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Virtual Environments…Vehicle for Pedagogical Advancement

Elizabeth M. Hodge, Sharon K. Collins, and Eric Kisling

***Abstract*—**Virtual environments are a hot topic in academia and more importantly in courses offered via distance education. Today's gaming generation view virtual worlds as strong social and interactive mediums for communicating and socializing. And while institutions of higher education are challenged with increasing enrollment while balancing budget cuts, offering effective courses via distance education become a valid option. Educators can utilize virtual worlds to offer students an enhanced learning environment which has the power to alleviate feelings of isolation through the promotion of communication, interaction, collaboration, teamwork, feedback, engagement and constructivists learning activities. This paper focuses on the use of virtual environments to facilitate interaction in distance education courses so as to produce positive learning outcomes for students. Furthermore, the instructional strategies were reviewed and discussed for use in virtual worlds to enhance learning within a social context**.**

***Keywords*—**Virtual Environments, Second Life, Instructional Strategies and Technology

I. Introduction

THE "shape" of the average student is changing" [1]. We are in an era of vast pedagogical changes albeit a revolution. The shift from traditional education brought about a multitude of innovative pedagogical strategies. Educators have entered into a new way of teaching, whereas technology, the art of teaching and the needs of learners are converging [2]. According to the NMC (New Media Consortium) the revolution brought about considerable change in the way people communicate [1]. Students are brought up with an average of three televisions, two computers, one gaming system, one iPod and cell phones for the entire family. The NMC premise is "that technology has not only mediated communication in countless ways, but that the very ways we communicate—and even the ways we talk and think about communication are changing as a result" [1]. To its end, communication is the key to teaching and engaging students in the learning process. As our era evolves to a society embracing technological communication devices so must our pedagogical approaches to teaching and learning process. Online education continues to play "a strategic role in responding to the dynamic, changing educational needs of society, in relation to the creating of a knowledge-based society" [3]. Unfortunately, not all educators are familiar with the various pedagogical strategies that afford distance education students to learn, collaborate and interact in an online environment.

Elizabeth M. Hodge is with East Carolina University , USA.
e-mail:hodgee@ecu.edu

In the quest to incorporate innovative instructional strategies Bannan-Ritland, *et al*, 2006 state that, university faculty are navigating a steep and continuously changing learning curve [4]. Like the old adage a face is worth a thousand words, educators are finding it difficult to keep students engaged in a non media rich learning environment.

The goal of this paper is to review the theoretical framework of communication and interaction models as they pertain to distance education environments. Furthermore, the paper hypothesizes that the use of virtual environments to facilitate interaction in distance education courses produces positive learning outcomes for students.

II. Communication, Interaction and Learning

A. Communication

Fundamental to all learning is the ability to communicate content knowledge, and the methods for interacting in a classroom setting. As speaking is the primary mode of communication within the communities in our culture [5]. The communication and interaction that takes place between the instructor and student and student to student is an integral piece that often times solidifies the learning process. Whereas, if this interactive environment is removed students become wrought with questions and uncertainties that isolate them from the learning process. Many methods for communicating in an online environment exist and depending upon the instructor and course curriculum these can be integrated to foster interaction among students and instructors.

Therefore, educators should assess the course to determine how to design the instructional material for distance learning [6]. For example online learning models often focus on differentiating between the communication elements in a course that are synchronous versus those that are asynchronous. Students enrolled in distance learning courses can now listen to podcasts, view video tutorials, receive text message updates, and conduct desktop video-conferencing to interact with fellow students and instructor. Assignments can be designed to enhance student social presence through both synchronous and asynchronous activities.

B. Interaction

The role of the instructor has transformed from the "sage on the stage" to one of facilitator of learning. The instructor no longer embodies all the knowledge that students need to possess when completing a course but rather shapes the instructional design of a course and provides for communication, interaction and learning to coexist. Dede (2004) notes that additional shifts have taken place not only

with the instructor but with student's roles, relationships, power, discourse, centrality/peripherality, and the ownership of knowledge. Fundamental to learning is the ability for an instructor to facilitate various ways for students to interact and connect [7]. For effective instructional interactivity to take place Bielaczyc and Collins (1999) discuss the importance of full participation and acceptance by the learning community [8]. Notably, if knowledge is socially mediated by the instructor through planned interactions both student and instructor becomes a member of a learning community. Because distance exists in an online learning course, instructors must design different forms of interaction and foster the instructional interaction between themselves and students. Thus a higher level of interaction evolves as student and instructor participate in discussions, collaborations, feedback and shared content knowledge [9].

C. Learning

Vygotsky [10], [11], states that learning is a social process and Swan and Shea [12] believe that this process is primarily found in the interaction within groups. Interaction and communication among group members lead to the formation of community, the construction of knowledge, and student learning [12-16]. Learning is described as the process of becoming part of a community of knowledge Lave and Wenger, [17] educators need to explore the social relationships that develop between students who are involved in instructional interactions. Additionally, as more courses are provided through online offerings, understanding the learning process, and the dimensions of communication and interaction are inherent to the instructional design process. Swan and Shea [12] summarize the learning process by stating that, "Knowledge … is inseparable from practice, and practice is inseparable from the communities in which it occurs" (p. 241).

III. Summary

The NMC premise is "that technology has not only mediated communication in countless ways, but that the very ways we communicate—and even the ways we talk and think about communication are changing as a result" [19].To its end, communication and interaction are the key to teaching and engaging students in the learning process. Notably, the inclusion of synchronous technology tools alleviates the barriers traditionally associated with the distance that exists in online courses. By fostering communication and interaction through collaboration, teamwork, feedback, engagement and constructivists learning activities, online course can alleviate students and instructors feelings of isolation. The following material presents how communication and interactions were achieved in an online course offering through the virtual environment, Second Life.

A. Virtual Environments

The emergence and use of virtual environments to develop and foster learning in education is a new phenomenon that is growing at a rapid pace. One particular virtual environment that is gaining momentum is Second Life. Second Life is a 3-D virtual world which is created and developed by its residents. Second Life is a virtual environment that includes; 3D graphics, voice chat (Voice over IP/VoIP), rich digital media and video capabilities. The virtual environment provides residents with a sense of "being there" even when attending a class or traveling to campus in person isn't possible, practical, or desirable, which in turn provides educators and students with the ability to connect and communicate in a way that greatly enhances the learning experience. Unlike traditional asynchronous and synchronous computer-based learning systems, virtual reality is designed to engage students in the learning process. The New Media Consortium reports that at any given time of day there are 40,000 residents logged into Second Life. Second Life continues to grow at an exponential rate. This can be noted by over 12,000 universities, community colleges, private institutions, and others in residence, with more joining each year.

Lave and Wenger (1991) discuss the concept of learning as not simply internalizing information and knowledge, but as a personal transformation defined by participation in a social community [17]. In an effort to create a learning environment that fosters socialization a southeastern university integrated the use of Second Life to foster communication and interaction. The following section provides a description of the virtual environment and the tool that led to the instructional strategy for use within Second Life to create a synchronous learning environment.

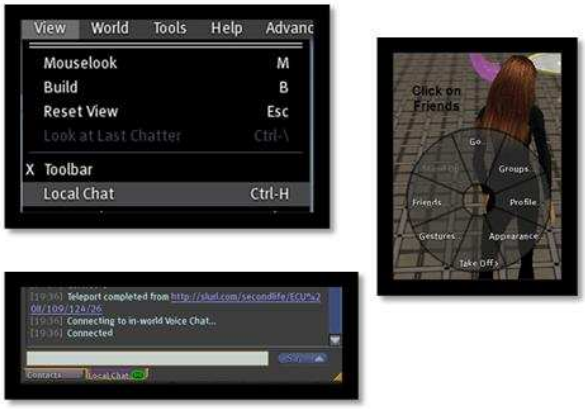
B. General Environment Description

If you are new to virtual environments and have not seen what the environment looks like, take a moment to close your eyes and think about if you could have anything in the world to teach your students what would it look like? If this statement sounds outlandish realize that the Second Life virtual environment allows you to create a world that encompasses anything you can dream. What you will find when you enter the virtual world is that you can explore environments already developed or create your own. For example, if you are teaching students about the solar system, you can recreate the solar system in-world and students can fly in a rocket and land on the various planets to learn more information about the planet, history, dimensions, distance from earth, and physical characteristics. In-world you will find a variety of international wonders recreated for you to take your students on a tour. For example you can visit the Sistine Chapel, Louvre Museum, and International Space Flight Museum or simply step into a Van Gogh painting to interact in the 3-dimensional environment. For many educators, the process is a progression from the traditional brick and mortar constructs to becoming aware of the multitude of objects that you can be created to engage your students in the learning process. Within our institutions

campus we have combined the traditional campus buildings with unique features that make learning come alive. The role of the professor is to create a dynamic learning environment which encompasses several outlets for learning to take place. When the professor provides the appropriate environment students have the opportunity to interact and communicate with other students. The following sections provide a review of virtual technology instructional strategies, the most important element according to Vygotsky [10], [11], states that learning is a social process and so to make learning in virtual environment effective, educators must have a distinct purpose for the use and integration of this technological tool.

C. Voice Communication - Interaction, Collaboration and Teamwork

Synchronous versus asynchronous communication is a topic frequently addressed by online educators regarding the advantages and disadvantages of both venues. The Second Life environment provides students with the opportunity to interact and communicate via text or voice chat with one another despite physical distance. The Second Life environment supports synchronous communication and the advantages of this include; [20-22] immediate response, increased dialogue and the spontaneous interactions that allow students to develop a social presence within a learning community. Second Life provides three synchronous platforms to communicate. Text chat allows students and teachers to type in text comments, questions and answers. Instant Messaging allows private discussions to take place within a group setting or one on one within the environment. By far the most valuable method is the voice chat capability which combines the use of microphone and speaker (headset) to communicate with one another. The latter provides for true interaction as the instructor can communicate with the students in real-time.



D. Projection System - Presentations

The virtual environment provides a variety of options for presentations. You can build your own or purchase educational tools in-world. Some of these include; presentation screens (FreeView FlatScreen TV), whiteboards, video players, ThincBooks to share course content with your students. Presentations are done on a presentation screen such as the FreeView FlatScreen TV. However a multitude of other projection objects exist and are available in-world. The presentation viewer can be viewed by all residents and is controlled by the presenter. The process of creating your presentation is a simple one that includes creating a standard slide presentation. The only difference is saving the presentation as individual images and uploading them into the Second Life environment. Other projection systems are available and can be found for free or purchased using $Linden (which is the in-world currency). Notably the presentations offer flexible learning as well as opportunities for synchronous discussions. One advantage of placing a presentation in-world is the ability students can have to re-review it at anytime that is convenient for themselves and fellow classmates. This gives the students the capability to meet and collaborate with one another without having a formal class meeting.

E. Machinima – Simulations

Machinimas are recordings inside Second Life where you can capture your class and share it with anyone. With the use of machinima professors can create simulated activities that can be viewed by students at anytime. The machinima is useful for students who may have missed a class or for students to review the material. Many individuals make machinimas in virtual worlds and upload them to YouTube. Machinima is valuable for students as it provides flexibility that many students enrolled in online courses require.

F. Objects–Resources

Second Life users have the potential to access many objects in-world that are built by its residents. These objects can be still objects, interactive, contain "note cards" of information, and serve other purposes. Objects can be in any shape, color, or scripted movement and provide the world with visual aids. Virtual objects can be shared with all avatars in your group or individual avatars as you provide the permissions. Most educational islands provide "books" of information or books that link out to a website, videos, readings, resources and course material. This provides a very interactive environment in order to discuss subject items in real-time as all are viewing the same material at the same time and in the same "virtual" location.

IV. Methods and Findings

The goal of this paper is to review the theoretical framework of communication and interaction models as they pertain to distance education environments. Furthermore, the paper hypothesizes that the use of virtual environments to facilitate interaction in distance education courses produces positive learning outcomes for students. The research questions include:

1. What are student perceptions of the SL environment?
2. Do students find the SL environment more engaging than asynchronous communication?
3. What do students find to be the most important feature in SL to increase learning?

A review of literature was performed to develop the survey instrument that was used for this study. The New Media Consortium Virtual Environments survey was also adapted for use. The process included the following steps; 1) review of literature, 2) development of research questions, 3)survey construct development, and then 4)survey question development. The validation process was conducted within the Perseus system software which requires a pilot test and question revision if appropriate. The Perseus survey software provides participants with a web based survey. The survey was deployed to students enrolled in the web-design course by providing a URL and disseminated through a notification to participants through email. The survey was administered over a four week period of time.

Researchers addressed the question of what students perceptions are of SL environment.

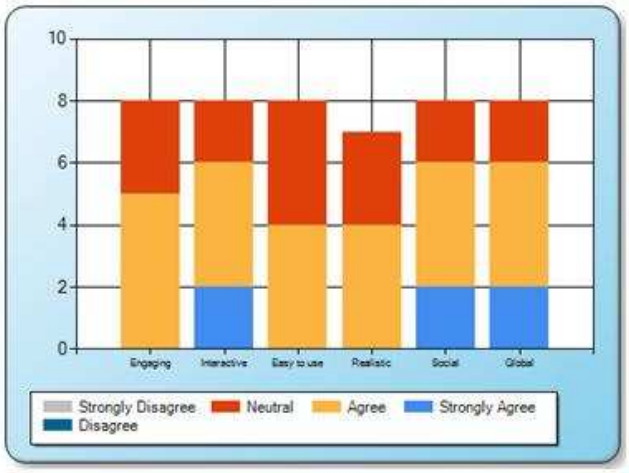


Fig. 1 depicts the students perceptions of the Second Life environment.

Sixty-two and a half (62.5%) percent of students found the environment to be engaging. Whereas, Seventy-five (75%) found the environment to be interactive, social and global. Of interest is student response to Second Life being a realistic environment at fifty-seven (57%) and ease of use at fifty (50%) percent.

Below is table 1.2 that depicts student perceptions and levels of satisfaction with utilizing Second Life as a means for synchronous learning. Satisfaction scale scores were computed based on a range from 1 (strongly agree) to 5 (strongly disagree). Both the median and mean scores for each item were less than the midpoint (3) of the scale. Despite the small sample size, the data demonstrates a significant importance to the engagement that is achieved in utilizing the Second Life virtual environment for teaching and learning. The table presents the specific questions and the associated student response median, mean and standard deviation. The satisfaction scores were computed for each student as well as the mean of the student's responses on student perceptions items within the survey. Several other questions were addressed; however the results are not reflected in the data. The questions not shown in the table outline communication, interaction and learning in Second Life. The study can best be described as exploratory as the participants were involved in a new course that was specifically designed to address virtual environments.The students involved in the web design course utilized the virtual interface for exploration, learning, and immersive design activities. Through the use of Second Life, the professor and students were able to interact and communicate synchronously. In addition, students met in groups outside of course set sessions to collaborate on course assignments and design applications. In some instances students met in-world mentors and were able to share resources. At times students became the class facilitator when they invited in-world mentors to be guest speakers in the class. In addition, students were provided tutorials, and video resources to help them become both familiar and comfortable with interacting and moving within the environment.

TABLE I
STUDENT SATISFACTION WITH SL

Item	Median	Mean	SD
I feel that the virtual environment is more engaging than an asynchronous environment.	2.000	2.000	0.926
I feel that the voice communication available in SL helped me communicate better with instructor and classmates.	1.000	1.500	0.756
I feel that the virtual demonstrations provided in SL provided me with a better understanding of material I was to complete for the course	2.000	1.875	0.641
I prefer taking classes in a virtual environment as opposed to traditional online content.	2.000	2.375	0.916
How strongly do you associate the following characteristics with SL. (Engaging)	2.000	2.375	0.518
How strongly do you associate the following characteristics with SL. (Interactive)	2.000	2.000	0.756
How strongly do you associate the following characteristics with SL. (Easy to use)	2.500	2.500	0.535
How strongly do you associate the following characteristics with SL. (Social)	2.000	2.000	0.756
How strongly do you associate the following characteristics with SL. (Global)	2.000	2.000	0.756

Researchers examined which feature students found to be most important when utilizing Second Life virtual environment. Respondents indicated that the most helpful feature was the tutorials (75%) that were provided on how to use Second Life. Furthermore 12.5% of students found the built in voice communication as well as the building/scripting feature to be very important. The following graph 1.3 below represents the respondent's perceptions.

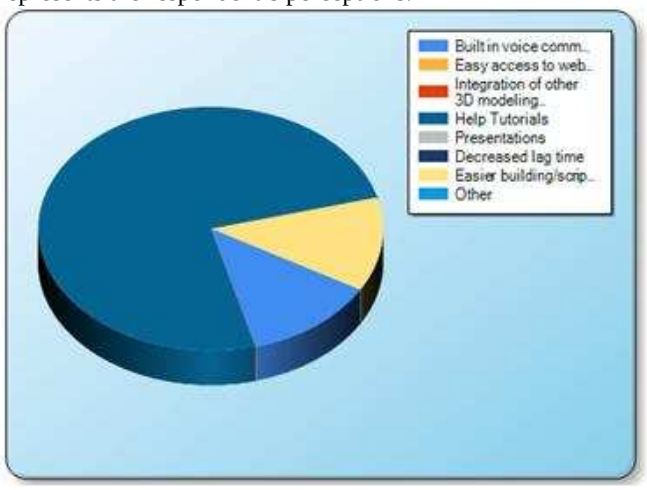


Fig. 2 Represents respondents perceptions of SL environment

V. Recommendations

The premise of this paper explored the use of communication, interaction and the learning that is associated to synchronous sessions in the virtual environment Second Life. The research demonstrates that students find SL interactive, engaging and useful for learning course content. Students noted that the use of synchronous class sessions increased their ability to interact with other students as well as meet fellow university students while exploring the campus environment.

By utilizing the virtual environment Second Life, students were able to collaborate on student assignments and projects. Furthermore, students communicated with one another within the scheduled sessions. Notably, students found the environment engaging and integrated use of the environment to communicate with professor, students, in-world "friends" and other university campus students on nonacademic related topics. Although the course was provided based on exploratory measures it can be noted that there was a high level of student satisfaction associated to the inclusion of a virtual environment. As educators we must be knowledgeable about the ways in which our current student population learns. As this generation of students have been referred to as gamers and bloggers, the need for alternative instructional strategies should become more pronounced as a means for delivering course material. As virtual environments embody the same principles that students associate with gaming, students will benefit from the interaction, collaboration and learning in an environment that is experiential. It is recommended that educators, researchers and administrators examine the use of virtual environments as a means for delivering content knowledge within a medium that versatile and engages students in experienced-based learning. Furthermore, the researchers suggest that an in-depth examination on a larger population is needed to understand the full effect of virtual environments on student learning.

VI. Limitations

A potential limitation was the population surveyed. Survey participants were students in an online course offering on Virtual Environments. The response rate was 67%, however the *N* was 12.

VII. Conclusions

Today's generation view Second Life environment as a strong social and interactive medium for communicating and socializing with others. In a recent study by EDUCAUSE Review, it was noted that the education community is using SL for many different academic, social, and corporate uses. The study goes on to state that **"**Educators and educational institutions need to understand that virtual worlds, like other social media, are here to stay and that these exciting forms of media are not a threat to formal education" [23]. As we seek to find solutions to the constantly evolving instructional methods available with technology, educators should be mindful of the vast technological advances that integrating SL will provide student learning. Inherent to this process is examining traditional learning theories as well as understanding the social context in which students interact and learn in a virtual environment. Further exploration is needed of today's students as they are "part of a generation in transition" [24]. The transition is a bridge between two distinct cultures; one which is comfortable in traditional learning environments yet the other is attached to their technology devices such as Wii, cell phones, and computers. Our jobs as educators will be to address this cultural transition and blend the methods so students can reach their full learning potential.

References

[1] New Media Consortium and the EDUCAUSE Learning Initiative, (2007). The Horizon Report 2007 Edition. Creative Commons. Stanford, CA.

[2] Bonk, C.J., (2004). The Perfect E-Storm: emerging technology, enormous learner demand, enhanced pedagogy, and erased budgets. The Observatory on Borderless Higher Education.

[3] Zuhairi, A., Wahyono, E., & Suratinah, S. (2006). The historical context, current development and future challenges of distance education in Indonesia. Quarterly Review of Distance Education, 7, 1, 95-101.

[4] Bannan-Ritland, B., Bragg, W. & Collins, M. (2006). Linking Theory, Educational Constructs, and Instructional Strategies in Web-based Course Development. Retrieved July 14, 2006, from http://www.virtual.gmu.edu/EDIT611/BannanWBC.pdf.

[5] Wenger, E. (2002). Communities of practice: Learning, meaning and identity. N.Y.: Cambridge University Press.

[6] Picciano, A. (2001). Distance learning: Making connections across virtual space and time. Upper Saddle River, NJ: Merrill Prentice Hall.

[7] [Dede, C. (2004, September). Enabling distributed learning communities via emerging technologies - Part one. T.H.E. Journal, 32(2), 12-22. www.thejournal.com

[8] Bielaczyc, K. & Collins, A. (1999) Learning communities in classrooms: A reconceptualization of educational practice. In C. M. Reigeluth (Ed.): Instructional-design theories and models: A new paradigm of instructional theory (pp. 269-292). Mahwah NJ: Lawrence Erlbaum Associates.

[9] Perraton, H. (1988). A theory for distance education. In D. Sewart, D., Keegan, & B. Holmberg (Eds.), Distance education: International perspectives (pp. 95-113). New York: Routledge.

[10] Vygotsky, L.S. (1978). Mind in society: The development of higher order psychological processes. Cambridge, MA: Harvard University Press.

[11] Vygotsky, L.S. (1986). Thought and language. Cambridge, MA: MIT Press.

[12] Hodge, E., Bosse, M., Faulconer, J., & Fewell, M., (2006). Mimicking proximity: The role of distance education in forming communities of learning. International Journal of Instructional Technology & Distance Learning, Vol. 3, No. 12.

[13] [Brown, A., Ash, D., Rutherford, M., Nakagawa, K., Gordon, A., and Campione, J. C. (1993). Distributed expertise in the classroom. In G. Salomon (Ed.), Distributed cognitions: Psychological and educational considerations, pp. 188-228. Cambridge MA: Cambridge University Press.

[14] Cazden, C. B. (1988). Classroom discourse: The language of teaching and learning. Portsmouth, NH: Heinemann.

[15] Cobb, P. (1994). Where is the mind? Constructivist and sociocultural perspectives on mathematical development. Educational Researcher, 23(7), 13-19.

[16] Wertsch, J.V. (1985). Vygotsky and the social formation of mind. Cambridge, MA: Harvard University Press.

[17] Lave, J. & Wenger, W. (1991). Situated learning: Legitimate peripheral participation. Cambridge, UK: Cambridge University Press.

[18] Swan, K. & Shea, P. (2005). The development of virtual learning communities. In. S. R. Hiltz & R. Goldman (Eds.), Learning together online: Research on asynchronous learning networks, pp. 239-260. Mahwah, NJ: Erlbaum.

[19] New Media Consortium (2007). Social Networking, the "Third Place," and the Evolution of Communication. New Media Consortium, Creative Commons. Retrieved January 20, 2008 from, http://creativecommons.org/
[20] Duemer, L., Fontenot, D., Gumfory, K., Kallus, M., Larsen, J., Schafer, S., et al., (2002). The use of online synchronous discussion groups to enhance community formation and professional identity development. Journal of Interactive Online Learning, 1. Retrieved September 12, 2008 from http://www.ncolr.org/jiol/
[21] Lobel, M., Neubauer, M., & Swedburg, R. (2002). Elements of group interaction in a real-time synchronous online learning-by-doing classroom without F2F participation. USDLA Journal. 16. Retrieved March 5, 2005, from http://www.usdla.org/html/journal/
[22] Park, Y. J., & Bonk, C. J. (2007). Synchronous learning experiences: Distance and residential learners' perspectives in a blended graduate course. Journal of Interactive Online Learning, 6(3) 245-264.
[23] Robbins-Bell, S., (September/October, 2008). Higher education as virtual conversation. EDUCAUSE Review. 43(5). Retrieved October 3, 2008 from http://connect.educause.edu/Library/EDUCAUSE+
[24] Review/HigherEducationasVirtualC/47220
[25] Rickard, W. and Oblinger, D. (2004). Unlocking the potential of gaming technology. Retrieved October 12, 2008, from http://download.microsoft.com/download/9/8/c/98c108c
[26] 2-ade9-4c60-a938-d508eea54cdc/Unlockingt
[27] hePotentialofGamingTechnology.pdf.