

Student Perceptions of Teaching Presence, Social Presence, and Cognitive Presence in a Virtual World

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Abstract

Presence - or having a sense of active participation - in distance education has increased with the expanding use of and affordances of communications technologies. Virtual worlds have been on the forefront of popular and education technology in the last three years and innovative methods of teaching and learning are emerging in these contexts. Using the recently validated community of inquiry (COI) instrument, this study focuses on students' perceptions of teaching, social and cognitive presence in virtual world contexts. The authors examine whether the COI Instrument can effectively be applied to virtual world learning events. The results are exciting: in a diverse sample, virtual world learners perceive teaching presence, social presence and cognitive presence.

Keywords: community of inquiry, virtual worlds, teaching presence, social presence, cognitive presence.

Introduction

Since the birth of distance education over 150 years ago, there has been both a practitioner and academic interest in presence – the concept of “being there,” despite physical separation. From earliest use of distance education – having lessons delivered by the Royal Post in mid 1800 England – sense of presence has now grown considerably closer to being “in the room”.

It has been popular to describe distance education in terms of the generations of pedagogy that have defined its delivery. For example, Garrison (1985) notes three generations – postal correspondence, multi media broadcast, through to interactive technologies – and some to a current generation of “interactive databases” (Taylor, 2001). However, to provide a less technologically deterministic lens, Anderson & Dron (in press) have written of three generations of distance education pedagogy.

In the first behaviorist /cognitive generation, marked by the use of correspondence and broadcast technologies, presence was almost non-existent, as emphasis was placed upon the transmission of content in clear and complete fashion. Although Holmberg (1989) wrote about the sense of teacher presence that could be developed through printed text in a style to which he referred as “guided didactic interaction,” for the majority of the learning time, this first generation was marked by lack of presence and a focus upon independent study. The second generation of distance education pedagogy emerged as a result of the capacity for both synchronous and asynchronous interaction between and among students and faculty. The most common instance today of this generation is the familiar cohort based e-learning course in which a group of students works together for a semester, managed through a learning management system that may or may not be augmented with synchronous text or web conferencing interactions. The constructivist learning models of the face-to-face classroom characterize this generation.

Authors such as Garrison and Shale (1987) argued that distributed learning should no longer be described as distance education, but as the more familiar “education at a distance.” Presence was indeed mediated with some clues filtered out, but increasingly learning activities were developed that provided for rich interactions amongst participants. The community of inquiry model (Garrison, Anderson & Archer, 2000) gave credibility to this second generation, and celebrated interactive possibilities, thus reducing the concern from first generation pedagogical models that had been perceived by many as a presence-deprived form of learning.

The third emerging generation is based upon constructivist pedagogy (Siemens, 2005, Strong & Hutchins, 2009, Downes, 2007). Connectivist pedagogy focuses on the development of networks of both content and persons that can then be applied to authentic problems. Presence encompasses capacity to be found and connected to through multi-mediated forms of both synchronous and asynchronous communications. It also focuses on the creation and contribution by learners of learning content creating an ever-growing global connection of learning content and other artifacts of the learning process. Further, connectivist learning activities usually create a sense of transparency in which one’s actions and the artifacts produced while learning, persist to guide, reinforce and contrast the learning of others (Dalsgaard & Paulsen, 2009). Finally, connectivism conceives of learning as the creation of networks involving objects, resources and human beings. It uses both strong and weak connections (Granovetter, 1973) and both planned and serendipitous meetings, browsing, searching, recommending celebrating and networking to inspire, guide and inform learning.

Virtual worlds in which learners and teachers can readily create, use and re-use learning objects, where planned and chance encounters abound and in which their presence is created and enhanced through avatar interaction are likely ideal contexts in which to develop and exploit connectivist learning pedagogies (see Loureiro & Bettencourt, 2010). It is through this lens that the authors focus on virtual worlds in this study: as an emerging education technology that has the potential to create rich sense of presence, ready construction of and contribution to learning archives and transparent visibility to “adjacent possibilities”(Kauffman, 2008).

Virtual Worlds Defined

Virtual worlds can be defined as digital, immersive environments that have three predominant characteristics: They are not a game (in that there is no artificially imposed goal or competitive activities), navigation is by graphic representation, typically an “avatar”, and the 3D environment is constructed and augmented both by the participants and designers (McKerlich & Anderson, 2007). Book (2004) outlines six additional features that virtual worlds have in common:

1. Shared space – many participants at one time
2. Graphical User Interface – place is depicted visually, often in 3D
3. Immediacy – real time interaction often with voice
4. Interactivity – between the user and the environment and the user and others
5. Persistence – the virtual world stays the same regardless if users are logged in
6. Socialization / Community – the world is most effective when groups and networks are established and supported.

Virtual worlds can be considered an emerging education technology tool and questions about learning effectiveness are common and expected. Gartner, a well-respected consulting firm that specializes in identifying trends, introduced the “Hype Cycle” (Fenn & Raskino, 2008) shown in Figure 1.

Virtual worlds most likely hit the peak of inflated expectations in 2009 and educational researchers are now beginning to assess the ways that these environments and emergent learning activities can be constructed to support high quality distance learning using all three generations of pedagogy. While the student and teacher have not been lost in this hype, this article focuses on learning in a virtual world from a student’s perspective.

The Community of Inquiry

The community of inquiry was developed in the late 1990s by Garrison, Anderson & Archer in response to the emergence of text based discussion forums and the constructivist generation of distance education pedagogy (Garrison, Anderson & Archer, 2000). In the mid 1990s, discussion forums were considered in the same way that virtual worlds are considered now: an emerging and somewhat disruptive education

technology. Internet based, asynchronous group discussion tools were new. Educators needed to be sure that there was sufficient quality in the educational experience that resulted from their use. This has since been confirmed, but there is still a need to evaluate emerging educational technologies. The community of inquiry could be a useful tool as educators consider the effectiveness and quality of emerging education technologies.

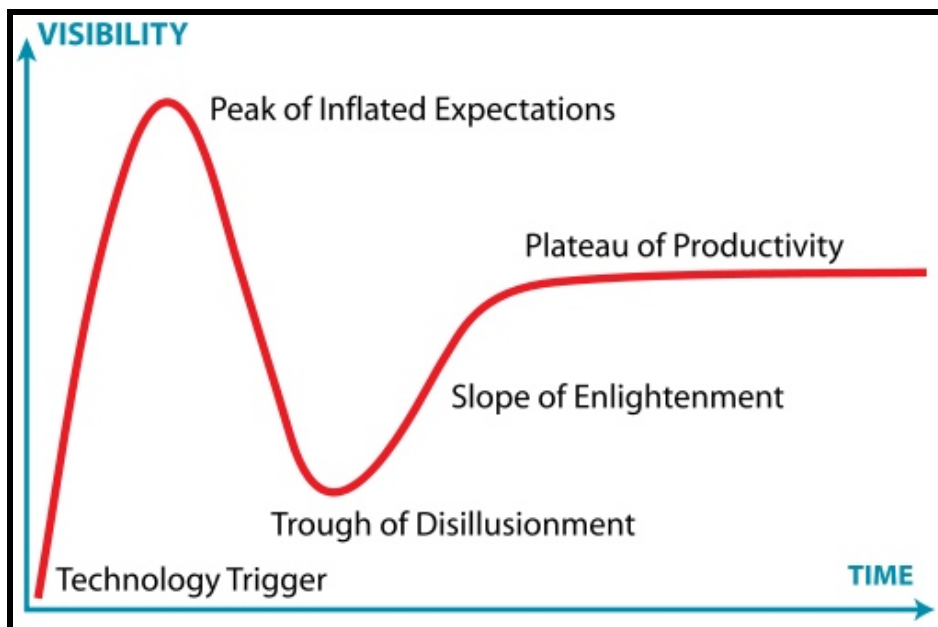


Figure 1. *The Hype Cycle*

The community of inquiry model has its roots in Dewey's practical inquiry (Dewey, 1933) and is shown below in graphic form.

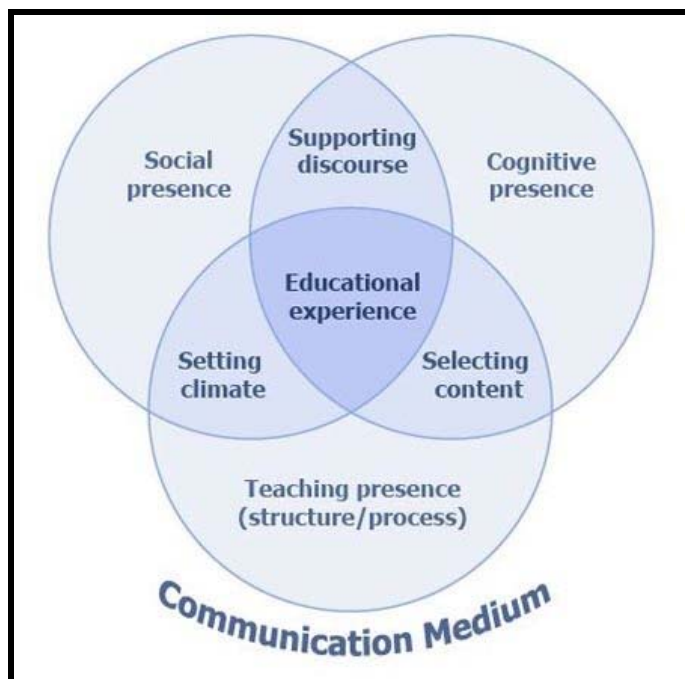


Figure 2. *The Community of Inquiry from Garrison, Anderson & Archer (2000)*

The central construct of the community of inquiry is that an educational experience occurs at the confluence of three distinct types of presence; social, cognitive and teaching presence (Garrison, Anderson & Archer, 2000). There is no consensus in the literature regarding the definition of presence. However, according to Biocca, Harms & Burgoon (2003) a distinction between tele-presence and social presence is common, and it is often used to describe a user's subjective sensation of "being there" in a mediated context (Lessiter, Freeman, Keogh & Davidoff (2001). Subjectivity is also emphasized by Witmer & Singer (1998). When discussing presence in educational contexts as seen from the students' perspectives Garrison, Anderson & Archer (2000) focus not only on social presence, but also choose to include considerations regarding cognitive and teacher-related aspects of the whole of the educational experience.

Social presence can be defined as the extent to which a student's true self is projected and perceived in an online course (Rourke, Anderson, Garrison & Archer, 2001). *Teaching presence* is the direct and indirect role and influence of the teacher and perhaps senior students in the design, direction and facilitation to ensure a meaningful educational experience (Anderson, Rourke, Garrison and Archer, 2001). *Cognitive presence* was defined as the extent to which a learner can construct and confirm meaning through discourse in a critical community of inquiry (Garrison, Anderson & Archer, 2000).

The existence of each presence was first validated by development and measurement of a set of indicators for each category, listed below in tabular form. Note that indicators are examples of each category only - there could be other additional and emergent indicators as well (Garrison, Anderson & Archer, 2000):

Table 1. *COI Categories and Indicators*

Elements	Categories	Indicators
Social Presence	Effective Expression	Emoticons
	Open Communication	Risk Free Expression
	Group Cohesion	Encourage Collaboration
Cognitive Presence	Triggering Event	Sense of Puzzlement
	Exploration	Information Exchange
	Integration	Connecting Ideas
	Resolution	Apply new ideas
Teaching Presence	Design & Organization	Setting Curriculum & Methods
	Facilitating Discourse	Sharing Personal Meaning
	Direct Instruction	Focusing Discussion

As described above, the community of inquiry originally focused on online discussion forums. As constructivist models of distance education progressed to include learning activities that used synchronous technology, the community of inquiry was applied to other emerging education technologies and as well to classroom contexts (see for examples the special issue commemorating ten years of COI research in *Internet and Higher Education* 13(1)).

McKerlich & Anderson (2007) created a prototype for an evaluation tool called the MUVEEET (Multi user Virtual Environment Education Evaluation Tool) and found that the core indicators in the community of inquiry can also be identified in quality synchronous learning events in virtual worlds. As a result of this exploratory study based on observations, the authors added the following indicators specific to virtual world environments (McKerlich & Anderson, 2007):

Table 2. *MUVEEET Categories and Indicators*

Elements	Categories	MUVE Indicators
Social Presence	Effective Expression	Emotive Expression of other avatars
	Open Communication	Reference to Real Life among avatars
	Group Cohesion	Initiation of After Class activities
Cognitive Presence	Integration	Integrated Education Tools
	Triggering Event	Use of Enhanced Multimedia
	Resolution	Mediated Assessment
Teaching Presence	Facilitating Discourse	Teacher Representation
	Direct Instruction	Logistical Focus
		Side Channel Control.

The MUVEEET was field tested by Burgess, Slate, Rojas-Lebouef & Laprairie (2010) and was found to be a promising, versatile tool that assisted in evaluating the educational effectiveness of learning in a virtual world. Burgess et al (2010) enhanced the MUVEEET by conducting their observations using Crocker & Algina's Quantitative Content Analysis (1986). Burgess et al commented on the MUVEEET's versatility and this is confirmed by Zhang, Marksburry & Heim (2010) who used the MUVEEET when researching communications and social interactions in Second Life.

Examples of the Three Presences in Virtual Worlds

One of the barriers to teaching and learning in virtual worlds is that navigation and visualization of this often-strange context can be challenging. To show how social, teaching and cognitive presence manifest themselves in virtual worlds, three images are displayed below and a brief description of the event follows to give further context.

Social Presence

In this example, a student is presenting her position on virtual worlds as a teaching and learning environment. As part of her presentation, she asks her fellow students to engage in ice-skating. This provides an opportunity for the class to collaborate as she asks them to skate in certain directions together. Steering the avatar on skates is a new and (to most students) difficult task that is fun and creates a relaxed atmosphere. Prior to the presentation, the student had found free skates for everyone, and as part of her presentation she instructs everybody on how to wear the skates. Everybody laughs throughout the experience both in voice and text. Some students make reference to their skating abilities in real life.



Figure 3. *Social Presence in Virtual Worlds*

Teacher Presence

In this example, a student is presenting his position on virtual worlds as a teaching and learning environment. As part of his presentation, the student wants to show his fellow students how additional avatars can be used. To ensure that the Instant Messaging (IM) with this additional avatar is working, the teacher engages in the IM and comments on using IM for teaching in the local chat. Some students find it difficult and the teacher offers her advice in the chat and on voice. As the presentation ends the teacher ask other students to reflect on the use of additional avatars.

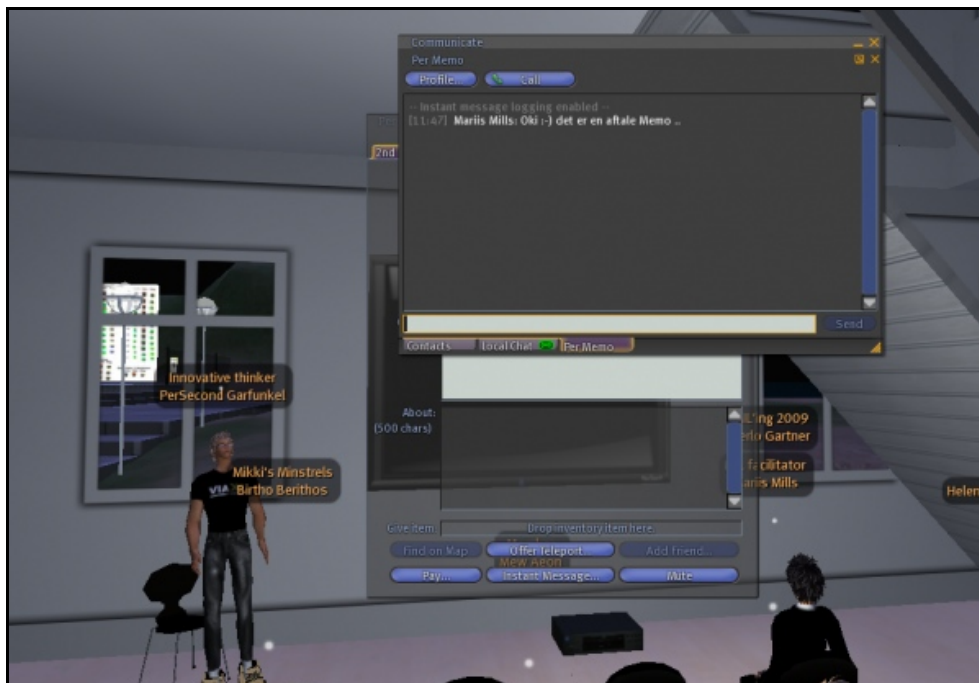


Figure 4. *Teacher Presence in Virtual Worlds*

Cognitive Presence

In this example, students are presented theoretical statements via the “opinionator”, a free virtual world tool that animates a Likert-like questionnaire scale. This provides an opportunity for the students to position themselves and then ask questions about the theoretical point and engage in an exchange of ideas as they explain their decisions or options to each other. Students display their positions by virtually placing their avatars on the opinionator. During the discussion, some of the students change their position, due to the arguments of fellow students. Some students favorably compare the engagement and presence of this experience as opposed to having a similar discussion in a conventional, text-based LMS.

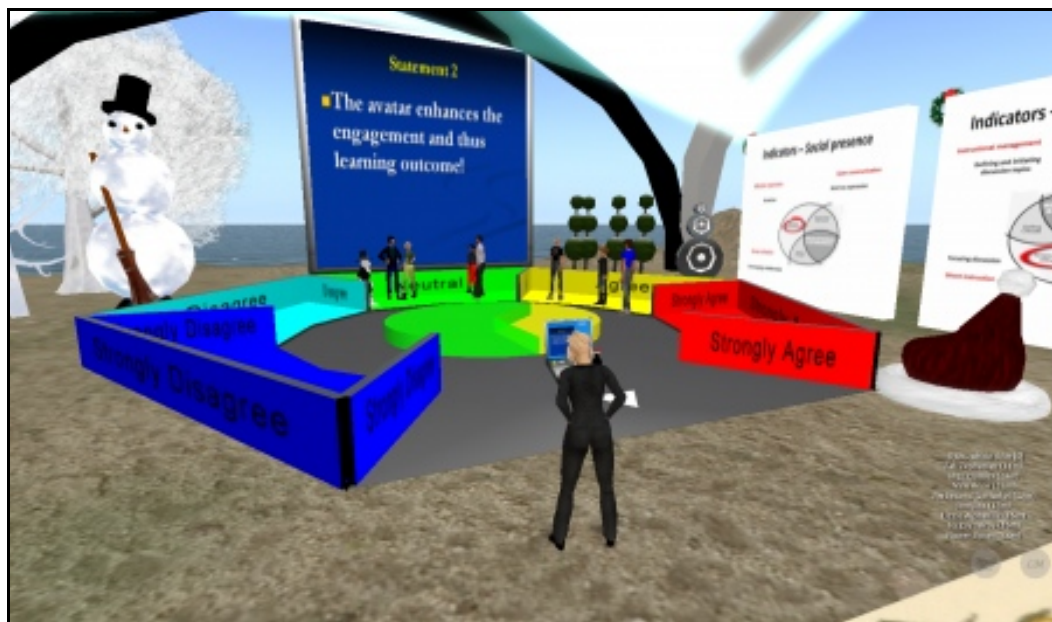


Figure 5. *Cognitive Presence in Virtual Worlds*

Rationale

There is considerable interest in teaching and learning in virtual worlds. A good barometer of this interest is the SLED list (Second Life Educators), a high volume listserv that has over 5,500 members (R. McKerlich, Personal Communication, April 20th, 2010). Virtual world educators are a rather optimistic group: 47% of people surveyed in the New Media Consortium survey on “Educators in Second Life” predicted that virtual worlds are the future of the web. In the same survey, when asked about Second Life’s potential in education, 75% selected distance learning programs as “high” or “very high” (New Media Consortium, 2008).

This growing interest and the subjective nature of measuring presence makes it important to examine how learning in a virtual world is perceived from a student’s perspective. The community of inquiry provides a suitable framework to guide this research. The author’s current research focuses on the following questions:

- Does the COI exist in a virtual world learning environment from a student perspective?
- Can the COI instrument be usefully applied to virtual world learning events?

Method

McKerlich and Anderson (2007) found that the community of inquiry could be applied to a learning environment in a virtual world. Since the design and development of the MUVEEET, the COI model has been developed, tested and validated in the form of questionnaire survey by Arbaugh et al (2008) and Swan et al (2008) using students registered in online courses as samples. Unlike earlier measures of COI derived through transcript analysis, this 34-item Likert scale instrument measures the presence categories of the Community of Inquiry from a student’s perspective. An example of one of the questions

related to teaching presence is “the instructor helped keep the course participants on task in a way that helped me to learn.”

The research team created an online survey based on a modified version of the COI instrument. The authors excluded four questions that did not apply to learning in a virtual world. A copy of the questionnaire is available at [Athabasca University's web site](#).

To avoid confusion for the survey participant, all questions in the “Teacher Presence” section of the survey began with “While teaching in a virtual world”. This was done in case the course they were taking was blended – part face-to-face, part avatar-to-avatar – or if the course was supported by a learning management system.

Sample Selection

The authors solicited our purposive sample by invitation to instructors teaching courses that were held exclusively in virtual worlds. The authors posted an email to the SLED list and to three other similar lists. In addition, when the researchers learned of a specific course being held in a virtual world, the authors contacted the instructor directly and asked if they could send the survey link to their students after the course was completed. Instructors were very supportive of our research and most complied when contacted directly.

Sample Description

The sample consisted of 26 adult students who were taking a higher education course that was completely held in a virtual world. The survey was anonymous and each question was mandatory, which may have resulted in additional 39 incomplete responses. The authors only report on the complete responses. While the sample size is small, its strength is in its diversity; it included learners from eighteen different virtual world learning events held over a six-month period from June 2009 to December 2009. Course subjects from the sample included advanced interpersonal communication, introduction to accounting and computer mediated communications. [Second Life](#) was the predominant virtual world used, but others were also represented, such as [OpenSim](#). In addition to the variety of learning events, there was also a range of competency levels reported by our subjects, as shown in Table 3.

Table 3. *Competency Level of Sample*

Competency Level	Percentage of Sample
Novice	23%
First Time in Virtual World	12%
Competent	38%
Expert	23%

Competency level is an important consideration because there is a considerable learning curve associated with actively participating in a virtual world learning event. In our sample, all competency levels are well represented.

Results

Table 4 displays the results of the main questionnaire items survey. The subjects were asked to strongly disagree, disagree, neutral, agree or strongly agree with thirty items relating to the indicators for the three forms of presence. These items were recoded from 1-5 (where 1=strongly disagree and 5 equals strongly agree) and the mean score for each of the category as well as an overall mean score for each element was calculated. Standard Deviation (SD) and median scores are also included.

Table 4. *Perceptions of Presence indicators N = 26.*

Element	Category	Mean	SD	Median
Cognitive Presence				
	Triggering Event	3.71	.13	4.0
	Exploration	3.81	.11	4.0
	Integration	3.67	.10	4.0
	Resolution	3.83	.05	4.0
	Overall Mean 10 items	3.77	.10	4.0
Teaching Presence				
	Design & Organization	4.08	.08	4.0
	Facilitation	3.87	.08	4.0
	Direct Instruction	3.71	.03	4.0
	Overall Mean 13 items	3.9	.07	4.0
Social Presence				
	Affective	3.62	1.24	4.0
	Open Communication	3.79	.16	4.0
	Group Cohesion	3.55	.01	4.0
	Overall Mean 7 items	3.66	.11	4.0

Does the COI exist in a virtual world learning environment from a student perspective?

Based on the results in table 4, the authors concluded that participants did experience a community of inquiry in the virtual world learning environment in which their course was held. Indicators for all three presences were perceived in this diverse sample. What is particularly interesting is that the relatively low standard deviations indicates a community of inquiry was perceived to be present among many *different* learning environments that teach *different* content as well as taught by *different* virtual world instructors. There was data from two *different* virtual worlds as well. Finally, the data included a range of competency levels.

This is in contrast with Burgess, et al (2010) who also applied the COI instrument to virtual world learning. However, that sample was small (10) and could be considered biased, as it consisted entirely of graduate students studying online instructional technology (Burgess et al, 2010).

Can the COI instrument be effectively applied to virtual world learning event?

The COI instrument was developed for use by students in largely asynchronous online courses. With minor adjustments, it seems capable of measuring student perception of the extent of an active Community of Inquiry. Unfortunately, the number of questions in the instrument, and the lack of incentives or relationship to the researchers seemed to have reduced interest in starting or completing the online questionnaire. These are details that future researchers attempting to use the tool will have to address.

Discussion

The high ratings for perception of teaching presence (3.9 overall mean score, $SD=.07$) in the survey results attests to the fact that the early adopter teacher of students in this sample are doing an admirable job applying their skills to virtual world learning events. Within the teaching presence element, the category with the highest mean score is Design & Organization. This echoes the perception of many professional education designers that, while other aspects of teaching are important, it is the design, not the media that is most related to effective learning (Clark, 2000).

In the study that validates the COI Instrument, the overall mean score for teaching presence was 3.34 ($SD = .61$) (Swan et al, 2008). This was the highest mean score in their study. Other mean scores were social presence 3.18 ($SD = .65$) and cognitive presence 3.31 ($SD = .60$). These similar results show that our research results are not unlike the original validated study in that the overall ranking was the same: teaching presence, cognitive presence and social presence.

In Burgess et al's study (2010), the overall mean score was higher for each element: teaching presence 4.37, cognitive presence 4.35 and social presence 4.31. The order was the same as all three studies quoted: teacher presence was highest overall.

Cognitive presence was rated highly in our survey results – the second highest overall mean (3.77, $SD=.10$). This is promising, because while all the presences are important, cognitive presence shows that the student is constructing meaning and connecting knowledge. Of particular interest is that the category that scored the highest – resolution – has to do with being able to apply the content to real life outside of the classroom. Low scores on this highest, resolution stage of cognitive presence have been a regular concern of researchers using the COI to study other modes of distance education (Rourke & Kanuka, 2009). Depending on the content that was studied, this could highlight one of the advantages of teaching in a virtual world.

It is interesting to note that social presence is the lowest overall mean score (3.66, $SD=.11$) in the survey. Because of the multi-faceted nature of virtual worlds, some of which are social in nature, many educators might expect that social presence would be higher. Also, with the visual affordances of virtual worlds the ability to project oneself as a person might enhance social presence. Nevertheless, the research showed that virtual worlds provide open-type communication, as evidenced by still relatively high mean score of that category item.

The COI was also applied to virtual world learning in a separate 2008 study, for much the same reasons of creating the MUVEEET: to make sense of learning in this unique environment and ascertain its effectiveness for learning. McKay, Van Schie and Headley (2008) used Dodge's (2007) learning power equation to evaluate the educational experience of virtual world students. The cumulative results were underwhelming but the study showed some strengths and weaknesses in learning in virtual worlds.

Dodge's (2007) learning power equation is as follows: Learning Power = Attention x Depth x Efficiency. Participants in a sample of 52 were asked to rate the three variables. The highest score of these variables was Attention, which the authors relate with social presence. The next highest score was Depth, followed by Efficiency. Correlated with the COI, the study showed that virtual worlds might not be the best place to recreate traditional classroom settings. In our view, this should not be construed negatively – the affordances of learning in a virtual world should be maximized. For example, instead of talking about cells and going through some familiar slides the virtual world instructor can take the student to a cell and allow them to immerse themselves in its structure.

McKay, Van Schie and Headly (2008) also note the importance of direct instruction, an indicator of teaching presence, especially in the beginning of a virtual world learning experience. This corresponds with an indicator in the MUVEEET – logistical focus for teacher presence (McKerlich & Anderson, 2007). The subjects in McKay, Van Schie and Headly's (2008) study also concur with the importance of good instructional design, regardless of the technology used.

It is quite clear from the above data that teaching in virtual worlds is perceived as meeting the social constructivist goals incorporated in the community of inquiry model. In our opinion, the skill of teaching in virtual worlds needs a name. Just as Knowles (1970) asserted that teaching adults (andragogy) is different than teaching children (pedagogy), teaching in virtual worlds is significantly different than teaching in any other online environment. In keeping with the "ava" terminology the authors propose the new term "avagogy". "Avatar" comes from the Sanskrit word "avatara" which means a personification of one's character (Zhang, Marksbury & Heim, 2010). The term gogy is a Greek term which means "to lead"

– so in the same fashion, avagogy means “leading avatars”. First proposed by Mckerlich and Anderson in 2008, the authors defined it as the “the strategy, design, art and technique for teaching and learning that uses avatars to represent learners in immersive environments.” (McKerlich, 2008).

Instead of devising characteristics of avagogy, the authors point to a number of researchers in the field who are writing about what makes an effective virtual world instructor. For example, Collin and Berge's study (2008) describes very clearly the pedagogical, social, managerial and technical responsibilities of teaching in virtual immersive worlds. The term is merely introduced in this article: further research is required to fully develop the definition and characteristics of avagogy.

Conclusion

While our sample size is low, our research shows that from a student's perspective, learning in a virtual world is often perceived as a rich educational experience that includes elements of all three presences in the community of inquiry. Because of the diversity of our sample, this result shows that strong educational potential exists in virtual worlds.

It is also clear that the COI instrument is an effective tool to measure teaching and learning effectiveness in virtual worlds. In all of the work that has been done so far on the community of inquiry instrument, it is interesting to note that the ranking of each presence is the same: teaching presence, cognitive presence and social presence.

The data collected by this research has shown that there is some very innovative and effective teaching that is being done in virtual worlds. Some teaching considerations must be acknowledged but the fact that the teaching presence element of the community of inquiry scores high indicates that students learning in virtual worlds perceive a high level of teaching presence.

As mentioned above, further testing of the COI Instrument in emerging education technology contexts is required. Further, more has to be learnt about the roles, responsibilities and possibilities of teaching in a virtual world.

Learning is taking place in virtual worlds and this medium will continue to grow. The days of presence deprived online learning could be limited; virtual worlds have the potential to provide a rich learning experience overflowing with presence. To ensure that the students and the teachers don't get lost in the hype, tools such as the community of inquiry instrument can be applied to virtual world learning and this emerging education technology can be used to its full educational potential.

References

- Anderson, T. & Dron, J (2010) . Three Generations of Distance Education Pedagogy. *International Review of Research in Open and Distance Learning*, 12 (3).
- Anderson, T., Rourke, L., Garrison, D.R., Archer, W. (2001). Assessing teaching presence in a computer conferencing context. *Journal of Asynchronous Learning Networks*, 5(2). Retrieved from http://www.aln.org/publications/jaln/v5n2/v5n2_anderson.asp
- Arbaugh, J.B., Cleveland-Innes, M., Diaz, S.R., Garrison, D.R., Ice, P., Richardson, & Swan, K.P. (2008). Developing a community of inquiry instrument: testing a measure of the community of inquiry framework using a multi-institutional sample. *The Internet and Higher Education*, 11(3-4), 133-136.
- Biocca, F., Harms, C. & Burgoon, J. (2003). Toward a more robust theory and measure of social presence: review and suggested criteria. *Presence*, 12 (5), 456-480.
- Book, B. (2004, October) *Moving beyond the game: social virtual worlds*. Paper presented at State of Play 2 Conference. Vancouver, BC.
- Burgess, M., Slate, J., Rojas-Lebouef, A., & Laprairie, K., 2010. Teaching and learning in Second Life: using the community of inquiry (coi) model to support online instruction with graduate students in instructional technology, *Internet and Higher Education* (January): 84-88
- Clark, R. (2000). Evaluating distance education: strategies and cautions. *Quarterly Review of Distance Education*, 1(1), 3-16.
- Collins, M.P. & Berge, Z.L. (2008, November). *Instructor's changing roles in multi user virtual environments*. Paper presented at the Elearn World Conference on E-Learning in Corporate Government. Las Vegas, NV; Healthcare and Higher Education.

- Crocker, L., & Algina, J. (1986). Introduction to classical and modern test theory. Toronto: Harcourt Brace Jovanovich College Publishers.
- Dalsgaard, C., & Paulsen, M. (2009). Transparency in cooperative online education. *International Review of Research in Open and Distance Learning*, 10(3). Retrieved from <http://www.irrodl.org/index.php/irrodl/article/view/671/1267>
- Dewey, J. (1933). *How We Think* (Rev ed.). Boston: D.C. Heath.
- Downes, S. (2007). *An Introduction to Connective Knowledge*. Paper presented at the Media, Knowledge & Education - Exploring new Spaces, Relations and Dynamics in Digital Media Ecologies, Proceedings of the International Conference held on June 25-26, 2007.
- Dodge, B (2007). *Learning power equation*. Paper presented at MacWorld, San Francisco, Ca. Retrieved July 8th, 2010 from <http://www.infinithinkingmachine.org/2007/03/itm-extra-p-x-d-x-e.html>
- Fenn, J and Raskino, M. (2008) *Mastering the hype cycle*. Boston: Harvard Business Press.
- Holmberg, B. (1989). *Theory and Practice of Distance Education*. London: Routledge.
- Garrison, D., Anderson T. & Archer, W (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, 2: 87–105.
- Garrison, D.R. (1985). Three generations of technological innovations in distance education. *Distance Education* 6 (2) 235-241.
- Garrison, R., & Shale, D. (1987). Mapping the boundaries of distance education: Problems in defining the field. *American Journal of Distance Education*, 1(3), 3-15.
- Granovetter, M. (1973). The strength of weak ties: A network theory revisited. *American Journal of Sociology*, 78, 1360-1380.
- Kauffman, Stuart. *Reinventing the Sacred: A New View of Science, Reason and Religion*. New York: Basic Books, 2008.
- Knowles, M. (1970). *The modern practice of adult education. Andragogy versus pedagogy*. Englewood Cliffs: Prentice Hall/Cambridge.
- Lessiter, J., Freeman, J., Keogh, E. & Davidoff, J. (2001). A cross media presence questionnaire: the ITC – sense of presence inventory. *Presence*, 10 (3), 282-297.
- Loureiro, A., & Bettencourt, T. (2010). Immersive environments – A connectivist approach. *Communications in Computer and Information Science*, 111, 202-214.
- McKay, S., Van Schie, J. & Headley, S. (2008). Embarking on an Educational Journey in Second Life. In K. McFerrin et al. (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference 2008* (pp. 1762-1766). Chesapeake, VA: AACE.
- McKerlich, R. & Anderson, T. (2007). Community of inquiry and learning in immersive environments. *Journal of Asynchronous Learning Networks*. 11(4).
- McKerlich, R. (2008, December 17th). Introducing Avagogy. Message posted to The Bowsprit Blog archived at <http://rmckerlich.wordpress.com>
- New Media Consortium (2008). Spring 2008 NMC survey: Educators In Second Life. Retrieved from <http://www.nmc.org/news/nmc/2008-sl-survey>
- Rourke, L, Anderson, T., Garrison, D.R., Archer, W. (2001). Assessing social presence in asynchronous text based computer conferencing. *Journal of Distance Education*, 14(2), 50-71.
- Rourke, L., & Kanuka, H. (2009). Learning in communities of inquiry: A review of the literature. *Journal of Distance Education*, 23(1). Retrieved July 2009 from <http://www.jofde.ca/index.php/jde/article/viewArticle/474/816>
- Siemens, G. (2005). Connectivism: Learning as network-creation. *ElearnSpace*. Retrieved Oct. 2005 from <http://www.elearnspace.org/Articles/networks.htm>.
- Strong, K., & Hutchins, H. M. (2009). Connectivism: a theory for learning in a world of growing complexity. *Impact: Journal of Applied Research in Workplace E-learning*, 1(1).
- Swan, K., Shea, P., Richardson, J., Ice, P., Garrison, D. R., Cleveland-Innes, M., & Arbaugh, J. B. (2008). Validating a measurement tool of presence in online communities of inquiry. *E-Mentor*, 2(24), 1-12. http://www.e-mentor.edu.pl/e_index.php?numer=24&all=1

Taylor, J. (2001). *Automating e-Learning: The Higher Education Revolution*.

Witmer, R. & Singer, M. (1998) Measuring Presence in Virtual Environments: A Presence Questionnaire. *Presence* 7(3), 225-240.

Zhang, Q., Marksbury, N. & Heim, S. (2010) A case study of communication and social interactions in learning in Second Life. Proceedings of the 43rd Hawaii International Conference on System Sciences, Manoa, Hi.

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