

## Exploring the Virtual Classroom: What Students Need to Know (and Teachers Should Consider)

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### Abstract

Technological improvements in many countries have meant that institutions offering distance education programmes now have more options available to them to communicate and interact with their students, and increasingly, attention is being turned to the potential of Web2 technologies to facilitate synchronous interaction. This study explores the affordances and limitations of an online virtual classroom, Adobe Connect Pro, when used in the learning programmes of two groups of undergraduate and postgraduate education students. Results indicate that while both groups gained value from using the classroom, they also found it a completely new environment, and one to which many had trouble transferring the interaction and communication skills developed in other contexts. The reasons for this related to three specific areas of knowledge – *technical*, *procedural* and *operational*, that were identified as being critical to student performance in this environment. The study suggests that educators and course designers need to embed strategies into their online offerings to enable students to develop these, if they are to gain substantial benefit from the availability of virtual classrooms. Additionally, the study identified that when making design decisions about online learning environments, it is very much a matter of *horses for courses* when selecting tools for specific purposes. While the virtual classroom proved useful for developing social connection and a sense of community, it may not be so beneficial for supporting deeper learning.

**Keywords:** online, learning, synchronous, interaction, Web2, community.

### Introduction

Recent technological developments have stimulated significant changes in the distance learning landscape, meaning that students have greater choices and flexibility in how, when, and where they learn. No longer are students tied to place and time – needing to physically attend classes, lectures or tutorials – but rather, are able to access and interact with tutors, other students and learning materials, using an array of digital devices such as laptop and tablet computers, and even mobile phones. Concurrent to the proliferation of these technologies, many tertiary education institutions have been quick to identify opportunities to use them to cost-effectively expand their reach, and, in some instances, as catalysts to challenge existing distance education practices (McBrien, Jones & Cheng, 2009; Murphy & Rodriguez-Manzanares, 2009; Scanlon & Issroff, 2005). This study explores students' experiences of one of the most recent additions to the toolset of online educators – the synchronous virtual classroom – and identifies areas where educators should pay attention to ensure their students gain maximum advantage from its use.

### Interaction in Distance and Online Learning

Typically, institutions have utilised a range of asynchronous online learning systems such as WebCT, Blackboard, Moodle, or InterAct to deliver course content to their students, this, in some cases, being supplemented by online discussion forums, synchronous one-to-one text-based chat, and break out rooms such as online cafés. While the advent of asynchronous systems to distance learning represents a significant progression on previous text-based correspondence modes, as authors such as McInerney and Roberts (2004) and Moore (1997) point out, learners studying at a distance can still suffer from a sense of isolation and disconnect which can adversely affect their performance. Moore and Kearsley (1996) refer

to this as *transactional distance*, however define it not in geographic terms, but as “a psychological space of potential misunderstandings between the behaviors of instructors and those of the learners” (p. 200). Moore (1997) claims that the extent of transactional distance experienced by distant learners is the result of the interaction of three elements within any course – the degree of learner autonomy, the level of flexibility of course structure, and the extent to which quality dialogue is able to be established. While all three are important, Moore emphasises the establishment of quality dialogue as being critical. By this he refers not simply to the presence of written or oral exchanges between participants, but to the qualitative nature of all interactions and activities that facilitate communication and relationship building, contributing to the formation of effective learning communities.

In a study of 1100 MBA students at the University of Wisconsin, Hay, Hodgkinson, Peltier and Drago, (2004) identified interaction as being crucial to online course effectiveness. After completing a multiple regression analysis to identify the relationship between types of interaction (instructor-student; student-student) and perception of course effectiveness, Hay et al. (2004) determined that instructor-student interaction was “the stronger of the two interaction measures in terms of predicting effectiveness for both types of delivery” (p. 200). However, analysis showed that in the online context, student-student interaction accounted for more variance in overall effectiveness than in the traditional classroom, possibly indicating that online students relied more on each other to support their learning. Hay et al.’s (2004) study is particularly interesting, in that it not only highlights the critical importance for all courses - online or face-to-face – to be designed to maximise inter-participant and tutor interaction, but it also goes some way towards dispelling myths related to the inferiority of online learning.

Another study conducted by Picciano (2002) explored interaction and sense of presence, and its relationship with postgraduate student course satisfaction and performance, as measured by perception of achievement of course objectives. Unlike other studies that indexed satisfaction and performance solely against course assessments or withdrawal rates (eg., Shea, Fredericksen, Pickett, Pelz & Swan, 2001), Picciano’s (2002) study used a questionnaire based on the Inventory of Social Presence, in addition to results from an examination and a written assignment, and data from online forums. While results indicated a relationship existed between students’ perceptions of the quality of their online interactions and their course performance, there was some inconsistency between this and quantitative measures of interaction, such as the number of contributions made to online forums. Interestingly, data indicated that students who were rated as having high levels of student-student interaction, outperformed others in assignment tasks that required collaboration - in this instance, the development of a case study. Consistent with Hay et al.’s (2004) findings, Picciano (2002) concluded that interaction between students during the online discussions built collaborative relationships, which, in this case, positively transferred to the assignment task. However, he also points out that the issue is a complex one, which requires multiple measures in arriving at any substantive conclusions. Studies by Gunwardena and Zittle (1997) and Jiang and Ting (2000) support this perspective, with Jiang and Ting’s (2000) study suggesting that for some groups instructor-student interaction may actually carry more weight, by stimulating higher levels of student contribution.

### **Synchronous Interaction and Online Learning**

While literature indicates the importance of interaction for supporting learning, it is somewhat less clear on the most effective means of facilitating this online (Gunawardena & Mclsaac, 2004). While most current online course offerings utilise predominantly asynchronous systems, recent improvements in technology and bandwidth in many countries have meant that synchronous communication is now becoming a viable option (Hrastinski, 2008). Although synchronous components have been present in many online courses for a number of years through text-based chat functionality, more recently, attention has turned to the potential of new technology to deliver streamed video and audio, provide access to suites of interactive tools such as ‘virtual whiteboards’ and file and document sharing, and allow learners to interact in real-time in purpose-built, virtual classroom environments.

Early work by Wang and Newlin (2001) in the use of text-based synchronous and asynchronous interaction indicates that each has a place in online learning, and that they serve different but complementary purposes. Wang and Newlin (2001) claim that synchronous interaction can be more effective in fostering the social goals of learning-community development, while asynchronous is more suited to the delivery of content or for administration purposes. This perspective is supported by Haythornthwaite (2002) and more latterly, Hrastinski (2008). Haythornthwaite (2002) argues of the importance of content-related, planning-related, and social-related interaction in the formation of effective

e-learning communities, while Hrastinski (2008) examined the relative effectiveness of synchronous and asynchronous interaction in these areas, for a group of Masters-level e-Learning students. While predictably Hrastinski's (2008) analysis revealed an overriding emphasis on content-related interaction across both modes (average of 57% synchronous vs 96% asynchronous), what was interesting was the extent of the difference between the two modes when used for collaborative planning and social support activities (average of 43% synchronous vs 4% asynchronous). Hrastinski's (2008) study clearly illustrates the students' *horses for courses* tool use decision-making process along a quite definite social/collaborative vs academic/content divide, and adds weight to earlier arguments about the complementary role both forms of interaction can play in supporting quality online learning.

Although literature indicates the importance of interaction in distance learning and that the use of tools that enable synchronous interaction is not new, due to their recent introduction, research into the use of virtual classrooms in distance learning is not so prolific. The following study seeks to add to literature in this field by exploring how using the virtual classroom Adobe Connect Pro, affected the learning experience of two groups of university education students.

### Research Context

This study was conducted over a 16-week semester during the second half of 2010, with the unit of analysis comprising 22 students from two university education courses. The first group of 10 were undergraduates in the final year of their three-year teacher education degree (all female, aged 23-38 years); while the second was a mixture of 12 primary, secondary and tertiary teachers and principals, industry training personnel, and people involved in online media production activities, studying for their Postgraduate Diploma in e-Education (10 female and 2 male, aged 28-52 years). The undergraduates were self-selected from a larger group of 80 who were studying via blended delivery involving online plus three weeks per year on campus, while the postgraduates were studying completely online. For both groups, this was the first time they had used the virtual classroom, and the purpose for using it was different for each group. The postgraduates engaged in a series of tutorials culminating in the presentation of an assessed seminar, while the undergraduates participated in tutorials providing feedback from assessment tasks, and introducing online forums and assignments. Students from both groups were geographically distributed across the length and breadth of New Zealand.

### The Virtual Classroom

The Adobe Connect Pro virtual classroom used in this study was a web-based, centrally-hosted platform which students accessed via a unique URL and password. Figure 1 illustrates a typical classroom layout, with the video/audio, participants, presenter notes and references, and shared whiteboard pods being visible. Other pods such as text-based chat, polling, and desktop, application and file sharing were revealed and used, as needed.

### Theoretical Reference

This study draws on the *tool mediation* tenet of Engeström's (1987) Activity Theory, although it does not attempt to use the entire framework in its analysis. The notion of tool mediation – that is, that human activity and interaction is influenced and mediated through the use of technological systems and artifacts, makes it useful for studies where technological innovations have been introduced into educational contexts (Benson, Lawler & Whitworth, 2008; Boer, Baalen & Kumar, 2002; Groves & Dale, 2004; Karasavvidis, 2009; Li & Bratt, 2004; Lin & Laffey, 2006; Murphy & Rodriguez-Manzanares, 2008, 2009; Mwanza & Engeström, 2005; Russell & Schneiderheinze, 2005). For this research, the concept of tool mediation was used as a critical referent against which to study any affect the virtual classroom had on the students' learning experience, and in particular, to identify any affordances or limitations of the virtual classroom and how it was used in assisting students to achieve their goals.

### Research Questions

The following research questions guided data collection for this study:

1. What affordances and limitations did students identify related to the use of the virtual classroom?
2. What factors impacted upon the effectiveness of the students' virtual classroom experience, and in what ways?
3. What information does this study provide to improve the use of virtual classrooms for distance learning?

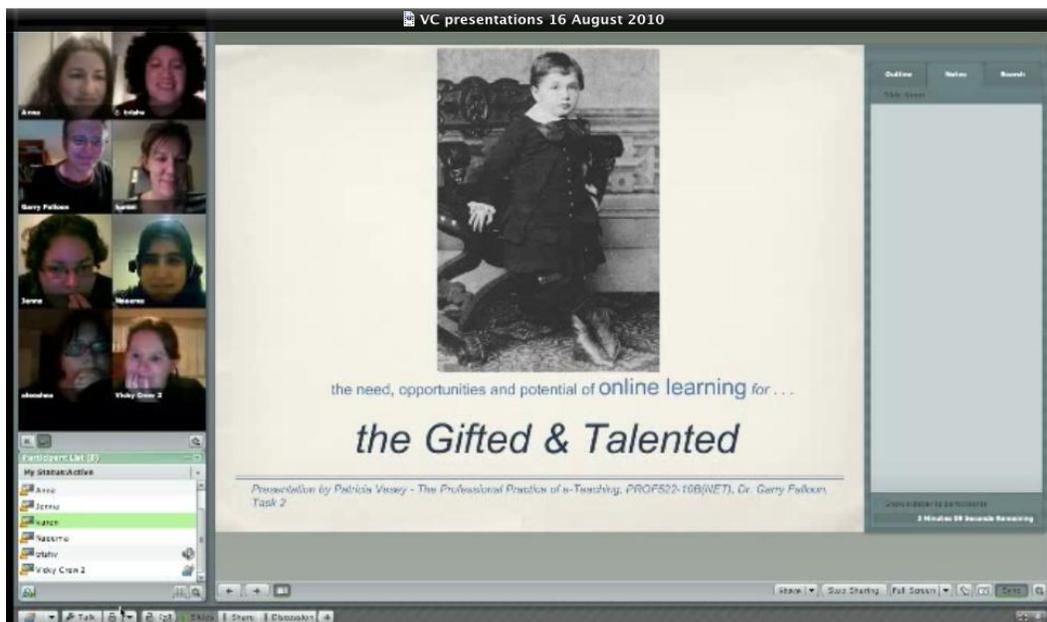


Figure 1: A typical virtual classroom layout

### Research Method, Data Collection and Data Coding

This study adopted an interpretive case study method, and used qualitative tools to gather data. To enhance validity, multiple tools were used. These were:

1. Individual participant interviews using a semi-structured interview schedule undertaken at the conclusion of the virtual classroom sessions (Appendix 1). All interviews were transcribed by a research assistant;
2. An anonymous 5-point Likert scale/short response questionnaire administered at the conclusion of the virtual classroom sessions using the online survey tool, SurveyGizmo™ (Appendix 2: Table 1);
3. Each of the virtual classroom sessions was recorded using a screen capture application called IShowU HD. This application recorded as video all screen activity and associated audio. During the six recorded virtual classroom sessions, over 7 hours of recordings were made.

Data were coded using an adaptation of Braun and Clarke's (2006) *Thematic Analysis framework*. Thematic Analysis was selected because it provided a structured method of organising and interpreting data of different types into progressively more tightly defined themes, directly aligned with the research questions. As the researcher was also the teacher of both groups, all interviews were carried out by an independent research assistant. In generating themes and to enhance internal validity, the assistant also supported the coding process. Interview transcripts and questionnaire results were duplicated and independently evaluated for themes that directly responded to the research questions. A meeting followed where the researcher and assistant compared their analyses and negotiated the following themes, under which subthemes were developed and data coded:

1. The impact of student knowledge of the virtual classroom on the quality of their learning experience;
2. Affordances and limitations of the virtual classroom (and the reasons for this) for supporting interaction, engagement, and deeper learning;
3. The relationship between the purpose for use of the virtual classroom and student perception of its value.

While audio from the iShowU HD video was not transcribed, the assistant reviewed each recording and generated a time-log, indexing relevant quotes and comments under each theme. These were included in the dataset. At the conclusion of the coding process an inter-rater reliability treatment (kappa) was

performed, and after some minor adjustments to interpretations, this yielded a consistency score of .69 ( $p < 0.05$ ) indicating substantial agreement between raters (Landis & Koch, 1977).

The research was approved by the University of Waikato's Research Ethics committee. It followed standard ethical guidelines including informed consent, right of participant or data withdrawal, procedures for data care, use and treatment, and measures to ensure participant anonymity.

### Findings and Results

While there were two participant groups involved in the study, findings and results are collectively presented here, with any significant differences being described where appropriate. Due to the volume of data it is not possible to present it all here, so representative samples have been selected relating to each coding theme. In presenting questionnaire results, data have been rounded to whole percentages.

### Impact of Student Knowledge of the Virtual Classroom on the Quality of Their Learning Experience

Data coded under this theme referenced three subthemes. The first of these was student *technical* knowledge, such as how to set up equipment, log in, and navigate the virtual classroom. The second was their level of *procedural* knowledge regarding the protocols and conventions to be followed when interacting in the classroom, and the third was *operational* knowledge – that being defined as knowledge of how to best use the communication tools available to them in the classroom.

While results of the Likert questionnaire indicated high levels of student satisfaction with the use of the virtual classroom (questions 1 and 7 - with an average of approximately 79% rating these at 4 or 5), qualitative comments revealed that for most, the experience could have been improved if they had greater knowledge of how the classroom worked. While 'practise' sessions were held for each group before formal interactions commenced, many were still unsure of the correct settings for their computers, had trouble logging in, or were unfamiliar with how to manage the classroom's tools. The technical design of the classroom also exacerbated this issue. An example of this was that participants needed to be promoted to *presenter mode* to be able to broadcast video and sound, which also meant they could control the meeting, and along with it, everyone else's screen. This caused frustration for some, who made comments such as,

We needed clearer guidelines on how the system worked, because in the last one there were a lot of people pressing buttons. I kept pulling my hand back from the keyboard; I thought 'I'm not going to touch anything' and I wished they would stop it... because it was completely confusing me. Things were going all over the place (Christine, interview, 21 September, 2010).

Having to put everyone as presenter to get their video working... it changes the dynamics of it a bit... if you have to say 'you can't touch this and you can't touch that.' That was a definite limitation (Helen, interview, 4 October, 2010).

To maximize continuity, an agenda was distributed and slideshows or Flash movies were uploaded in advance of each meeting. The agenda included a list of participants, items or topics to be discussed, the format/approximate timing of the session, and necessary pre-reading. Participants appreciated this structure as indicated by responses to questionnaire question 11, which just under 83% rated at 4 or better. However, qualitative feedback indicated that student unfamiliarity with the environment and the protocols for asking and responding to questions, had a stifling effect on interaction. Some students appeared unable to transfer learnt conversation or interaction skills and protocols to this new environment. As one participant commented,

I didn't know what to do... I didn't want to jump in (and ask a question). I thought it was just easier to let her go (on with her presentation). I had lots of things I wanted to ask... but it's not like when you are in a classroom or anything. I put my hand up to say something (the 'raise hand' emoticon) but it wasn't registered – it didn't come across until later – and by that time, the moment had passed (Becky, interview, September 23, 2010).

Another stated that the synchronous nature of the virtual classroom acted as a disincentive for her to interact, claiming, "I didn't feel comfortable. I don't feel comfortable asking questions online, and this was worse. You can look stupid. You don't have a lot of time to think about what to say, so you don't say anything..." (Kate, interview, September 21, 2010).

Of the 22 participants, 16 made comments indicating that group size discouraged their interaction. While not all attended every session, there was a general tendency towards the larger the group, the less interaction. When one participant was asked about this, she commented, “it would have been easier with a smaller number – probably about eight, max. If you really want to get into the content and deeper learning...” (Rebecca, interview, 18 August, 2010). However, others appeared caught between agreement with this, and acknowledging the benefits of having as many as possible together for developing a sense of community, and helping break down learner isolation.

Possibly the most influential factor identified related to student *operational* knowledge. This significantly affected how well students were able to communicate meaning and respond to feedback in the classroom, and particularly influenced the assessed seminars presented by the postgraduate students. While some students reported frustration at the lack of verbal feedback, others appeared unsure of how to monitor and respond to feedback provided by the video images (body language etc.), or use the emoticon tools (thumbs and hands up, down, sideways etc.) to convey or interpret formatively, feedback on what was being presented (iShowU HD, 34.30-47.08). Some appeared to be distracted by having no idea how they were ‘coming across’ to their audience, and this may have had a negative impact on their performance,

...you were just firing away with your presentation, but there was a thought in the back of my head, can they actually hear me – how am I coming across? Not being able to get that instant feedback, like in a room when you are speaking... you know how to adjust; you can read your audience better. That was a bit daunting... there was just no way of knowing. I wasn't sure I was making that connection (Helen, interview, 4 October, 2010).

Some students picked up on this point, and were well aware of the impact this appeared to have on the quality of others' presentations,

I noticed in the second one (presentation) the person was having trouble with the sound, and watching her, just the level of disadvantage it was. She was really frustrated by it. That must have affected how well she did (Simone, interview, 20 September, 2010).

Another commented that a lack of operational knowledge and of the capabilities of the tools in the classroom, narrowed her options when it came to preparing her seminar. She stated that there was a need for students to be “completely familiar with the environment if it was to be used for ‘high stakes’ assessment” (Petra, interview, 27 September, 2010) otherwise their capacity to convey understandings to the best of their ability could be compromised. She illustrated this by her own experience, claiming, “we only touched on what could be done in there... I could have uploaded and used the screen-share, and the pointer, and highlighted various things I wanted to talk about. I could have been much more creative” (Petra, interview, 27 September, 2010). She was also aware of how a lack of operational knowledge impacted upon others, commenting, “I felt sorry for Julia – nobody could hear her video, only see it. I think it must have been in the wrong format or something” (Petra, interview, 27 September, 2010).

The level of technical, procedural and operational knowledge undoubtedly influenced students' perceptions of the value of the virtual classroom, and how well they performed within it. It appeared that these groups viewed the classroom as a completely new environment – one with its own rules and procedures they needed to master. However, this did not seem to undermine their willingness to persevere, with many putting such issues down to the ‘learning curve’ associated with any innovation. This claim is supported by quantitative data from the questionnaire, with slightly less than 92% of students registering a 4 or better response to question 7: *To what extent would you support the use of the virtual classroom more frequently in courses such as this?* Most felt it was more a matter of time and experience that would enable them to gain the best advantage from the classroom.

### **Affordances and Limitations of the Virtual Classroom (And The Reasons For This) For Supporting Interaction, Engagement, And Deeper Learning**

A number of affordances and limitations of the virtual classroom for promoting learner engagement, interaction and deeper learning, were identified in this study. Seven questions from the questionnaire linked to this theme (questions 2, 3, 4, 5, 8, 9 & 10) across three subthemes. These were: relationship development (2, 3); learner isolation (4, 5); and collaboration and knowledge development (8, 9, 10).

## Relationship Development

Questionnaire data indicated an average of slightly less than 86% rated questions about the affect of the classroom on relationship development at either a 4 or 5; however, there was a considerable difference in the average rating between groups. While approximately 91% of postgraduate students allocated these ratings, this applied to only 76% of undergraduates. Analysis of qualitative data provided insights into the reasons for this.

Postgraduate students who were studying completely online rated these questions the highest, in particular, students from minority ethnic groups. Feedback from two of these students – one from Iran and the other from Romania, strongly advocated the use of the classroom earlier and more frequently in their course, indicating its powerful impact for building friendships, helping to diminish barriers and self-consciousness associated with being non-native English speakers, and strengthening their sense of security as members of a supportive learning community. The visual and conversational nature of the environment enhanced these students' sense of connection with their peers, which had a flow-on effect to other aspects of their coursework,

I feel that they are not only pictures. I see them as real people. I can talk with them. We talk not only about the learning, we talk about other things like another participant's cat. I see how they act. In the last week, I didn't write many comments in Moodle as I'm afraid I'd mistake or something (sic), but after I'd finished that classroom, I went to Moodle and wrote two or three comments including jokes from me because I feel, 'Oh, they are friendly. It's OK to make mistakes with them' (Julia, interview, 18 August, 2010).

Similar sentiments were echoed by others, one who commented that the addition of video and audio assisted them to get,

...a better sense of people's personalities – who they are as a person – that sort of thing. We only get a snippet of that from what they write, but actually being able to see what a person looks like – see their face, their emotions, their voice... it makes it so much more real (Helen, interview, 4 October, 2010).

Although the undergraduates made similar comments, they tended to emphasise the value of the classroom for *maintaining* rather than *establishing* relationships. This was not really surprising, given the mixed-mode delivery of their course, and the fact that they were in their final year and had met face-to-face three times previously. As one commented, "we have a strong community which really needs to continue to develop and support each other, and also share ideas" (Becky, interview, September 23, 2010). Another stated that the sessions reinforced relationships, as she "knew each of them beforehand. I feel I know them in the same way. It was great to catch up again, but nothing's really changed" (Katrina, interview, September 2, 2010). However, most indicated that they would have appreciated using the virtual classroom earlier in their degree, as they considered it was a valuable tool for forming supportive relationships. Others commented on the potential of the classroom for student-initiated study groups, or for interacting and maintaining networks when they commenced teaching.

## Learner Isolation

Consistent with previous studies (McBrien et al., 2009), both groups rated positively questions regarding the affect of the virtual classroom on learner isolation. An average of just under 90% rated responses to questions 4 and 5 at either Likert 4 or 5, and this was once again supported by qualitative data. Perceptions in this subtheme linked with relationship development, and the importance students placed on physical contact as part of *belonging* and *community membership*. Although students in both courses were geographically dispersed, some had organised their own group meetings, although as one described, "this can be a hassle as I usually have to stay overnight and organise care for my children when I am away" (Tessa, interview, September 24, 2010). Interestingly, one student made a distinction between face-to-face and person-to-person contact, claiming that although the virtual classroom "was a big step up on Moodle (text-based interactions), it was not the same as actually fronting up in person" (Simone, interview, 20 September, 2010). Elaborating on this, she added that being able to see and hear each other "seemed to be a powerful thing, but you don't get it all. You only see a small head – it's amazing how much extra information you can get from the rest of the body – movement, gestures..." (Simone, interview, 20 September, 2010). This point was also mentioned by another, who claimed,

...it's lonely studying at a distance... you definitely lack that ability to be part of a group... you actual forget you are! But I don't think it (the virtual classroom) can every completely take the place of getting together (in person), but it's sure better than nothing (Christine, interview, September 21, 2010).

Some feedback pointed to the value of the classroom as going at least some way towards providing what one student described as "the intimacy needed to learn from and with each other" (Becky, interview, 20 September, 2010). By this she referred to the viewable layout of the classroom and the power of the video and voice, which, in her opinion, created "a more private environment, and a chance to just look at one another" (Becky, interview, 20 September, 2010). She compared this to a lecture or tutorial environment, where opportunities for actually 'eyeballing' other students were minimal. As she put it, "we don't look at one another (in lectures)... we look at the front, and we don't have tutorials in this course like on-campus students do, so I think that visual aspect is significant. It certainly helped with my connection" (Becky, interview, 20 September, 2010). Others shared similar views, commenting that their decision to be involved in this study was at least partially triggered by a desire to connect with others who they had not seen at all, or in nearly 12 months (Katrina, Tessa, Petra, Emma, Alexandra, Sam, Kate, Robyn, Marlyn, Jenna).

### **Collaboration and Knowledge Development**

On average, just over 94% of participants recognised the potential of the classroom for supporting student collaboration, rating as either 4 or 5 their response to question 8: *To what extent do you perceive the virtual classroom as a tool for students' use?* Most feedback identified document sharing and the combination of sight, sound, and live interaction as being potentially beneficial, especially if students were able to access the classroom on an 'as-needed' basis, to collaboratively complete assignments or other tasks. Although some students had organised their own study groups using email, Skype™, phone, and Google Docs™, many felt the convenience of having all of these available 'under the same roof', to be highly beneficial. One student illustrated this by reference to her literacy assignment, commenting, "we're talking about the forms of language... and honestly, my email... maybe 50 a day coming through about it. It would be much more efficient to use the classroom, and so much easier to build an answer together" (Christine, interview, 21 September, 2010).

Opportunities for using the classroom for collaborative knowledge development were identified by many students, and are consistent with Jonassen and Rohrer-Murphy's (1999) findings on the value of technology to support constructivist learning. However, while the environment was identified as being potentially useful in this respect, findings indicate some students struggled to communicate accurately and meaningfully within it. Likert data from question 9: *How easy was it to communicate your thoughts in the virtual classroom?* yielded, at best, lukewarm agreement, with an average just over 62% of responses rating this at 3 or below. Interview data revealed that the synchronous nature of the classroom actually discouraged interaction for some, due to the lack of reflective time available to construct what they perceived to be quality responses. Despite the trust and confidence-enhancing benefits already reported, many participants remained self-conscious about how they would appear to others, and chose to opt out, rather than, as one put it, "risk looking like an idiot in front of the others" (Alexandra, interview, 18 August, 2010). Eight made comments that they found the asynchronous forums more useful for promoting deeper learning, as they allowed time for research rather than "having to think off the top of your head – which I'm not that good at" (Sam, interview, 21 September, 2010). They also commented they felt less pressured in the forums, as their contributions could be distributed over a greater time period.

Interestingly, there was once again a marked difference between the results of the two groups. While 77% of the postgraduate students rated question 9 at 3 or below, just under 40% of the undergraduates did likewise. Qualitative feedback from this latter group indicated that their greater familiarity with each other through having met on campus, and relationships developed over a longer period, helped diminish their self-consciousness and encouraged them to contribute. While IShowU HD data was not precisely analysed for differences in interaction time, observationally this was far greater for the undergraduates, which tends to support this claim (IShowU HD, 2010).

### **Relationship between the Purpose for Use of the Virtual Classroom and Student Perception of Its Value**

An average of just under 82% responded to question 6: *To what extent do you consider the use of the virtual classroom affected your studies?* with Likert ratings of 4 or 5. While displaying firm and positive

impressions, interview data qualified this by indicating a strong *what's in it for me* perception. That is, the measure of value was closely aligned with what students got out of it – this being defined by the extent to which the classroom sessions assisted them in meeting their objective, which, for both groups, meant gaining a better assessment grade. Five of the 10 postgraduate students commented that they found presenting in the classroom a preferable assessment to a written essay. One claimed it enabled her to create an outcome of a “multimodal nature” (Petra, interview, 27 September, 2010). By this she referred to the different information formats that could be combined in her presentation (audio, video, text, graphical etc.), and the capacity of the classroom to support audience interaction. Some considered this to be a significant advantage in meeting what they saw as their ‘preferred learning style’. Illustrating this, Petra commented on her preference for visual cues, and felt that the classroom, “better validated different forms of information – it was highly valuable in this way” (Petra, interview, 27 September, 2010).

All but four participants mentioned the importance of publishing an agenda and uploading resources in advance of each session. They stated that this helped clarify purpose and objectives, assisted with their organisation, and provided structure. Six postgraduates commented on the desirability of having access to presentation topics and a one-page descriptor of each in advance, so they could do prior research that they felt would have helped them to contribute more effectively.

One participant cautioned against becoming ‘mesmerised’ by the technology, commenting that in her observation education has a tendency “to lurch from gadget to gadget, trying to find a use for it” (Simone, interview, 20 September, 2010). Although she didn’t explicitly place the virtual classroom in this category, she said in evaluating any technology there needs to be,

... an appraisal of the time involved, and what you get out of it. I think all the bells and whistles are not necessary for certain tasks, in fact may demand extraneous amounts of time for what you get. We need to be careful to keep the horse in front of the cart (Simone, interview, 20 September, 2010).

It was pleasing to note other participants making similar comments (Sue, Kate, Alexandra, Emma), indicating the presence of a level of critical review around technology adoption and use.

### Discussion and Implications

Whilst acknowledging the limitations of sample size, the intensive nature of this study, and the multiple data tools used, enabled the identification of significant affordances and limitations in the use of the virtual classroom.

Of significance in this respect is the *multiple knowledges* students need to get the best from these environments. The study showed that many found difficulty in transferring communication conventions and interpersonal skills from other contexts to the virtual classroom, with the mediating influence of the communication tools and knowledge of how they worked significantly influencing the level and quality of their interaction. As data indicated, knowledge was required on three fronts – *technical*, *procedural* and *operational*, with all three needing to be present to a significant extent for participants to gain real value from the experience. Clearly there is a danger in making assumptions, therefore, about students’ ability to ‘hit the ground running’ in these environments, with careful consideration needing to be given to developing protocols, skills and knowledge across all three domains, and ensuring a supportive structure and environment is in place to promote collaboration and interaction.

Secondly, data supports perspectives introduced in the literature regarding the usefulness of synchronous tools in online learning, but only to the extent that they supplement and not replace asynchronous modes (Hrastinski, 2008; Wang & Newlin, 2001). A clear message here is that it is a *case of horses for courses*, with each mode offering its own unique contribution to the online learners’ experience. While the virtual classroom was undoubtedly useful for relationship and community building, and for diminishing learner isolation, it did not appear to perform so well in supporting deeper learning, where the asynchronous forums allowed more time for reflection and researching ‘intelligent’ contributions (Wang & Newlin, 2001). Students were also aware of the relatively permanent nature of text-based forum postings, and were therefore generally more careful about what they wrote. The insecurity of ‘appearing dumb’ in front of their peers in the virtual classroom was a significant factor discouraging interaction. Data also indicated that the *relationship-building*, face-to-face benefits of the classroom diminished with the more person-to-person contact students had, perhaps indicating they saw the classroom as being inferior to actual physical contact.

Thirdly, it needs to be remembered that in the technological timeline, virtual classrooms are at the emerging stage, and like any innovation, their performance will take some time to normalise. In hindsight, while such tools provide us with an array of new options for interacting online, it was not a good idea to effectively trial this on a 'high stakes' assessment task, without allowing adequate familiarisation time. Doing this undoubtedly penalised some students, and affected their performance. Other issues such as variable bandwidth and computer knowledge and quality can impact upon the presentation options for students, giving some a task-independent advantage over others. In considering using the virtual classroom therefore, educators should keep in mind that the nature of, and expectations around what goes on in there, should not penalise students who only have access to inferior technology. Also, while it is not possible to mitigate all variables, a key message is that students must be given time to learn about the tool before it is used, especially for assessment purposes. Where possible, if a virtual classroom component is to be included in a course, consideration should be given to organising group tutorials (preferably person-to-person) to assist in this learning.

Finally, this study illustrates the importance students place on clear *purpose* and *relevance* for technology use. They displayed high levels of critical review in appraising the potential of the virtual classroom, seeing little benefit from using the tool just for the sake of it, especially if it had little apparent advantage for them in achieving their immediate goals. Consistent with McBrien et al.'s (2009) study, these students saw little purpose in spending their time informally chatting in the classroom, or enduring a disorganised tutorial. This puts the onus on course conveners and tutors to ensure use of the virtual classroom is purposeful and apparent, that what goes on in there is organised, valuable, and efficiently managed, and that objectives, goals and evaluation criteria are clearly communicated.

### Conclusion

Due to their relatively recent advent, there needs to be considerably more research on identifying 'best practice' models for virtual classroom use. While some studies have been carried out that have established advantages from using virtual classrooms for enhancing online interaction and improving dialogue (eg., McBrien et al., 2009), there appears to be far fewer studies that identify what students need to learn and master to enable them to get the best from these new learning environments. This needed research might explore more deeply the nature of the three areas of knowledge identified in this paper as being critical to student performance in the virtual classroom, namely *technical*, *procedural* and *operational* knowledge. It might further seek to develop protocols or strategies to assist online teachers and course designers to embed the development of these in any online offerings utilising such tools, to ensure students are able to gain the best advantage from their use. Additionally, research needs to explore how virtual classrooms can best be integrated into online learning programmes so that their presence does not detract from the learner's sense of autonomy or choice. Due to their synchronous nature, it may well be that too regular or trivial use could negatively affect students' attitudes towards, and performance in an online course, by removing the flexibility they have to study anywhere, at any time. As Hrastinski (2008) and Wang and Newlin (2001) point out, and as confirmed by this study, it is not a matter of asynchronous vs synchronous, as both have a role to play in online learning. The challenge is to identify an effective and workable balance between both modes to ensure the optimum online learning environment is created for our students.

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## Appendix 1.

### Semi-structured interview schedule

1. How do you perceive the use of the virtual classroom affected your learning experience in this paper, and in what ways? (**Explore responses to this question in depth**).
2. How do you consider the use of the virtual classroom affected your sense of membership of a 'learning community'? (Explain and justify your response).
3. How effective do you consider to be the use of the virtual classroom for presenting your assessed assignment to others?
4. Were there any ways in which you consider this virtual classroom session could have been improved? (**Explore and explain**)
5. Do you consider the use of the virtual classroom and possibly the 'attendance requirement', in any way influenced your sense of learner autonomy or independence?
6. Would you like to see greater use made of communication tools such as the virtual classroom for eLearning? Follow up: for what purposes could you see such tools being used more widely, and how regularly? Do you see any possible issues with increased use of these systems?
7. Were there any features of the virtual classroom you considered particularly helpful or unhelpful, and why/in what ways? (prompts: shared whiteboard for powerpoints, file sharing to access others' presentations, the live chat, webcam images of participants etc.).
8. Can you think of any disadvantages/limitations of using communications tools like the virtual classroom for eLearning? What might these be?
9. Did you experience any technical issues in using the virtual classroom or the audioconference facility, and if so, what were these and how were they overcome (if they were)?

## Appendix 2.

Table 1. SurveyGizmo™ Likert-scale questionnaire summary

Questionnaire question/statement	No. of responses at each rating (1=max. negative, 3=neutral, 5=max. positive)					
	1	2	3	4	5	Total x (%)
1. To what extent do you consider the use of the virtual classroom affected your learning in this course?		3	9	5	5	22(100)
2. To what extent do you consider the use of the virtual classroom affected your relationships with other students?		1	2	10	9	22(100)
3. To what extent do you consider the use of the virtual classroom affected your relationship with the course tutor?			4	9	9	22(100)
4. To what extent do you consider the use of the virtual classroom affected your perception of membership of a learning community?		2	2	11	7	22(100)
5. To what extent do you consider the use of the virtual classroom affected any sense of personal learner isolation?			1	14	7	22(100)
6. To what extent do you consider the use of the virtual classroom affected your studies?		2	2	10	8	22(100)
7. To what extent would you support the use of the virtual classroom more frequently in courses such as this?			2	12	8	22(100)
8. To what extent do you perceive the virtual classroom as a tool for students' use?			1	14	7	22(100)
9. How easy was it to communicate your thoughts in the virtual classroom?	2	3	9	6	2	22(100)
10. I learnt new knowledge and/or skills through our time in the virtual classroom		3	6	7	6	22(100)
11. To what extent do you consider the provision of an agenda and/or other support materials provided for the virtual classroom sessions (eg: powerpoints) affected your learning?		1	3	11	7	22(100)
12. To what extent do you consider the time the virtual classroom session was held was convenient?	2	2	5	8	5	22(100)
13. To what extent do you consider the performance of the virtual classroom was adequate for your purposes (quality of audio, video, speed of download etc.)?		3	7	9	3	22(100)

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