealt more with why and how they added value to the learning process and appropriate instructional strategies (Rappa & Chan, 2006; Tan, 2005). The structured discussion board in this study, by contrast, was designed and customised by the research lab of the university to provide not only tools for generating arguments but was further adapted to enable analysis of the structuring of arguments based on the Toulmin model (1958/2003). The Toulmin model (1958/2003) based on 'fairly detailed models of argumentative

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reasoning' (Newman & Marshall, 1986, p. 5) was built on philosophical and pedagogical issues of logical form based on analysis of reasoning practice. Argumentation was held as 'a primary site of practical human reasoning' with a scheme proposed for 'analyzing the logical microstructure of everyday arguments' (Newman & Marshall, 1986, p.7). The model provided a test for the soundness of argument. It has been applied as a methodological tool for the analysis of a range of school subjects such as English (Andrews, 1995; Mitchell & Riddle, 1996), History (Pontecorvo & Girardet, 1993) and Science (Erduran, Simon & Osbourne, 2004). In the Singapore context, the Toulmin model (1958/2003) was recognized to facilitate instruction in providing 'tools for students to evaluate the persuasiveness of texts that they both read and wrote' (Varghese & Abraham, 1998, p.290).

Studies on the SL virtual world were noted to revolve primarily around the creation of interactive learning experiences for collaboration across time and space among curriculum specialists, learning scientists and assessment experts. These focused on environmental issues and concerns (Hackathorn, 2006), interactive science (Doherty & Rothfarb, 2006) as in a spaceflight museum (Cochrane, 2006), and a global youth development model to deal with child sex trafficking (Feldman, 2006) through a non-profit educational organization, Global Kids. Other studies focused on instructional design issues and learning management systems (Kemp & Livingstone, 2006). With regard to language learning, Morton and Jack's (2005) study of scenario-based interaction with virtual agents involved spoken speech recognition to develop a self-access learning package for Italian and Japanese language learners within a virtual learning environment. The focus was on language proficiency in English as a Foreign Language (EFL) environments.

Presently, there is a dearth of local studies in Singapore on the integration of three-dimensional virtual worlds into the pre-university curriculum. Studies incorporating three-dimensional virtual worlds in this region have, thus far, focused on the elementary and middle school levels in predominantly Science subjects (Chee, 2006a, 2006b; Chee, Liu & Hong 2006; Lim, Nonis & Hedberg, 2006; Yuan & Chee, 2005). These studies addressed primarily effective instructional design issues for student engagement in learning. At the polytechnic level, SL featured in a pilot project for the teaching of Computer Science (Lim & Edirisinghe, 2007). It provided a student and lecturer perspective of the advantages and disadvantages of virtual worlds in the areas of education, commerce, and marketing.

Available technologically-mediated studies in argumentation showed support for social negotiation and the explication of informal reasoning in the form of argumentation through computer-supported collaborative argumentation (CSCA) (Jonassen & Remidez, 2002). CSCA was used to embed the learning opportunities provided by argumentation, for example, through specific discursive processes in learning to model in Science (Baker, 2002), and in integrating simulation and argumentation to enhance organizational decision making (Karacapilidis & Adamides, 2003). These studies which were predominantly based beyond Asian contexts involved primarily computer-supported, collaborative tools for group learning in argumentation in specific disciplines.

This study within the context of the GP fills a critical gap in current educational research in this region for integrating the use of a multi-user, virtual environment with web-based scaffolding in argumentation for the development and analysis of students' argumentation and critical thinking skills at the pre-university level.

Theoretical underpinnings

The study aimed to provide students with a concrete and vicarious learning experience by engaging them through two complementary modes of experiential learning (Kolb, 1984) - namely, the SL immersive virtual environment and VoR web-based structured argumentation board. Experiential learning involved moving from stored units to what was 'experienced' as *events*. According to Jenkins (1974, p. 786), 'contextualism holds that experience consists of *events*. Events have a *quality* as a whole. By quality is meant the total meaning of the event. The quality of the event is the resultant of the interaction of the experiencer and the world, that is, the interaction of the organism and the physical relations that provide support for the experiences'. Experience itself, as Jenkins (1974, p.787) reminds us, 'cannot be viewed as isolated simuli that are presented to people. Rather, what is experienced is a construction of the person . . .,the result of the interaction of the experiencer and the world'. In other words, 'the subject's experience cannot be equated with the observer-experimentalist's view of stimuli. Experience is relational within a context conceived by the subject' (Clancey 1997, p. 65). Ultimately, 'what is constructed is a kind of gestalt or integrated whole' (Clancey 1997,p.64).

This experience of integrated meaning-making was what our study aimed to provide students through the two platforms of experiential learning. The SL enactive role play segment of the learning design was aimed at supporting the 'extensional' mode of learning through 'the active extension and grounding of ideas and experiences in the external world' (Kolb, 1984, p. 52). This 'concrete experience' for students through their thinking in and 'acting' out roles of various characters in SL corresponded to a more 'direct, practical experience' (Atherton (2005, ¶4) as opposed

to theoretical 'knowledge about' something. The web-based scaffolded argumentation discourse in VoR supported the 'intensional' (Kolb, 1984, p.52) mode of conceptual thinking and internal reflective observation. Experiential learning theory further presented knowledge construction as arising from 'the dialectic relationship between the two forms of knowing' (Kolb, 1984, p.101) - the more immediate and concrete 'apprehension' of happenings in the 'here-and-now' (Kolb, 1984, p.102) as with the enactive role play in SL, and 'the interpretive process' of comprehension (Kolb, 1984, p.103) realized through argumentative discussion on VoR. Figure 1 captures the various dimensions of the learning process according to Kolb's (1984) experiential learning theory:

Concrete
Experience

Grasping via
APPREHENSION

Active
Experimentation

Transformation
via EXTENSION

Transformation
via INTENSION

Reflective
Observation

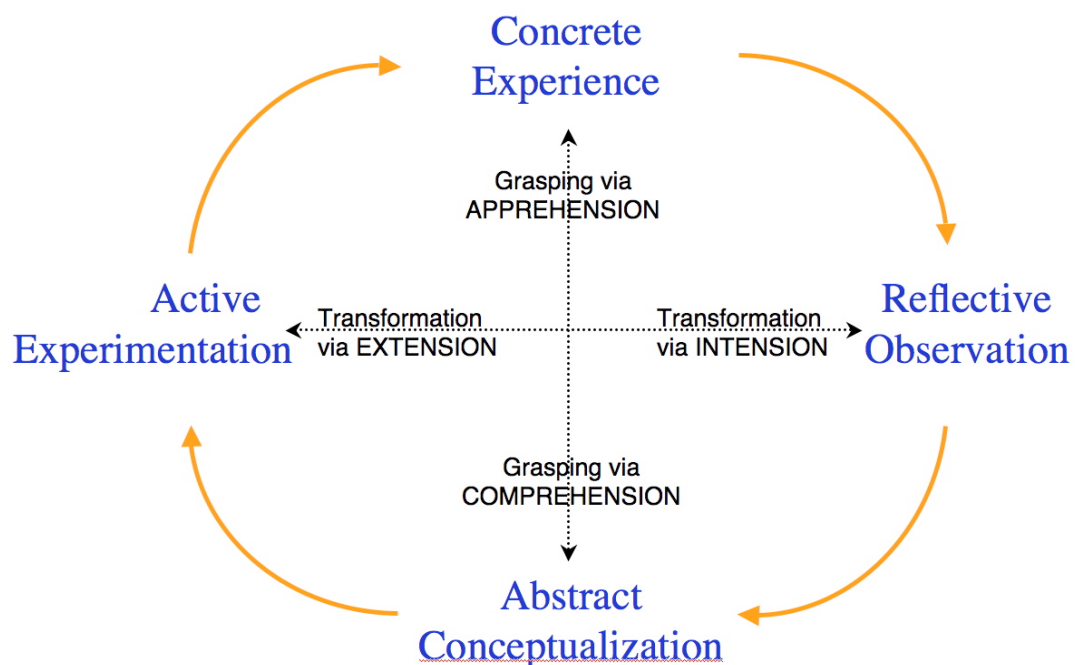Grasping via
COMPREHENSION

Abstract
Conceptualization

Figure 1
Kolb's experiential learning cycle
(1984, p.42)

Integration was a primary, underlying principle in the design of the two technology platforms. SL and VoR were interleaved such that students participated in

the two separate modes of technology-facilitated learning in a cyclic, interwoven fashion. In this way, for the treatment of any particular GP topic, students alternated back and forth between enactment and argument so that the outcomes of each phase continually fed into the processes of the next phase. SL supported active experimentation and provided the concrete experience which formed the basis for students' reflective observations about the issues raised on VoR. Active experimentation and concrete experience were not always the starting point. In one term, students began with abstract conceptualization in the form of a VoR discussion about the desirable qualities of a global citizen. This served to tap students' prior knowledge as well as promoted greater self-awareness about their shared understanding, attitudes and values regarding globalization and global citizenry. SL enactments then provided students the active experimentation and concrete experience to address anti-globalization perspectives. This enabled them to reassess their initial understanding of globalization. This was then followed by another discussion on the VoR where, having understood the full implications of globalization, they discussed the resultant problems arising from globalization.

In our study, setting the process of thinking and argumentation within a specific context of experiential learning realized, in a concrete way, the means for 'situated cognition'. This reinforced Brown, Collins & Duguid's (1989) argument that knowledge was integral to the context and activity where learning occurred. The writing experience of students was strategically situated within a particular context provided for by the immersive virtual environment and the argumentation board. 'Situated writing' (Barton, Hamilton, & Ivanič; 1999; Duranti & Goodwin, 1992; Gee, 2008/1996; Street, 1995) was realized through students' writing experiences which involved real-life issues and outcomes in carefully designed scenarios which

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extended beyond the confines of traditional writing contexts.

Second Life virtual environment

The immersive virtual environment of SL developed by Linden Lab (Linden Research Inc., 2008) provided the platform for enactive role play. The Internet-based virtual world allowed its users, 'residents', to interact with one another through customized avatars (Figure 2). Tools were provided through a 'Creation Portal' (Linden Research Inc., 2008) for the creation of a virtual space for participants to explore, socialize and be involved in individual and group activities with relative ease. Navigation tools facilitated movement within the virtual space by 'teleporting' participants around as they walked, ran or flew from one point to another. Participant-designed avatars allowed for changes in their physical appearance, attire, gestures and names selected. These provided participants a sense of ownership and affiliation with their chosen avatars. Objects (such as sofa, tables) and buildings (such as peasants' hut, official headquarters of an organization) could be built into the environment in addition to creating, editing and uploading sounds and animation for the background.

Figure 2
Screen shot of sample enactive role play session

In order to have a virtual world that was accessible only to staff and students of the participating college, a virtual 'private island' was acquired for use by the team of researchers. Land could be bought by educational institutions in SL for the construction of a private, virtual world primarily for their internal use. The land bought could be used to construct buildings, hold events and carry out activities. There was control over access and visibility within this private space by the owners. The option of making the private island public and opening access to others rested with the owners. A monthly maintenance fee was paid by the research team for access to and use of the island.

The private island, 'YouTopia' was developed for this study within the Teen Grid of Second Life, specifically targeted at teenagers between 13-18 years old. The name of the island, '*You*Topia', sought to convey to students that, as residents of the island, they could create their own perfect or ideal society. The social state of the island depended on them. Students had the power to enact how they would want things to be. The ability to negotiate issues from their own perspectives was what mattered.

None of the students involved had any prior experience with SL. Students volunteered as a class to be involved in the Tablet personal computer (PC) project of the college through an online voting system. The selection was narrowed down to classes where 100% of the students opted to participate in the project. The participating Arts and Science classes were then chosen. Each student was provided a tablet PC for the duration of the study.

The 17 to 18 year old students in the two experimental groups comprised 45 (22 Science, 23 Arts) final-year, pre-university male and female students with average to low ability in the GP subject (mean of standardized test scores was 51%). Two control group classes were included with students having the same academic profile as the test groups. The majority of the students came from families with a predominantly middle to low income background residing in a typical public housing neighborhood estate in Singapore.

Appendix 1 shows an extract of the structure of implementation schedule in weaving the cycle of technology-based components (SL and VoR) with face-to-face components of the study. A SL enactment of a scene in class continued out-of-class at the students' convenience in groups after which there was self evaluation of SL enactments. The teacher then conducted face-to-face in class discussions with feedback provided on earlier VoR sessions. This was then followed by a subsequent SL enactment in class. The out of class SL enactments proceeded without the pressure of time constraint as would be the case during a fixed period of formal class time. The face-to-face monitoring sessions enabled teachers to provide specific input on students' argumentation. At the same time, supplementary teaching materials, where relevant, enabled teachers to explicitly teach specific argumentation skills at the particular stage required. These were complemented by additional homework tasks which reinforced specific aspects of argumentation based on the pedagogical model adopted.

Structured argumentation board

VoR used in this study was developed in a separate research project (Brudvik, Hong, Chee & Guo, 2006; Hong, Brudvik & Chee, 2006). It aimed at facilitating students' acquisition of argumentation skills through collaborative, dialogical, group

argumentation. Scaffolding for the development of students' argumentation skills comprised appropriate sentence openers based on critical aspects of the Toulmin argumentation framework (Toulmin 1958/2003; Toulmin, Rieke, & Janik, 1984). These included the elements (Figure 3): Claim (assertion or conclusion), Grounds (data as evidence to support claim), Qualifier (limitation of the applicability of the claim), Warrant (a reason for making the claim), Backing (scientific models, principles or laws), and Rebuttal (a reasoned rejection of claim, warrant or backing).
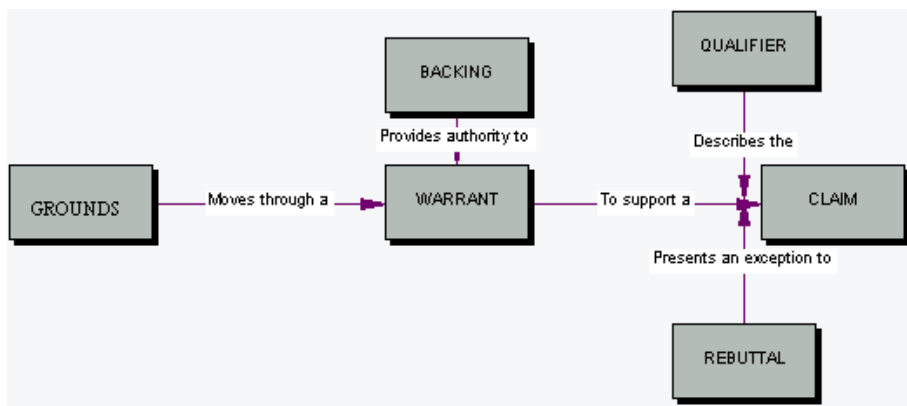
Figure 3
Toulmin argument structure (Toulmin, Rieke & Janik,1984)

A screenshot of the VoR interface, with its threaded discussion functionality and built-in scaffolds, is shown in Figure 4.

Figure 4
Screen shot of VoR

Research design and methodology

Figure 5 captures the research design framing the structure and implementation of the study:
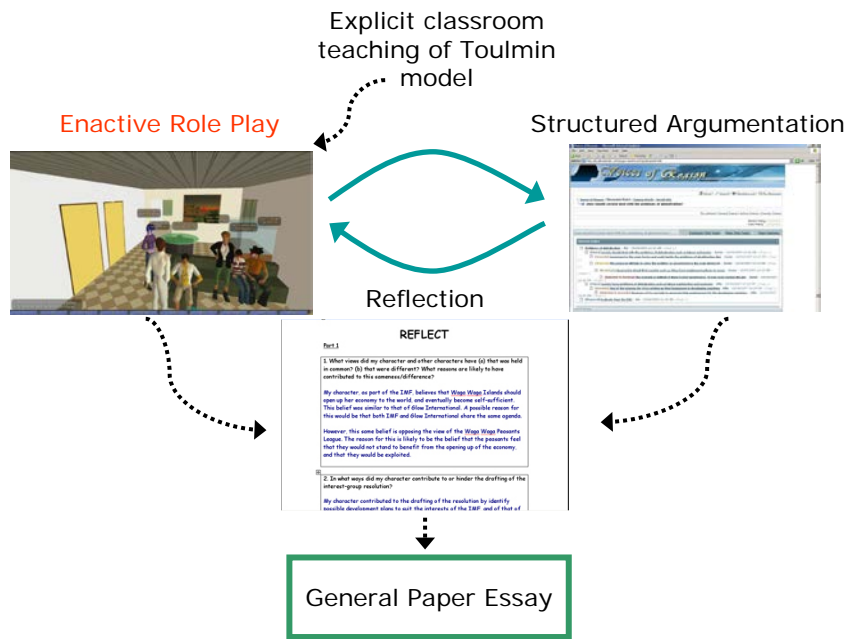
Figure 5
Research design framework

Prior to the virtual enactments, the teacher conducted a series of face-to-face classroom lessons which introduced students to elements of the Toulmin (1958/2003) argumentation model. This was critical in laying the theoretical foundation and grounding in the use of the model. It was appropriate that the content base for these face-to-face sessions maintained the topical link focus to the main themes which would be unpacked in the ensuing virtual enactments and structured argumentation sessions.

Following the first two weeks of face-to-face classroom teaching on the argumentation model, students alternated back and forth between virtual enactment and structured argumentation, in a cyclic, interwoven fashion, for the remaining three weeks of the first term. Each enactive role play session lasted about one and a half

hours. The same teacher facilitated both the enactive role play sessions. In the second term, the cycle repeated itself based on a different theme focus for another three weeks.

The two core technologies of SL and VoR served to complement and reinforce each other, rather than competed with each other. Although the learning experience for students first involved the virtual enactments based on the content in specific scenarios, this was necessary to provide the contextualized experience for students to tap into as a rich content base for their discussion later on VoR. Subsequently, VoR was a key teaching resource in impacting students' understanding of the internal structuring of argumentation. The time spent on VoR was critical in enhancing and making a qualitative difference to the nature of subsequent enactments in the SL environment. Classroom face-to-face facilitation sessions by teachers ran parallel to the technology-facilitated sessions on a just-in-time basis, addressing students' concerns as and when these were raised.

The study evolved over several phases in the project implementation. These are elaborated as follows:

Phase 1 – Conceptualization

The initial stage of conceptualization involved the design of scenarios, development of curriculum materials and resources, and planning for the interweaving of the two platforms of technology to support classroom teaching. While the Co-Principal investigator (PI) designed the bulk of the main scenarios which were revised based on input from the team, the teachers worked on the curriculum materials. Knowing the goals the researchers had for the study was critical. It was felt, though, that while the Head of the English Department was in direct contact with the academic researchers from the start, her two teachers who were critical to the

classroom implementation of the project may not have initially shared the same mental map of the entire design process at this stage. It was during the implementation stage that their understanding of the impact of the design process and interventionist measures on pedagogical approaches evolved.

The intricate work in planning the work schedule for interweaving the two platforms of technology was handled by Co-PI and the Head of English who liaised with each other frequently. Open communication between the two staff allowed for easy accessibility to information and the frequent schedule modifications required based on planned and unexpected college events and happenings. It also facilitated ownership of the project for both academic researchers and classroom practitioners.

To ensure the syllabus and assessment objectives were not compromised in any way, specific steps were taken. Topics and skill sets targeted were consistent with the GP syllabus and assessment objectives. The curriculum was designed to provide students with adequate practice in writing. Pre- and post-test essays and VoR discussions in each intervention cycle gave students the opportunity to engage in the process and topics of argumentation required in the GP.

Phase 2 – Orientation

The second stage of orientation involved teachers' initiation into SL. This was facilitated by the research staff who was the administrator of the virtual world. A handout of overview of basic navigation features and instructions for avatar management in the SL environment (Appendix 2) was provided. The teachers, however, did not individually participate in their students' virtual enactments during class time. A distant gap was observed between the instructors' engagement with the virtual world and their students' first-hand experience. Students' one and a half hour SL orientation sessions were planned for the second lesson after the project briefing.

The implementation stage involved a prior testing of participant interaction in the virtual world. This enabled problems with quality of the logged texts and recorded SL virtual enactments to be identified early. All logged texts from participants' interactions were saved in text format using the SL feature. The quality of image resolution recorded internally within the SL environment was poor. The Open Source software, *Camstudio*, was thus used for all screen activity recordings of role play sessions. The presence of the academic researchers during the first round of virtual enactment allowed for an immediate de-brief session which facilitated open communication regarding initial reactions, concerns and problems. These issues were further addressed during teachers' weekly review of lessons with the Head of the English Department for adjustments to be made to future lessons to enhance the learning experience.

Pre-test and post-test GP essays on related topics were administered at the start and end of each term of the project intervention to assess the development of students' skills in argumentative writing. The results from the pre and post test essays were contrasted with similar topic essays from students of the control group. The control group students did not participate in the technology-facilitated learning but went through regular, face-to-face classroom lessons on argumentative writing based on the college curriculum. The control classes were in no way disadvantaged as the essential skills needed for the GP were covered in the regular curriculum.

Scenarios

Within the YouTopia island of SL, a context was developed for virtual enactment through a series of scenarios. Each scenario carried a distinct creative

tension which was played out in the enactments among participants in each group; the underlying premise being that 'active learning takes place in moments of conflict and disjuncture' (Lewis, 2006). There was a complication, tension or conflict in every scenario. The particular stakeholders had their own legitimate concerns or conflicting interests regarding the problem at hand. The decision to be taken or solution to be offered required students to not only offer an 'answer' but also to simultaneously address the concerns of the various stakeholders. Students, through a process of negotiation, analyzed each complication in terms of the legitimate conflicting interests of stakeholders, and focused on understanding the needs of the relevant parties affected by the specific problem. The goal of negotiation was to reconcile the various conflicting interests of stakeholders in an equitable manner, given the constraints of each context, and to be aware of how proposed decisions impacted their legitimate interests.

Each scenario involved four or five participants in each of the five groups for each class. Where a scenario involved four avatars, the fifth role was that of a student moderator and/or observer with a specific role in monitoring and providing feedback to the team on specific areas. The number of students in each group was kept relatively small so as to give each student an instrumental rather than peripheral role in the enactive role play. The learning outcomes, setting, situation, props, list of characters and role cards relevant to each scene were provided (Appendix 3).

In the first term, students enacted five scenarios based on contexts dealing with life and death issues revolving around euthanasia (Ho, in press). Students had to think in role as particular individuals, namely, doctor, pastor, lawyer, parents of a woman who was in a persistent vegetative state, husband and friend/lover. Students were gradually initiated into the process of virtual enactment beginning with issues

pertinent to teenagers, namely, dieting, looks and weight-consciousness. Their characters then advanced into adulthood to deal with the issue of euthanasia and its attendant medical, religious, moral, social, and personal implications.

In the second term, students role-played in two rounds as lead negotiators in a globalization dispute concerning five interest groups of a fictitious Waga Waga Island (WWI). WWI sought to join the community of regional and international democracies after decades of totalitarian government (Ho, 2007). The students were randomly assigned to one of five special interest groups (native peasants, women's peasants, International Monetary Fund, a non-governmental organization and a multi-national corporation). In the first enactment, members from different parties aimed to establish an alliance, raised questions about resolutions offered by other alliances, and addressed questions concerning their own resolutions. In the second enactment, students submitted their resolution for members of opposing alliance(s) to raise their questions or concerns about each resolution. The original resolution was then amended.

Feedback from students

Feedback from students was elicited through the use of questionnaires administered followed by face-to-face interviews with selected participants. Information was drawn from the students' unedited responses with regard to the benefits and problems with the use of SL and VoR. The positive impact of the experience is presented first before the limitations of the technologically-mediated learning environment. Recommendations follow in a later section.

Benefits

The gains for students ranged from developing a voice for expressing viewpoints and exploring perspectives, enhancing interest in the subject GP, and

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experimenting with the technological affordances provided for within SL and VoR. With regard to developing a voice, students maintained that they 'learnt to develop (their) own points of view which (they) might otherwise not have considered at all'. Most students found the experience 'engaging and innovative'. The interactive sessions allowed them 'to express (their) stand more efficiently'. As a platform for exploration of different perspectives, students indicated they were allowed to 'role play to understand the characters more and hence provided better points of view'. They learnt 'to identify unspoken assumptions' and acquired 'more skills of persuading others that were required in writing essays'. In fact, the ability to 'take into account the views of different people even if you did not agree with the points of view' and 'to have a realistic sense of what was happening in the world but on a smaller scale' were cited as clear benefits shared repeatedly among students. One student felt that 'through conversations with other characters, we could actually see how others think and also why I think in this particular way'. In terms of enhancing interest in the GP, the technological intervention, to one student, 'completely raised GP to another level of excitement'. Another student summed up the experience as - it 'sparked our interest in GP lessons' as it really 'depended all on our minds and imagination'.

With regard to the 'visually enlightening' affordances of SL technology, students believed they were able 'to assume a character in a virtual world to discuss issues that were happening in the world today'. They felt SL was better than other programs such as Windows Live Messenger (formerly MSN Messenger), an instant messaging client created by Microsoft, because 'on SL, we were able to express ourselves better, especially with the feature for gestures to get our points across'. It was generally acknowledged that the immersive environment of SL facilitated the

nurturing of a greater sense of affiliation for a given role or identity. Making sense of the physical environment through the process of embodiment provided students the opportunity 'to create complexity by letting people experience the world from different perspectives'. They had 'to act as a given character' and 'live in a virtual world and make sense of it'(Gee 2007, p. 158). It was this 'making sense of the virtual world amid not just thought but also action in the world' which amounted 'to experiencing new and different cultural models' (Gee 2007, p. 159). Essentially, it enabled students to engage in a specific Discourse ('big D' Discourse, Gee, 1992, 2008/1996) with its inherent ideological stance of shared values and viewpoints. SL realized, in a concrete way, a 'socially accepted association.. of thinking, feeling, believing, valuing and acting' (Gee 2008, p.161). This could be used to 'signal (that one was playing) a socially meaningful "role" ' (Gee 2008, p.161).

Specific reference to VoR also showed direct gains for students. These comprised the nature of feedback, motivation for thinking and consolidation, editing opportunity and quality of argumentation.

One student felt there was 'more constructive feedback' from his classmates which helped him to improve his essay and 'come up with more feasible solutions'. There was frequent mention among students of the environment providing a guided, almost deliberate motivation for thinking through and internally processing an issue. One student shared –

'I think and process a particular topic with different views. It's like sometimes I have to argue on this point even though I don't think so. It's like sometimes I don't agree but I have to think of ideas to back this up. It's like this is actually my rebuttal but now I have to take it as my stand'.

There was also the recognition among students that although the process of critical thinking and argumentation was 'actually more difficult, it makes me do research and understand the topic better; so it actually helps me to widen my knowledge'. VoR was also perceived as creating a base to help students 'consolidate what (they) have learned from second life and from what teachers have gone through on the points on euthanasia and globalization'. Another student pointed out that by 'using VoR I can actually remember what points my friends have gone through and then find evidence to back up my own claim'. The facility for editing one's writing was also raised as a plus point by a number of students - 'Using the VoR…was a better substitute to SL because you can write everything in one spot and you can vet whatever you wrote'; 'you can see your points of views and you could edit it there and then, plus there were the guidelines to use warrants and things like that; so in a way it did improve our GP'. The benefits of VoR highlighted by students were also reflected in a significant increase in the quality of claims, grounds, warrants and a balanced argumentation stance between the students' pre and post test essays (Jamaludin, Ho & Chee, 2007b, p. 435).

Drawbacks

The negative aspects of the two forms of technology adopted related primarily to technical problems. These included Internet connectivity, time lag and frequent updates required. Student unfamiliarity with the virtual environment accounted for distractions from the use of tools for non-verbal communication and the difficulty in focusing on given tasks. There were also limitations in terms of time constraint, requirements or demands of given roles, and space for exploration within the environment.

Students reported initial problems with the use of SL tools as in activating gestures. These came across as 'quite troublesome as we need to click for the actions and emotions and (are) not able to just type a simple code'. The distraction from customizing their avatars' appearance affected some in terms of the focus they needed for constructing their responses in the process of dialoguing. A student claimed it was 'hard to concentrate on what was important'. However, this was not a significant problem with many students. The scheduled time for SL work in class, though, restricted students in terms of their personal exploration of the SL environment, reflection and further discussion with their peers.

With regard to VoR, technical aspects again surfaced as initial problems. Students had to deal with the unfamiliarity of the web-based environment and scaffolding tools provided. This affected participation on the board. In the words of a student: 'Use of the argumentation board was actually quite ok but except that there's some problem that the argumentation is lagging so that it was quite hard to find where our arguments are and caused a lot of confusion'.

Feedback from teachers

The positive gains for teachers ranged from pedagogic advantages for the teacher to student ownership and autonomy in learning. Teachers accepted the technologically-mediated intervention as being integral for pedagogy: 'how ICT could be manipulated to serve our purpose', given that it was 'more than just .. a novelty'. It developed ownership in learning - 'by letting students have the opportunity to have hands-on session in using these technologies, we were actually giving the ownership of learning and technology to the students'. Further, it enhanced students' autonomy in learning - 'we left it in their hands and saw how it benefited their own learning'.

As to drawbacks, specificity in information for user navigation was pointed out by teachers. Although teachers appreciated the usefulness of VoR as a scaffolding tool 'that helped them to identify claims, warrants or backing', what they felt was lacking was 'explanation on how these things like rebuttal worked; it did not give you a step by step instruction of how it worked'. This suggested the need for more explicit background information and instructions to be built in a systematic way into the argumentation platform.

Ultimately, how the tool was used by teachers to enhance student learning was paramount in the study. There was a recognition for teachers to provide the initial hand-holding - 'I think the teachers' part was how to teach the students to use the components accurately, efficiently..and to set the foundation for their friends to critique their own work'. Students could then be given free rein to work on their own. This view was consistent with findings that suggested more explicit instruction in strategizing moves to impact an individual's viewpoint or stance on an issue to facilitate consensus building was required (Jamaludin, Ho & Chee, 2007a, p.567).

With regard to the two technology platforms complementing each other, one teacher felt that 'one was more about developing of perspectives and the other was trying to filter all those perspectives into a discernible structure so that they could argue better; one was really about regeneration and the other was about structuring … they complemented each other quite well'.

Recommendations

Recommendations for addressing specific problems identified focused on the technical aspects of implementation first before discussing pedagogic issues.

Technical aspects

A ten mbps private network line was required for SL access on the Internet by

students because of its graphic intensive nature. GP classes were scheduled at different times for the two participating classes to ensure that the limit for access by a maximum number of twenty-five students was not exceeded. However, access difficulties persisted as the wireless router was unstable. Local area network (LAN) was recommended by the college given the SL graphic intensive content. Given the Ministry of Education network security policy, only college Technology Assistants (TAs) had administrator rights to regularly install patches required onto students' tablet PCs for SL access. Daily evening checks ensured installation follow-up during students' break. Sets designed for 'YouTopia' were recommended by the college not to be placed close to each other to avoid cross-lines in 'conversation' among groups.

Navigation in a virtual world

As with all three-dimensional environments, an island map was useful for navigation. Although names of structures were not visible on the map, a search function facilitated location of relevant structures. The college recommended that the 'Landmark' feature could be used to record the three-dimensional position of a place on the island. These Landmarks could then be set to 'Show on Map' and shared with other residents of the island for users to directly teleport.

Orientation for novice participants

Although orientation session in the virtual environment had been planned for both classes, unfortunately, due to unanticipated technical glitches, only one class had the privilege of a thorough orientation. This led to the class which missed out on the orientation wasting precious time during the first enactment in dealing with basic navigation issues. The flow of their interactions was affected as discussions were disrupted.

Maximizing interactivity within the virtual world

Participant interaction within the SL environment did not extend beyond predominantly texting. The use of non-verbal features such as gestures, moreover, was not sufficiently reinforced early enough in the intervention phase nor adopted consistently and widely by all participants. To maximize interactivity within SL and to leverage on available virtual tools and resources, more could have been built into participant tasks in the form of concrete tokens of incentive for motivating participants to engage more fully with each other in the virtual world. For instance, avatars' haversacks were noted to enable things to be taken in and out. A scoring system through the acquisition and/or exchange of virtual tokens or targeted prize objects as incentives in encouraging a friendly, competitive spirit among participants could have been implemented. This could be based on the quality of arguments, challenge and rebuttals, and depth in questions raised.

The teachers recommended that the sets could have been designed to encourage lateral movement within the virtual environment. Further exploration with particular virtual tools and resources to acquire specific information would bolster students' arguments. For example, students could click on tools in the Waga Waga Peasants' League hut and learn about the harvest and a farmer's earnings or browse through the financial records of the Multi-National Corporation and learn more about its profit and loss margins.

Evaluating and monitoring on-going performance

Evaluation of students' ongoing performance after each role-playing session was not always productive. The teachers suggested making the logged texts of online conversations available to students. This would have facilitated understanding of what they were discussing at a meta-textual level and supported evaluation of their own performance' for the purpose of facilitating consensus building.

Not all students assigned as student observers in the initial enactments were clear over their roles. Teacher demonstration and modeling of effective critical evaluations of enactments would have concretized the task for students as to expectations required and facilitated the representation of a range of views.

With regard to scaffolding for an open learning environment, definitions of key concepts relating to the topic under discussion, and role cards summarising the background, issues and characters involved were provided. However, students' reflection templates could feature guiding questions *during*, not after, virtual enactments. These would facilitate reflection-in-action rather than reflection-on-past action which added to an already heavy cognitive load for students.

Conclusion

This study, in the spirit of design research, sought to integrate empirical educational research with the theory-driven design of our learning environment. It offered a concrete attempt to understand the intricacies of pedagogic innovation of argumentation in practice. By grounding the work in a specific Singapore classroom context, the insights gathered would generate observations useful for application to other settings. Two technology platforms, SL and VoR, were interwoven with in-class and out-of-class sessions. The active experimentation and concrete experience (Kolb, 1984) through SL virtual enactments complemented the reflective observation and abstract conceptualization (Kolb, 1984) of structured argumentation based on the Toulmin (1958/2003) model through VoR.

The intervention involved grounding the specific curricular aims of argumentation in an integrated framework, weaving the two parallel platforms of technology. Argumentation was viewed not as a one-off activity but as a staged, collaborative process that built on students' concrete experience and reflective

thinking and observation over a period of time. The need for explicitly guided, face-to-face instruction and monitoring by teachers was also not to be undermined, given the integral part they played in classroom technological interventions both in the initial and later stages of implementation.

Pedagogical advantages were acknowledged by teachers in enhancing the teaching of argumentation, and in developing student ownership and learning autonomy. Students benefited from developing a voice for expressing opinions and critiquing perspectives, and also having their interest in the subject GP stimulated. The nature and quality of feedback and argumentation, with the added motivation for thinking and consolidation of arguments, were also other areas raised as having a positive impact.

The study, at the same time, showed the complexities involved in planning an implementation schedule. The close collaborative ties maintained between the key researchers and teachers were acknowledged as plus factors for project implementation. The technicalities involved in the platforms of technology adopted were other critical factors to be considered. The study highlighted the need for early attention to issues of accessibility, navigation, orientation and the sustained use of the respective technologies by the students involved.

At the same time, teachers' and students' competencies and their level of readiness in the use of the technologies were also to be taken into account. The role of teachers in maximizing the pedagogical impact of the intervention on student learning was critical. This would facilitate students in acquiring the necessary skills required for effectively exploring different perspectives, and critically evaluating perspectives and arguments presented. There was room for more work in maximizing

interactivity and facilitating sustained engagement for all students throughout the process of argumentation.

The challenge in this study, as with any design research, was to view the pedagogical innovation as a 'joint product of the designed intervention and the context' (Design-based research collective, 2003, p. 7). The 'context' here had to take into account not only the technological demands of the intervention but also curricular goals, classroom constraints and the background of the teachers and students involved. At the same time, the need for 'maintaining a productive collaborative partnership'(Design-based research collective, 2003, p.7) of school practitioners and researchers was not to be overlooked.

It is acknowledged that this exploratory study with a relatively small group of subjects from two classes in a pre-university course may not necessarily be representative of all other situations involving such forms of technology. The discussion and recommendations based on specific issues arising from the investigation, however, provided a useful starting point for other studies in the field which, it is hoped, this study would further stimulate.

The study could provide a base for comparative studies in other contexts to determine the extent to which the findings could be generalized. These could include developing scenarios focusing on other themes within a language-based curriculum such as Crime and punishment and Environmental issues, and at various levels – elementary, secondary and pre-university. The impact of virtual environments integrated with web-based scaffolding on the specific nature of subject matter involved, be it a static body of content knowledge and/or particular skills set as in languages, is a worthy area for further investigation. More research is required for a

more comprehensive framework to account for these forms of technology and their

impact on learning in various contexts.

References

Andrews, R. (1995).*Teaching and learning argument*. London: Cassell Publishers.

Atherton, J.S. (2005) *Learning and teaching: Experiential learning.* Retrieved 7 November 7, 2008, from
http://www.learningandteaching.info/learning/experience.htm

Baker, M.J. (2002). Argumentative interactions, discursive operations and learning to model in science. In P. Brna, M. Baker, K. Stenning, & A. Tiberghien (Eds.), *The role of communication in learning to model* (pp. 303-324). Mahwah, NJ: Lawrence Erlbaum Associates.

Barton, D., Hamilton, M., & Ivanič, R. (1999). *Situated literacies: Reading and writing in context.* London: Routledge.

Bereiter, C. (2005/2006). Design research: The way forward. *Education Canada, 46* (1), 16-19.

Brown, A. L. (1992). Design experiments: Theoretical and methodological challenges in creating complex interventions in classroom settings. *The Journal of The Learning Sciences, 2*(2), 141–178.

Brown, S.J., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning, *Educational Researcher*, *18* (1), 32-42.

Brudvik, O. C., Hong, K. S., Chee, Y. S., & Guo, L. (2006). Assessing the impact of a structured argumentation board on the quality of students' argumentative writing skills. In R. Mizoguchi, P. Dillenbour, & Z. Zhu (Eds.), *Proceedings of the 14th International Conference on Computers in Education* (pp. 141–148). Amsterdam: IOS Press.

Chee, Y. S. (2006a). Experientially-grounded learning in multi-user virtual worlds. In M. S. Khine (Ed.), *Teaching with technology: Strategies for engaging learners* (pp. 295–322). Singapore: Prentice-Hall.

Chee, Y. S. (2006b). Pedagogical design of educational games: What makes a game educational? Panelist statement. *Workshop Proceedings of the 14th International Conference on Computers in Education* (p. 60). Beijing Normal University.

Chee, Y. S., Liu, Y., & Hong, K. S. (2006). Weaving pedagogy into gaming: Learning design principles for developers. In R. Mizoguchi, P. Dillenbour, & Z. Zhu (Eds.), *Proceedings of the 14th International Conference on Computers in Education* (pp. 495–498). Amsterdam: IOS Press.

Clancey, W. J. (1977). *Situated cognition: On human knowledge and computer representations.* Cambridge, UK: Cambridge University Press.

Cobb, P. (2001). Supporting the environment of learning and teaching in social and institutional context. In S. Carver, & D. Klahr (Eds.), *Cognition and instruction: 25 years of progress* (pp. 455-478). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Cochrane, K. (2006). Case study: International spaceflight museum. In Livingstone, D.; Kemp, J. *Proceedings of the First Second Life education workshop,* p.2-5.2006 Second Life Community Convention, 18-20 August, Fort Mason Centre, San Francisco, US. UK: University of Paisley. Retrieved December 1, 2006, from http://www.simteach.com/SLCC06/

Coffin, C., Painter, C., & Hewings, A. (2006). Patterns of debate in tertiary level asynchronous text-based conferencing. *International journal of educational research, 43*, 464-480.

Collins, A. (1992). Toward a design science of education. In E. Scanlon, & T. O'Shea (Eds.), *New directions in educational technology* (pp. 15–22). New York: Springer-Verlag.

Collins, A., Joseph, D., & Bielaczyc, K. (2004). Design research: Theoretical and methodological issues. *Journal of the learning sciences, 13* (1), 15-42.

De Costa, I. P. (2003). *Unravelling Voice: Is there a Person behind the Writing?* Unpublished M.A. (Applied Linguistics) thesis. Singapore: National Institute of Education, Nanyang Technological University.

Design-based research collective. (2003). Design-based research: An emerging paradigm for educational inquiry. *Educational researcher, 32* (1), 5-8.

Doherty, P., & Rothfarb, R. (2006). Building an interactive Science museum in Second Life. In D. Livingstone, & J. Kemp, *Proceedings of the First Second Life education workshop,* (pp. 19-24).2006 Second Life Community Convention, 18-20 August, Fort Mason Centre, San Francisco, US. UK: University of Paisley. Retrieved December 1, 2006, from http://www.simteach.com/SLCC06/

Duranti, A., & Goodwin, C. (Eds.) (1992). *Rethinking context: Language as an interactive phenomenon*. Cambridge: Cambridge University Press.

Erduran, S., Simon, S., & Osborne, J. (2004). TAPping into argumentation: Developments in the use of Toulmin's argument pattern in studying science discourse. *Science Education*, *88*(6), 915-933.

Feldman, L. (2006). Camp Global Kids: A case study of bringing a global youth development model into Teen Second Life. In D. Livingstone, & J. Kemp (2006). *Proceedings of the First Second Life education workshop*, p.11. 2006 Second Life Community Convention, 18-20 August, Fort Mason Centre, San Francisco, US. UK: University of Paisley. Retrieved December 1, 2006 from http://www.simteach.com/SLCC06/

Gee, J. P. (1992). *The social mind: Language, ideology, and social practice*. New York: Bergin & Garvey.

Gee, J. P. (1999). *An introduction to discourse analysis: Theory and method*. New York: Routledge

Gee, J.P. (2007). *What video games have to teach us about learning and literacy*. New York: Palgrave Macmillan.

Gee, J.P. (2008/1996) *Social linguistics and literacies: Ideology in discourses*. New York: Routledge.

Hackathorn, E.R. (2006). Designing an educational island inside Second Life for the National Oceanic and Atmospheric Administration (NOAA) Earth System Research Laboratory (ESRL). In D. Livingstone, & J. Kemp, *Proceedings of the First Second Life education workshop*, (p. 12). 2006 Second Life Community Convention, 18-20 August, Fort Mason Centre, San Francisco, US. UK: University of Paisley. Retrieved December 1, 2006, from http://www.simteach.com/SLCC06/

Ho, M. L.C. (1995). *Discourse features and strategies in students' argumentative writing at pre-university level.* Unpublished M.A. (Applied Linguistics) thesis. Singapore: National Institute of Education, Nanyang Technological University.

Ho, M. L. C. (2006). Introduction. In Ho, C., Teo, P., & Tay, M.Y. (Eds.) *Teaching the General Paper: Strategies that work* (p1-4). Singapore: Pearson Longman.

Ho, M. L. C. (2007). Globalization in the language classroom: The case of the Waga Waga Islands. *Modern English Teacher*, *16* (3), 29-35.

Ho, M. L. C (in press). Dealing with life and death issues: Engaging students through scenario-driven pedagogy. *Journal of the Imagination in English Language Teaching, 9.*

Hoadly, C., & Roschelle, J. (Eds.). (1999). *Proceedings of the third conference on Computer Supported Collaborative Learning*. California: Stanford University.

Hong, K. S., Brudvik, O. C., & Chee, Y. S. (2006). The impact of structured discussion on students' attitudes and dispositions toward argumentation. In R. Mizoguchi, P. Dillenbour, & Z. Zhu (Eds.), *Proceedings of the 14th International Conference on Computers in Education* (pp. 133–140). Amsterdam: IOS Press.

Jamaludin, A.; Ho, M. L. C., & Chee, Y.S. (2007a). Argument-based negotiation and conflict resolution through enactive role play in Second Life. In T. Hirashima, U. Hoppe, & S.S.C. Young (Eds.), *Proceedings of 15th International Conference on Computers in Education: Supporting learning flow through integrative technologies*, (pp.561-568). 5-9 November 2007, Hiroshima, Japan. Amsterdam, Netherlands: IOS Press.

Jamaludin, A.; Ho, M. L. C., & Chee, Y.S. (2007b). The impact of structured argumentation and enactive role play on students' argumentative writing skills. In R.J Atkinson, C. McBeath, S.K.A Soong, & C. Cheers (Eds.) *ICT: Providing choices for learners and learning. Proceedings of Ascilite 2007* (pp.430-439). Singapore: Center for Educational Development, Nanyang Technological University.

Jenkins, J. J. (1974). Remember that old theory of memory? Well, forget it! *American Psychologist, 29* (11), 785-795.

Jonassen, D., & Remidez, H. (2002). Mapping alternative discourse structures onto computer conferences. In G. Stahl (Ed.), *Computer support for collaborative learning: Foundations for a CSCL community* (pp. 237-244). Hillsdale, NJ: Erlbaum

Karacapilidis, N., & Adamides, E. (2003). Integrating simulation and argumentation in organizational decision making. *Lecture Notes in Computer Science: Knowledge-based intelligent information and engineering systems*, 2774, 107-114. Berlin/ Heidelberg: Springer.

Kemp, J. & Livingstone, D. (2006). Putting a Second Life 'Metaverse' skin on learning management systems. In D. Livingstone, & J. Kemp (2006). *Proceedings of the First Second Life education workshop,* (pp. 13-18). 2006 Second Life Community Convention, 18-20 August, Fort Mason Centre, San Francisco, US. UK: University of Paisley. Retrieved December 1, 2006, from http://www.simteach.com/SLCC06/

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice-Hall.

Kuhn, D. (2005). *Education for thinking*. Cambridge, MA: Harvard University Press.

Lewis, C. (2006). Identity, agency and power: Reframing sociocultural research on literacy. Talk presented at National Institute of Education, Singapore on 9 January, 2006, Centre for research in pedagogy and practice (CRPP) Seminar Series.

Lim, C. P., Nonis, D., & Hedberg, J. (2006). Gaming in a 3D multiuser virtual environment: Engaging students in Science lessons. *British Journal of Educational Technology 37,* 2, 211–231

Lim, K. S, J. & Edirisinghe, E.M.N.S. (2007). Teaching computer science using *Second Life* as a learning environment. In R.J. Atkinson, C. McBeath, S.K.A. Soong, & C. Cheers (Eds.). *ICT: Providing choices for learners and learning. Proceedings of Ascilite 2007* (pp.583-586). Singapore: Center for Educational Development, Nanyang Technological University.

Linden Research, Inc. (2008). Second Life. Retrieved January 2, 2006, from http://secondlife.com/

Marttunen, M., & Laurinen, L. (2001). Learning of argumentation skills in networked and face-to-face environments. *Instructional Science, 29* (2), 127-153.

Ministry of Education (2007). New 'A' Level curriculum. Retrieved October 1, 2008, from http://www3.moe.edu.sg/cpdd/alevel2006/experience/exp.htm

Ministry of Education (2004). *Framework for the new 2006 "A" Level curriculum.* Retrieved April 11, 2005, from http://www.moe.gov.sg/corporate/preu_01.htm

Mitchell, S., & Riddle, M. (2000). *Improving the quality of argument in higher education: Final report.* School of Lifelong Learning and Education, Middlesex University, London.

Morton, H., & Jack, M.A. (2005). Scenario-based spoken interaction with virtual agents. *Computer-Assisted Language Learning, 18* (3), 171-191.

Newman, S.E,. & Marshal, C. C. (1986). Pushing Toulmin too far: Learning from an argument representation scheme. Retrieved October 2, 2008, from http://www.csdl.tamu.edu/~marshall/toulmin.pdf

Ng, S.P. (1999). *Using argument analysis to develop critical thinking in the General Paper.* Unpublished M.A. (English Studies) thesis. Singapore: Dept. of English Language & Literature, Faculty of Arts & Social Sciences, National University of Singapore.

Pontecorvo, C., & Girardet, H. (1993). Arguing and reasoning in understanding historical topics. *Cognition and Instruction*, *11*(3/4), 365–395.

Rappa, N. A., & Chan, C. H. (2006). Using discussion boards for English Language and General Paper instruction. In C. Ho, P. Teo, & M.Y. Tay (Eds.), *Teaching the General Paper: Strategies that work* (pp. 217-238). Singapore: Pearson Education South Asia

Street, B.V. (1995). *Social literacies: Critical approaches to literacy development, ethnography and education*. London: Longman.

Tan, K. (2005). Teaching argument with discussion forums in the junior college classroom: Some practical considerations for the teacher-facilitator. In C.K. Looi, D. Jonassen, & M. Ikeda (Eds.), *Towards sustainable and scalable educational innovations informed by the learning sciences,* Volume 133, Frontiers in Artificial Intelligence and Applications. Amsterdam: IOS Press.

Terenzini, P. T., Spinger, L., Pascarella, E. T., & Nora, A. (1995). Influences affecting the development of students' critical thinking skills. *Research in higher education, 36*(1), 23–39.

Toulmin, S. (1958/2003). *The uses of argument*. Cambridge: Cambridge University Press.

Toulmin, S., Rieke, R., & Janik, A. (1984). *An introduction to reasoning*. New York: Macmillan; London: Collier Macmillan.

Varghese, S.A., & Abraham, S.A. (1998). Undergraduates arguing a case. *Journal of second language writing, 7* (3), 287-306.

Yuan, X., & Chee, Y. S. (2005). Design and evaluation of Elva: An embodied tour guide in an interactive virtual art gallery. *Computer animation and virtual worlds*, *16*, 109–119.

Appendix 1   **Extract of Structure of Implementation Schedule**

Scenario in Second Life / Use of Voice of Reason (VoR)	Content focus	Setting/No of characters	In class (IC) or Out of class (OC)/Duration	Curriculum materials/resources/tasks/notes for teachers
Scenario 3	Discussion of legal aspects of euthanasia, responsibility of spouse of terminally ill patient, medical malpractice suit lodged against attending doctor.	Home of Mr and Mrs Wee 3 avatars, 1 student moderator: • Richard Wee – Amy's father • Shirley Wee - Amy's mother • Mohd Faizal-Mr & Mrs Richard Wee's lawyer fr Tahir & Abraham • Student moderator	IC 1.5h	Material on Advanced Medical Directive (AMD), key aspects of euthanasia Rubric for evaluating arguments, sample egs and evaluation
Out of scene dialoguing	Continuation of dialoguing on medical, legal implications	Richard Wee Shirley Wee Sean Wee	OC 1h	Project Portal, journaling/blogging
Self evaluation of SL interactions			OC 1h	After SL enactment, students complete and submit their reflections and evaluation in terms of the following questions: - How does my point of view (POV) differ from others? - What are the possible assumptions that differ between us? - What did I say or do to try to persuade others' to accept my point of view? - What did I say or do to reinforce views that we share? - How did I use this commonality as a stepping stone to resolve our differences?

Teacher feedback on VoR 2 and VoR3	"With great power comes great responsibility." (Spiderman, 2002) What powers and responsibilities should a legal guardian have?		IC 1.5h	Students select, copy and paste relevant information on case studies and well-known persons into an MS OneNote/ Word/Windows Journal file to ensure that their arguments reflect a range of perspectives while adhering to the Toulmin structure. Reference: Definition of key terms, case studies and well-known persons http://en.wikipedia.org/wiki/Euthanasia They then log in and participate in the VoR discussion. They also refer to a rubric to evaluate the strength of each other's arguments (refer to Toulmin notes) on the DB.
Scenario 4	Discussion of observations of movements of particular characters in the recent past, giving rise to suspicion and underlying motives. Decision to involve legal expertise.	Starbucks 4 avatars, 1 student moderator: • Sara De Souza • Santokh Singh • Richard Wee • Shirley Wee • Student moderator	IC 1.5 h	Supplementary teaching material- for S to discover that: -we all have perceptions towards everything, and they are always subjective. Can be done via showing them pictures, quotes (essay questions), speeches, music. -cues to identify assumptions, e.g. use of absolute terms. Supplementary Task: Chunked text passages. 1 sample passage to be discussed in class. Students to: - identify underlying assumptions of the author -find out if there are backing/grounds/warrant -model after the Toulmin structure via written exercise (homework); post them on VoR

Appendix 2

Second Life Orientation: Instructions handout

SECOND LIFE
www.secondlife.com

1. To launch Second Life, double click on the Second Life program on your desktop

2. Log in to Second Life using your Second Life First Name, Last Name and password as indicated at the bottom of this page

3. Your Second Life avatar will appear on YouTopia Island.

4. You can edit the Appearance of your avatar by clicking on the right-mouse button.-->Appearance

5. Familiarize your avatar with the set of available gestures in Second Life (to be used during role-play)

6. You can interact with other avatars by using the 'Chat' function.

7. The Inventory list contains all items belonging to your avatar such as clothing, objects etc.

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Appendix 3

Sample role cards for Scenario 3, Term 1

Objectives:

1. Students to enact and discuss in class the laws and medical practices governing euthanasia in several countries
2. Students to evaluate and reflect upon their own character's comments individually and within group

Learning outcomes:

1. Students are able to compare and contrast international medical laws and practices and are able to recognize the implications of euthanasia as well as medical malpractice.
2. Students are able to recognize and reflect upon the multiple perspectives which exist and are able to shift focus from what is interesting to them to what matters to others

Setting/Situation:

Amy and Kok Leong married when they were 21 years old. After 5 years of marriage, Amy collapsed one morning at approximately 5:30 am. Interruption of oxygen flow to her brain caused permanent brain damage. Chan Kok Leong was appointed by the court as her legal guardian. After another 8 years of Amy being in a vegetative state, Kok Leong has decided to discuss with his lawyer and Amy's doctor Amy's hope for recovery and the possibility of moving her to another country with the aim of euthanizing her.

Your discussion centres on what it means to be in a Persistent Vegetative State and differences in the euthanasia laws and medical guidelines in America, the Netherlands and Singapore.

Props:

Living room of Kok Leong's home at Thomson. Sofa, chairs, coffee table, side table.

Characters:

- Mohd Faizal (Kok Leong's lawyer)
- Chan Kok Leong
- Wendy Chua Ai Ling
- Dr Martin Loh (Amy's physician)

Role Card 1	Role Card 2
Mohd Faizal/Dahlia Samsudin	**Chan Kok Leong**
You are Senior Partner of your law firm. You are known as a strong proponent of revisions to legitimize euthanasia. You want to help the Kok Leong in whatever way you can. You inform him about the differences in the legislations in Singapore, the Netherlands and USA. You also strongly advise KL to agree to a live interview on 'Face-to-Face', a prime -time TV chat show in order to win support from the public which would boost his case to retain legal guardianship. You	You are tired of Wendy pressurising you to get married. You would like to get on with your life with Wendy but you feel a tremendous amount of guilt about abandoning Amy. When she first suffered brain damage, you told yourself that you would not forsake her. You are considering taking Amy to either the USA or Netherlands to have her euthanized by having her feeding and hydration tube removed even though she did not sign any a living will. You feel that in having her

know that the nation-wide public interest in this case is gaining even greater publicity for you and your law firm.

Kok Leong: Your client

Wendy: Your client's girlfriend whom you consider an obstacle to achieving success in this case. You have advised your client to keep this relationship discreet

Dr Martin Loh: Amy's physician whom you are wary of as he seems to be reluctant to have Amy euthanized

euthanized, you are doing what is best for her and that you would not have broken your promise. You are open to your doctor's and lawyer's suggestions.

Wendy: Your lover for the past 3 years whom you have asked to conduct the relationship in as discreet a manner as possible

Mohd Faizal: Your lawyer

Dr Martin Loh: Amy's physician who seems keen to further Amy's treatment

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Role Card 3

Wendy Chua Ai Ling

You would like to use this discussion with Mohd Faizal and Dr Martin Loh as a way to get Kok Leong to move on and start life anew with you. You think that he has spent far too long taking of someone whom you feel is, essentially, not alive. You also feel that you have waited far too long for him to let go of Amy. You are certain that you would not want to continue living if there was no quality of life and that Amy would have thought so too.

Kok Leong: Your lover for the past 3 years who has asked that you both conduct this relationship in as discreet a manner as possible

Mohd Faizal: Kok Leong's lawyer

Dr Martin Loh: Amy's physician whose opinion you do not trust as he has been encouraging Kok Leong to further Amy's treatment

Role Card 4

Dr Martin Loh (Amy's physician)

You have been invited to meet Kok Leong to discuss the likelihood of Amy recovering. However, you are surprised at the turn of events when Kok Leong discusses the possibility of Amy being euthanized. You point out the intricacies of the situation and advise them on medical practices in Singapore in contrast with the Netherlands and USA. You try to provide information in a neutral fashion and offer whatever information you can to enable Kok Leong to arrive at a decision. However, you feel a great deal of discomfort as you think that there is clash of interests since you are Amy's doctor. You are unsettled at meeting Wendy and suspect that Kok Leong intends to end Amy's life so that he can get married to Wendy.

Kok Leong: Your patient Amy's husband.

Wendy: Kok Leong's girlfriend whom you are meeting for the first time

Mohd Faizal: Kok Leong's lawyer

Role Card 5	
Student moderator Your role is to take note of each character's point of view regarding the issue(s) being discussed, whether these have changed over the course of the discussion and surface possible views that they could have raised. You should also examine their interaction with one another to determine how they perceive other characters and why they perceived them as such. Consider how they can better relate with one another. Kok Leong: Amy's husband Dr Martin Loh: Amy's physician Mohd Faizal/Dahlia Samsudin: Kok Leong's lawyer Wendy: Kok Leong's "girlfriend"	