

INTEGRATION OF VIRTUAL IMMERSIVE ENVIRONMENTS AS AN INTERACTIVE COLLABORATIVE MEDIUM: A CASE STUDY IN STUDENT PERCEPTIONS

Charles J. Lesko, Jr.
Department of Technology Systems
East Carolina University

Abstract

The purpose of this case study is to evaluate the use of virtual immersive environments as a platform for the conduct of synchronous and asynchronous classroom activities. The context for conducting the study is an undergraduate 'Technology Project Management' course that includes delivery approaches to students from both online (Distance Education) class offerings and on-campus (Face-to-face) class offerings. A composite evaluation of survey responses and assessments analysis is examined.

Discussion includes the use of virtual teaming sessions and self-paced online case studies; incorporation of in-world interactive learning modules; assessment of impromptu, in-world, e-learning sessions in the form of informal student interactions; the and use of online text and voice chat capabilities. The data indicates, surprisingly, that the learning curve related to new technology for students, was not as steep as expected and that overall the students felt reasonably comfortable with the introduction of this technology into their learning environments. Finally, there is little empirical evidence, beyond pedagogical preference, of adverse effects in using this framework while there were some initially positive small gains in the online students' performance related to learning objectives using the VIE technologies.

Background

In today's global economy, there continues to be a significant growth in the number of organizations that consider themselves to be project-oriented. Directly correlating with this

growth is a heightened pressure to ensure that projects meet with a high degree of success [1]. Projects on a global-scale, with their virtual project teams, have emerged as the catalyst by which the time and cost of projects can be reduced while maintaining relative control over the scope and quality of each project [2]. There is clearly an operational and financial rationale to develop a supportive infrastructure that facilitates these virtual project team efforts.

To understand the challenges faced by virtual project teams, it is essential for this discussion to define the concept of the virtual team. Essentially, virtual teams are a group of individuals who work across time, space and organizational boundaries typically utilizing various internet based technologies. Lipnack and Stamp refer to virtual teams as "the peopleware for the 21st century" [3]. It is through the use of virtual teams that managing project-oriented organizations has become a reality, and it is because of virtual teams and their associated projects that reduce the limitations of physical boundaries to insignificance.

As the use of virtual teams becomes more and more common in the workplace, it is critical that students become acquainted with and even master the skills necessary to compete in the highly competitive global workplace market. The academic challenge is to integrate these concepts and trends into the project management learning experience. This article focuses on an ongoing study of undergraduate and graduate technology students as they study the concepts of managing technology-based projects in today's context particularly using

virtual environment tools to manage virtual teams. The key ingredient to the success of any virtual project team is the team's ability to communicate [4]. So the focus of this study centers on a relatively new and evolving set of VIE technologies. The integration of three-dimensional (3D) virtual immersive environments (VIE's) allows virtual teams (or in this case students, faculty and other attendees) to interact within a computer-generated space just as they would in a real world physical space. The ability to fully immerse students in a safe, deliberately designed, and controlled environment for meetings, collaboration and training is tremendous. VIE's can provide virtual teams with:

- 1) an opportunity for global collaboration and social networking;
- 2) a method to promote compliance and adherence to regulations through practice in a realistic but safe environment;
- 3) an environment that can be recorded and monitored for compliance; and
- 4) a communicative medium that affords team members the opportunity to interact with others without geographical boundaries.

Over the past few years, several factors have surfaced to help motivate this effort. First, the need to facilitate course delivery to both on campus (face-to-face) and online sections of the same course inspired the need to evaluate the use of VIE technologies as a common delivery media. Secondly, having utilized the VIE technologies in online sections prior to this and observing the many synchronous and asynchronous advantages it gave to online

students indicated that VIE would be a viable delivery option for on-campus students as well. Finally, the opportunity to offer online students the opportunity to interact with on-campus synchronous sessions appeared to be a plausible option for multiple, geographically dispersed students to interact.

From a functional perspective, early VIE efforts within academia have taken advantage of the technology's capabilities including social presence, persistence and the visual presentation of the virtual environment. Emphasis has focused on the visual presentation or building out of these environments for pedagogical deployment in an effort to develop virtual classroom and meeting spaces that not only replace the actual real world academic experiences, but also maximize the inherent unique functionalities that the new VIE provides. Yet once the spaces are in place there comes the need to communicate course content; therein lies the impetus behind a growing interest in the use of VIE as delivery media for presenting content both synchronously and asynchronously.

This case covered the course delivery involving three separate sections of undergraduate students. The undergraduate course was a junior (3000 level) course titled: 'Technology Project Management'. The total population of three sections at the beginning of the semester was (71) students and at the end of the semester there were (65) students. Table 1 provides a breakdown of online verses on-campus students for this case along with actual response rates.

Table 1: Initial and final survey population with response rates.

Survey	Total Population			Online Students			On-Campus Students		
	No. Students	Completed Survey	Return Rate	No. Students	Completed Survey	Return Rate	No. Students	Completed Survey	Return Rate
Initial SL Survey	71	63	88.7%	47	42	89.4%	24	21	87.5%
Final SL Survey	65	63	96.9%	44	40	90.9%	21	17	81.0%

Case Methodology

The objectives and assessment criteria for the Technology Project Management course typically involves not only lecture and case study presentations, but also provides an opportunity for virtual teaming and interaction among project management students. The overarching objective of this research effort was to gather preliminary data to gain a better understanding of the practical challenges associated with the integration of VIE's into an undergraduate project management course. Additionally, given the growing need to deliver similar course content to both on-campus and online students the study looked not only to assess changes in student perceptions towards the use of VIE technologies as a delivery media, but also to assess student perceptions and reactions to the merging of both online and on-campus sections.

Research objectives

To evaluate the effectiveness of the VIE media and the merging of both online and on-campus delivery efforts this study sought to assess the effect these activities had on the student's perception of both in the learning process. This research addressed three objectives with the first two incorporating survey assessment tools:

- 1) First, an online, anonymous 'Initial Second Life Experience Survey' was used to evaluate the early interactions of the students with the virtual environment Second Life and specifically the population background, initial learning curve students experienced, avatar interaction, and perceived effectiveness of the VIE medium.
- 2) Second, an online, anonymous 'End of Semester Survey' was used to assess use and perceived effectiveness of the virtual interactive labs and of Second Life as a collaborative site, as well as the value of integrating online with on-campus sections.
- 3) Finally, general observation was incorporated into this study, where

appropriate, to evaluate challenges associated with course delivery and management [5] [6].

Course structure for this case

Students were instructed at the beginning of the semester that this course was being offered both to on-campus (face-to-face) students as well as online (distance education) students. They were also told that the course would utilize several forms of communication throughout the semester and that online students would have two delivery options to choose from when communicating and completing course work. The primary modes of communication for the online sections were Blackboard (the institution-wide online learning management solution), Second Life (a VIE solution used for both synchronous and asynchronous delivery) and Centra (an online course meeting tool used fairly extensively at the institution, and email (if needed as a backup). On-campus students met in a multimedia classroom on campus. The students in the multimedia classroom had access to laptops or the option to bring their own laptops with them to class.

Online students were given two options for attending class lectures. Since the on-campus section was using Second Life in the live synchronous class sessions, online students were given the option to attend the on campus lectures by logging into Second Life. Those online students unable to attend during the on-campus session were given a second option to attend evening lectures via the Centra online meeting tool. Both on-campus and online, live Centra sessions were used for reviewing lecture material, case study assignments, and to discuss quiz results. The students were allowed to complete all other activities on their own time throughout the course week including reviewing interactive lab lessons in Second Life and completing online quizzes and case study assignments in blackboard.

Within the institutions already existent virtual campus environments, three distinct virtual spaces were created to provide virtual space to conduct the Second Life activities. The first virtual space created was a virtual classroom space (see Figure 1). This space provided an initial meeting room for all synchronous sessions. Students logged in here and through an activity bot (a proximity counter program) attendance was automatically collected. The auditorium style seating gave plenty of space for all and provided visibility to three separate boards in the front. Having multiple presentation screens allows the instructor to present several aspects of the course at once, including: class agenda, case study, reading assignments, video clips, and presentation slides.



Figure 1: Virtual classroom space.

The second virtual space that was created was a virtual interactive lab building (see Figure 2). This space contained a lobby floor with access to four floors above it. Each of the first three floors above the lobby housed eight learning modules. Each learning module consisted of four viewing stations that the student completed with the fourth station being a review station. The viewing stations presented a series of 12-18 slides, on a timed presentation with each slide presentation lasting approximately 4-6 minutes each. Each week students were assigned two of the learning modules to complete and were quizzed on the material.



Figure 2: Virtual interactive lab building.

A depiction of one of the lab modules showing the first three viewing stations can be viewed in Figure 3. Students were able to access the lab modules at any time throughout the week with the online quiz being available through the course blackboard site. Each station allowed up to four students at a time to view the material. Students had the ability to control the presentation by stopping, starting, advancing or backing up the presentation as required.



Figure 3: Virtual interactive lab modules.

The final virtual space that was created consisted of a series of Virtual Team Studios (see Figure 4). Students were able to move to (teleport) to their assigned studio by using access links located in the lobby of the virtual interactive lab. A total of eight studios were created so that the class could be broken into small virtual teams of 6-8 students each for open

group discussions. Time was allotted each week (usually during the last 20 minutes of the second class session of the week) for the students to move to their assigned studios and interact with their respective virtual teams. The primary topic of discussion was usually the case project assignment for the week but students were allowed to discuss any course related topic of interest.

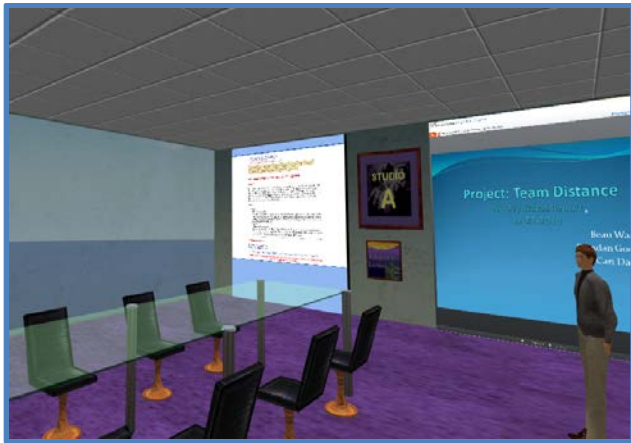


Figure 4: Virtual team studios.

Survey Overview

During the first week of the course, students received basic instructions on Second Life setup with short online videos that took the students through the process of creating an avatar account, logging into the Second Life environment, learning how to move, interact and communicate in the VIE, and how to locate the virtual classroom site. All students (both on-campus and online) were required to create accounts. Following their initial Second Life exercise, all students in the three sections were presented with an online, anonymous survey of (14) closed-ended statements collecting ordinal-level data as responses.

A final survey at the end of the course was also conducted where all students in the three sections were presented with an online, anonymous survey of (8) closed-ended statements collecting ordinal-level data as

responses. The population and response rates for both surveys are indicated in Table 1.

Survey Population and Return Rates

A key area of interest was to assess the experiences of online student's verses on campus students to determine if their classroom experience was independent or associated with of type of section (Online or On-campus) to which they were assigned. In other words, is there a difference in experience between online and on-campus students, if not then the experience is considered independent of the type of section (online/on-campus) that the student is in; otherwise, the experience has some level of uniqueness between online and on-campus and there is a characteristic association between the online and on-campus experiences. Hypotheses for select statements were pre-established and chi square analysis was used to evaluate the data.

Initial Survey Analysis

The intent of the survey was to collect student opinion data following completion of their first course experience with the Second Life VIE environment. This same survey instrument had been used and pretested in a previous case study involving a smaller group of online graduate students a year prior [7]. The survey population consisted of (71) students that were registered for the course with (65) students actually completing the survey (see Table 1).

Specifically, the survey instrument was designed to focus on four key concept areas. The first area surveyed focused on gaining a foundational understanding of the surveyed population's background with respect to this type of communication media. The second was to assess the initial learning curve experienced by each student and the third focused on the early avatar interactions and mechanics associated with the utilization of the avatar as a personal proxy in a real world communication

Table 1: Initial and final Second life survey population and return rates.

Survey	Total Population			Online Students			On-Campus Students		
	No. Students	Completed Survey	Return Rate	No. Students	Completed Survey	Return Rate	No. Students	Completed Survey	Return Rate
Initial SL Survey	71	63	88.7%	47	42	89.4%	24	21	87.5%
Final SL Survey	65	63	96.9%	44	40	90.9%	21	17	81.0%

Table 2: Survey results for first concept area: Perceived effectiveness of the medium.

Statement	Concept Being Canvassed	Responses	Total Population		Online Students		On-Campus Students	
			No.	Percent.	No.	Percent.	No.	Percent.
1. Throughout the course, weekly assignments included Interactive Modules in Secondlife; these asynchronous modules proved helpful as study aides?	Second Life Interactive Labs	1. Strongly Agree	15	24.2%	14	31.8%	1	5.6%
		2. Agree	25	40.3%	19	43.2%	6	33.3%
		3. Undecided	11	17.7%	6	13.6%	5	27.8%
		4. Disagree	5	8.1%	1	2.3%	4	22.2%
		5. Strongly Disagree	6	9.7%	4	9.1%	2	11.1%
2. While reviewing the Interactive Modules in Secondlife, did you ever collaborate with other students?	Second Life Interactive Labs	1. Never	18	29.0%	11	25.0%	7	38.9%
		2. On one or two occasions	14	22.6%	9	20.5%	5	27.8%
		3. On three to five occasions	9	14.5%	5	11.4%	4	22.2%
		4. On six to ten occasions	15	24.2%	13	29.5%	2	11.1%
		5. Eleven or more occasions	6	9.7%	6	13.6%	0	0.0%
3. Interacting with other students while reviewing the Interactive Modules helpful in your studies?	Second Life Interactive Labs	1. Strongly Agree	8	12.9%	8	18.2%	0	0.0%
		2. Agree	12	19.4%	10	22.7%	2	11.1%
		3. Undecided	8	12.9%	6	13.6%	2	11.1%
		4. Disagree	1	1.6%	1	2.3%	0	0.0%
		5. Strongly Disagree	1	1.6%	0	0.0%	1	5.6%
		6. I did not interact with others	32	51.6%	19	43.2%	13	72.2%

gathering feedback from the students on their experiences with the Second Life virtual environment in our classroom experiment.

Since the responses to the survey statements are all categorical variable yield data the chi square (X²) statistic is used here to investigate whether distributions of the various categorical variables differ from one another. The chi square statistic presented here compares the tallies of categorical responses between two independent groups: the on-campus student population and the online student population. The chi-square test is testing the offered null hypothesis asserting that there is no significant difference between the expected and observed result. The p-value is the probability that the deviation of the observed from that expected is due to chance alone with no other forces acting on it. A relative standard commonly used in this type of research is $p > 0.05$ is accepted for this study [8]. For this analysis our predetermined

alpha level of significance is (0.05), with a degree of freedom (df =1).

First concept area – Population background

The results of the first three statements (see Table 2) indicate that the majority of the students had past experiences with online courses and various online delivery tools but little virtual world experience. It should be noted here that Statement 4 of the survey was not applicable to this article’s focus so was not considered here. Specifically, the first surveyed statement indicates that the majority (76.2%) of the students had taken online classes for credit. What was interesting to note here was that (81%) of the on-campus students had taken online courses indicating that the vast majority of the student base is becoming more comfortable with both course delivery modalities.

The second surveyed statement coincides with the first statement indicating a strong familiarization with basic online collaborative tools. The results from the third statement are indicative of the newness of Second Life as a virtual reality academic tool with nearly (80%) of the students indicating that they have never operated in this virtual world environment before. The final statement in this concept area addresses hardware and software compatibility issues. The results indicate that (19%) of the students had some issue; however, it should be noted here that by the end of the course week that this assignment was given, all students indicated that they were able to overcome their technical issues and were able to log into Second Life and complete their assignment. In evaluating independence or association between online and on-campus students, all three statements in this concept area were considered.

Statement 1: “Prior to taking this course, had you ever taken an online distance education course for academic credit?” Responses for this statement were: 1.Yes, 2.No. The hypotheses established for this statement were as follows:

Ho: The experience of taking previous online courses is independent of type of section (Online or On-campus) that the students are in.

Ha: The experience of taking previous online courses is associated with type of section

(Online or On-campus) that the students are in.

For Statement 1, resulting analysis on the chi square statistic ($\chi^2 = 0.394$) and a corresponding probability ($P=0.530$) were below the conventionally accepted significance level of 0.05, so the null hypothesis that the two distributions are the same is verified (see Table 3). Based on these results, the null hypothesis that the experience of taking previous online courses is independent of type of section (Online or On-campus) that the students are in is accepted.

Statement 2: “Prior to taking this course, had you ever utilized online collaboration tools such as or similar to: Centra (online meeting), or Blackboard?” Responses for this statement were: 1.Yes, 2.No. The hypotheses established for this statement were as follows:

Ho: The experience of utilizing online collaboration tools such as or similar to: Centra (online meeting), or Blackboard is independent of type of section (Online or On-campus) that the students are in.

Ha: The experience of utilizing online collaboration tools such as or similar to: Centra (online meeting), or Blackboard is associated with type of section (Online or On-campus) that the students are in.

Table 3: Chi square results for Statements 1 through 3.

	Statement	Category	Expected		Observed			df	Chi-Square	Probability
			1.	2.	1.	2.	Total			
S1	Prior to taking this course, had you ever taken an online distance education course for academic credit?	On-campus	16.0	5.0	17	4	21	1	0.394	0.530
		Online	32.0	10.0	31	11	42			
		Total			48	15	63			
S2	Prior to taking this course, had you ever utilized online collaboration tools such as or similar to: Centra (online meeting), or Blackboard.	On-campus	19.7	1.3	21	0	21	1	2.136	0.144
		Online	39.3	2.7	38	4	42			
		Total			59	4	63			
S3	Prior to taking this course, rate your frequency of use with Second Life or other similar virtual worlds.	On-campus	16.7	4.3	16	5	21	1	0.194	0.660
		Online	33.3	8.7	34	8	42			
		Total			50	13	63			

For Statement 2, resulting analysis on the chi square statistic ($\chi^2 = 2.136$) and a corresponding probability ($P=0.144$) were below the conventionally accepted significance level of 0.05, so the null hypothesis that the two distributions are the same is verified (see Table 3). Based on these results, the null hypothesis that the experience of utilizing online collaboration tools such as or similar to: Centra (online meeting), or Blackboard is independent of type of section (Online or On-campus) that the students are in is accepted. Statement 2 coincides with Statement 1 indicating a strong familiarization with basic online collaborative tools.

Statement 3: “Prior to taking this course, rate your frequency of use with Second Life or other similar virtual worlds?” Responses for this statement were: 1.Never, 2.Seldom, Sometimes, Often (collapsed results to indicate either the student had ‘Never’ or had [‘Seldom,’ ‘Sometimes,’ ‘Often’] utilized the tools. The hypotheses established for this statement were as follows:

Ho: The experience of utilizing Second Life or other similar virtual worlds prior to this course is independent of type of section (Online or On-campus) that the students are in.

Ha: The experience of utilizing Second Life or other similar virtual worlds prior to this course is associated with type of section (Online or On-campus) that the students are in.

For Statement 3, resulting analysis on the chi square statistic ($\chi^2 = 0.194$) and a corresponding probability ($P=0.660$) below the conventionally accepted significance level of 0.05, so the null hypothesis that the two distributions are the same is verified (see Table 3). Based on these results, the null hypothesis that the experience of utilizing online collaboration tools such as or similar to: Centra (online meeting), or Blackboard is independent of type of section (Online or On-campus) that the students are in is accepted.

Second concept area – Initial learning curve

The second group of statements (see Table 4) presented in the survey focused on gaining an understanding of the initial learning curve that the students were tasked to complete. The study’s concern here is that the introduction of any new delivery medium to the course should not limit the learning process. Overall, the results of the next four statements indicate that the vast majority of the students had little to no difficulty in learning to interact within the Second Life virtual world environment.

The fifth survey statement focused on the difficulty of changing the avatar’s appearance. Although changing the avatar’s appearance is not a required skillset for setting up an account or interacting in the Second Life environment, it is a skill that is covered during the initial setup phase of the avatar account, thus its inclusion in this survey vehicle. The results indicate that approximately one quarter (25.4%) of the students felt that changing the avatar’s appearance was difficult (see Table 4).

It should be noted here, that results from the original survey pretest indicated two interpretations from this statement; some felt that the question was asking if changing the appearance inferred making the avatar mimic the student’s own appearance while others felt it just dealt with the mechanics of making basic changes. Although the statement was not reworded following pre-test for this study it may be worth reconsidering rewording for subsequent evaluations.

Specifically, responses for the eighth statement of the survey indicate (see Table 4) that most students (92.1%) took less than an hour to practice within the Second Life environment before moving on to their first virtual world assignment. There also was a discernable difference between online and on-campus students; the majority (33.3%) of the online students took less than 10 minutes to complete practice verses (19%) of the on-campus students

Table 4: Survey results for second concept area: Initial learning curve.

Statement	Concept Being Canvassed	Responses	Total Population		Online Students		On-Campus Students	
			No.	Percent.	No.	Percent.	No.	Percent.
5. Changing your avatars appearance was difficult to accomplish?	Initial Learning Curve	1. Strongly Agree	2	3.2%	1	2.4%	1	4.8%
		2. Agree	14	22.2%	10	23.8%	4	19.0%
		3. Undecided	20	31.7%	14	33.3%	6	28.6%
		4. Disagree	26	41.3%	16	38.1%	10	47.6%
		5. Strongly Disagree	1	1.6%	1	2.4%	0	0.0%
6. Moving your avatar (to include walking, flying, and sitting) was a difficult skill to learn?	Initial Learning Curve	1. Strongly Agree	0	0.0%	0	0.0%	0	0.0%
		2. Agree	6	9.5%	3	7.1%	3	14.3%
		3. Undecided	8	12.7%	5	11.9%	3	14.3%
		4. Disagree	43	68.3%	29	69.0%	14	66.7%
		5. Strongly Disagree	6	9.5%	5	11.9%	1	4.8%
7. Communicating in Second Life (to include Local Text Chat and Voice Chat) was a difficult skill to learn?	Initial Learning Curve	1. Strongly Agree	1	1.6%	1	2.4%	0	0.0%
		2. Agree	5	7.9%	4	9.5%	1	4.8%
		3. Undecided	18	28.6%	13	31.0%	5	23.8%
		4. Disagree	31	49.2%	17	40.5%	14	66.7%
		5. Strongly Disagree	8	12.7%	7	16.7%	1	4.8%
8. How much time did you take to practice in Second Life prior to your first class session?	Initial Learning Curve	1. Less than 10 minutes	18	28.6%	14	33.3%	4	19.0%
		2. 10 to 29 minutes	18	28.6%	11	26.2%	7	33.3%
		3. 30 to 59 minutes	23	36.5%	16	38.1%	7	33.3%
		4. 1 to 2 hours	3	4.8%	0	0.0%	3	14.3%
		5. More than 2 hours	1	1.6%	1	2.4%	0	0.0%

who were taking less than 10 minutes to complete practice. Basic communications and avatar movement within the virtual world environment were addressed in the sixth and seventh statements with survey responses indicating that less than (10%) of the students felt that it was difficult to move and communicate within the virtual world.

In evaluating independence or association between online and on-campus students, Statement 6 and Statement 7 in this concept area were considered.

Statement 6: “Moving your avatar (to include walking, flying, and sitting) was a difficult skill to learn?” Responses for this statement were: 1.Strongly Agree, Agree; 2.Undecided, Disagree, Strongly Disagree. The hypotheses established for this statement were as follows:

Ho: The skill of moving the avatar within the VIE was difficult to learn is independent of type of section (Online or On-campus) that the students are in.

Ha: The skill of moving the avatar within the VIE was difficult to learn is associated with type of section (Online or On-campus) that the students are in.

For Statement 6, resulting analysis on the chi square statistic ($\chi^2 = 0.829$) and a corresponding probability ($P=0.363$) were below the conventionally accepted significance level of 0.05, so the null hypothesis that the two distributions are the same is verified (see Table 5). Based on these results, the null hypothesis that the skill of moving the avatar within the VIE was difficult to learn is independent of type of section (Online or On-campus) that the students are in is accepted.

Statement 7: “Communicating in Second Life (to include local text chat and voice chat) was a difficult skill to learn?” Responses for this statement were: 1.Strongly Agree, Agree; 2.Undecided, Disagree, Strongly Disagree. The hypotheses established for this statement were as follows:

Ho: The skill of communicating within the VIE is independent of type of section (Online or On-campus) that the students are in.

Ha: The skill of communicating within the VIE is associated with type of section (Online or On-campus) that the students are in.

For Statement 7, resulting analysis on the chi square statistic ($\chi^2 = 0.829$) and a corresponding probability ($P=0.363$) were below the conventionally accepted significance level of 0.05, so the null hypothesis that the two distributions are the same is verified (see Table 5). Based on these results, the null hypothesis that the experience of utilizing online collaboration tools such as or similar to: Centra (online meeting), or Blackboard is independent of type of section (Online or On-campus) that the students are in is accepted.

Third concept area – Avatar interaction

The third group of statements presented in the survey focused on avatar/student interactions. Unlike real world interactions, the interaction of students as they progress through a VIE session can present some real world situations for the student with a unique twist to them in a virtual setting.

Overall, the results of this concept area (see Table 6) indicate that students expected that the general conduct of the avatar as the student’s VIE ‘proxy,’ be similar to that of the real world where a code of standard behavior is expected. Specifically, statement nine responses find that (78.7%) of the students find it important for VIE sessions to maintain a code of conduct. Also of

note here, only one student in the population indicated that maintaining a code of conduct was unimportant.

Statement 9: “How would you rate the importance of maintaining a Code of Conduct for holding academic sessions in Second Life environments?” Responses for this statement were: 1. Unimportant, Of Little Importance; 2. Moderately Important, Important, Very Important. The hypotheses established for this statement were as follows:

Ho: The student perception towards the importance of maintaining a Code of Conduct for holding academic sessions in Second Life environments is independent of type of section (Online or On-campus) that the students are in.

Ha: The student perception towards the importance of maintaining a Code of Conduct for holding academic sessions in Second Life environments is associated with type of section (Online or On-campus) that the students are in.

For Statement 9, resulting analysis on the chi square statistic ($\chi^2 = 0.829$) and a corresponding probability ($P=0.363$) were below the conventionally accepted significance level of 0.05, so the null hypothesis that the two distributions are the same is verified (see Table 3). Based on these results, the null hypothesis that the student perception towards the importance of maintaining a Code of Conduct for holding academic sessions in Second Life environments is independent of type of section (Online or On-campus) that the students are in is accepted.

Table 5: Chi square results for Statements 6 and 7.

	Statement	Category	Expected		Observed		Total	df	Chi-Square	Probability
			1. YES	2. NO	1. YES	2. NO				
S6	Moving your avatar (to include walking, flying, and sitting) was a difficult skill to learn?	On-campus	2.0	19.0	3	18	21	1	0.829	0.363
		Online	4.0	38.0	3	39				
		Total			6	57				
S7	Communicating in Second Life (to include Local Text Chat and Voice Chat) was a difficult skill to learn?	On-campus	2.0	19.0	1	20	21	1	0.829	0.363
		Online	4.0	38.0	5	37				
		Total			6	57				

Table 6: Survey results for third concept area: Avatar interaction.

Statement	Concept Being Canvassed	Responses	Total Population		Online Students		On-Campus Students	
			No.	Percent.	No.	Percent.	No.	Percent.
9. How would you rate the importance of maintaining a Code of Conduct for holding academic sessions in Second Life environments?	Avatar Interaction	1. Unimportant	1	1.6%	0	0.0%	1	4.8%
		2. Of Little Importance	5	7.9%	3	7.1%	2	9.5%
		3. Moderately Important	8	12.7%	7	16.7%	1	4.8%
		4. Important	25	39.7%	19	45.2%	6	28.6%
		5. Very Important	24	38.1%	13	31.0%	11	52.4%
10. The general appearance of most avatars was distracting?	Avatar Interaction	1. Strongly Agree	1	1.6%	1	2.4%	0	0.0%
		2. Agree	7	11.1%	6	14.3%	1	4.8%
		3. Undecided	16	25.4%	8	19.0%	8	38.1%
		4. Disagree	34	54.0%	24	57.1%	10	47.6%
		5. Strongly Disagree	5	7.9%	3	7.1%	2	9.5%
11. It is important for avatars to closely resemble the human they represent?	Avatar Interaction	1. Strongly Agree	0	0.0%	0	0.0%	0	0.0%
		2. Agree	17	27.0%	11	26.2%	6	28.6%
		3. Undecided	14	22.2%	10	23.8%	4	19.0%
		4. Disagree	28	44.4%	20	47.6%	8	38.1%
		5. Strongly Disagree	4	6.3%	1	2.4%	3	14.3%
12. The presence of avatars enhanced group communication and interaction?	Avatar Interaction	1. Strongly Agree	2	3.2%	1	2.4%	1	4.8%
		2. Agree	13	20.6%	8	19.0%	5	23.8%
		3. Undecided	35	55.6%	23	54.8%	12	57.1%
		4. Disagree	9	14.3%	6	14.3%	3	14.3%
		5. Strongly Disagree	4	6.3%	4	9.5%	0	0.0%

Table 7: Chi square results for Statements 9 and 12.

	Statement	Category	Expected		Observed			df	Chi-Square	Probability
			1.	2.	1.	2.	Total			
S9	How would you rate the importance of maintaining a Code of Conduct for holding academic sessions in Second Life environments?	On-campus	2.0	19.0	3	18	21	1	0.829	0.363
		Online	4.0	38.0	3	39	42			
		Total			6	57	63			
S12	The presence of avatars enhanced group communication and interaction?	On-campus	5.0	16.0	6	15	21	1	0.394	0.530
		Online	10.0	32.0	9	33	42			
		Total			15	48	63			

Statement 12: “The presence of avatars enhanced group communication and interaction?” Responses for this statement were: 1.Strongly Agree, Agree; 2.Undecided, Disagree, Strongly Disagree. The hypotheses established for this statement were as follows:

Ho: The student perception that presence of avatars enhanced group communication and interaction is independent of type of section (Online or On-campus) that the students are in.

Ha: The student perception that presence of avatars enhanced group communication and

interaction is associated with type of section (Online or On-campus) that the students are in.

For Statement 12, resulting analysis on the chi square statistic ($\chi^2 = 0.394$) and a corresponding probability ($P=0.530$) were below the conventionally accepted significance level of 0.05, so the null hypothesis that the two distributions are the same is verified (see Table 7). Based on these results, the null hypothesis that the student perception that the presence of avatars enhanced group communication and interaction is independent of type of section

Table 8: Survey Results for Fourth Concept Area: Perceived Effectiveness of Medium.

Statement	Concept Being Canvassed	Responses	Total Population		Online Students		On-Campus Students	
			No.	Percent.	No.	Percent.	No.	Percent.
13. Second Life is an effective platform for conducting academic meetings?	Perceived Effectiveness of the Medium	1. Strongly Agree	5	7.9%	3	7.1%	2	9.5%
		2. Agree	15	23.8%	9	21.4%	6	28.6%
		3. Undecided	24	38.1%	14	33.3%	10	47.6%
		4. Disagree	12	19.0%	10	23.8%	2	9.5%
		5. Strongly Disagree	7	11.1%	6	14.3%	1	4.8%
14. Does a virtual environment such as Second Life make you more or less motivated to conduct online collaboration?	Perceived Effectiveness of the Medium	1. More Motivated	20	31.7%	12	28.6%	8	38.1%
		2. No Difference	26	41.3%	16	38.1%	10	47.6%
		3. Less Motivated	17	27.0%	14	33.3%	3	14.3%

(Online or On-campus) that the students are in is accepted.

Fourth concept area - Perceived effectiveness of the medium

The last group of statements presented in the initial survey focused on the perceived effectiveness of the Second Life VIE that was presented to the students for use in the class. The overall results of the fourth concept area (see Table 8) indicate that approximately one-third of the population deems the medium effective following their initial experience with the virtual environment.

The first statement in this concept area (Statement 13) assessed the student’s view toward the use of Second Life as an effective platform for conducting academic meetings. The responses to this statement showed some significant differences between online and on-campus students. Only (85.7%) of the on-campus students felt that the environment was an effective platform compared to (38.1%) of the online students. The second statement in this area (Statement 14) considered the motivational aspect of the Second Life and whether the VIE environment encouraged the student to collaborate online. Nearly a third of the students (31.7%) indicated that following their initial exposure to the virtual environment made them more motivated to conduct online collaboration.

In evaluating independence or association between online and on-campus students within the fourth concept area, both statements were considered.

Statement 13: “Second Life is an effective platform for conducting academic meetings?” Responses for this statement were: 1.Strongly Agree, Agree; 2.Undecided, Disagree, Strongly Disagree. The hypotheses established for this statement were as follows:

Ho: The student perception towards Second Life as an effective platform for conducting academic meetings is independent of type of section (Online or On-campus) that the students are in.

Ha: The student perception towards Second Life as an effective platform for conducting academic meetings is associated with type of section (Online or On-campus) that the students are in.

For Statement 13, resulting analysis on the chi square statistic ($\chi^2 = 0.586$) and a corresponding probability ($P=0.444$) were below the conventionally accepted significance level of 0.05, so the null hypothesis that the two distributions are the same is verified (see Table 9). Based on these results, the null hypothesis that the student perception towards Second Life as an effective platform for conducting academic meetings is independent of type of section (Online or On-campus) that the students are in is accepted.

Statement 14: “Does a virtual environment such as Second Life make you more or less motivated to conduct online collaboration?” For Statement 14 from the three responses ('More Motivated', 'No Difference', and 'Less Motivated') an evaluation based on motivation was sought so the data was evaluated comparing all responses indicating more motivation ('More Motivated') to those responses indicating otherwise ('No Difference', and 'Less Motivated'). Responses for this statement were: 1. More Motivated; 2. No Difference or Less Motivated. The hypotheses established for this statement were as follows:

Ho: The student perception that virtual environments such as Second Life make you more or less motivated to conduct online collaboration is independent of type of section (Online or On-campus) that the students are in.

Ha: The student perception that virtual environments such as Second Life make you more or less motivated to conduct online collaboration is associated with type of section (Online or On-campus) that the students are in.

For Statement 14, resulting analysis on the chi square statistic ($\chi^2 = 0.586$) and a corresponding probability ($P=0.444$) were below the conventionally accepted significance level of 0.05, so the null hypothesis that the two distributions are the same is verified (see Table 9). Based on these results, the null hypothesis that the student perception that virtual environments such as Second Life make you more or less motivated to conduct online

collaboration is independent of type of section (Online or On-campus) that the students are in is accepted.

Final Survey Analysis

During the final week of the course all students (both online and on campus students) in the three sections were presented with an online, anonymous survey of that contained (8) closed-ended questions related to their course experiences with the Second Life VIE environment and their interactions with fellow students. Similar to the initial survey, pretesting was conducted prior to issuing the survey; the pretesting involved presenting the surveys to (12) students in the form of respondent debriefings. Based on the results of the pretest, minor adjustments were made to the survey statements to ensure clarity of meaning and intent in the questions.

The intent of the End of Semester Survey was to collect student opinion data following completion of their course experience utilizing the Second Life VIE environment. The survey population consisted of (71) students that were registered for the course with (65) students actually completing the survey. Table 1 provides a detailed breakdown on the survey population and also indicates section and total population return rates.

Specifically, the end of semester survey was designed to concentrate on three key concept areas. The first area of concentration surveyed, focused on gleaning feedback from the students regarding their use of the Second Life

Table 9: Chi square results for Statements 13 and 14.

	Statement	Category	Expected		Observed			df	Chi-Square	Probability
			1.	2.	1.	2.	Total			
S13	Second Life is an effective platform for conducting academic meetings?	On-campus	6.7	14.3	8	13	21	1	0.586	0.444
		Online	13.3	28.7	12	30	42			
		Total			20	43	63			
S14	Does a virtual environment such as Second Life make you more or less motivated to conduct online collaboration?	On-campus	6.7	14.3	8	13	21	1	0.586	0.444
		Online	13.3	28.7	12	30	42			
		Total			20	43	63			

Table 10: Survey results for first concept area: Interactive labs.

Statement	Concept Being Canvassed	Responses	Total Population		Online Students		On-Campus Students	
			No.	Percent.	No.	Percent.	No.	Percent.
1. Throughout the course, weekly assignments included Interactive Modules in Secondlife; these asynchronous modules proved helpful as study aides?	Second Life Interactive Labs	1. Strongly Agree	15	24.2%	14	31.8%	1	5.6%
		2. Agree	25	40.3%	19	43.2%	6	33.3%
		3. Undecided	11	17.7%	6	13.6%	5	27.8%
		4. Disagree	5	8.1%	1	2.3%	4	22.2%
		5. Strongly Disagree	6	9.7%	4	9.1%	2	11.1%
2. While reviewing the Interactive Modules in Secondlife, did you ever collaborate with other students?	Second Life Interactive Labs	1. Never	18	29.0%	11	25.0%	7	38.9%
		2. On one or two occasions	14	22.6%	9	20.5%	5	27.8%
		3. On three to five occasions	9	14.5%	5	11.4%	4	22.2%
		4. On six to ten occasions	15	24.2%	13	29.5%	2	11.1%
		5. Eleven or more occasions	6	9.7%	6	13.6%	0	0.0%
3. Interacting with other students while reviewing the Interactive Modules helpful in your studies?	Second Life Interactive Labs	1. Strongly Agree	8	12.9%	8	18.2%	0	0.0%
		2. Agree	12	19.4%	10	22.7%	2	11.1%
		3. Undecided	8	12.9%	6	13.6%	2	11.1%
		4. Disagree	1	1.6%	1	2.3%	0	0.0%
		5. Strongly Disagree	1	1.6%	0	0.0%	1	5.6%
		6. I did not interact with others	32	51.6%	19	43.2%	13	72.2%

Table 11: Chi square results for Statements 2 and 3.

	Statement	Category	Expected		Observed			df	Chi-Square	Probability
			1. YES	2. NO	1. YES	2. NO	Total			
S2	While reviewing the Interactive Modules in Secondlife, did you ever collaborate with other students?	On-campus	5.2	12.8	7	11	18	1	1.196	0.274
		Online	12.8	31.2	11	33	44			
		Total			18	44	62			
S3	Interacting with other students while reviewing the Interactive Modules helpful in your studies?	On-campus	3.3	1.7	2	3	5	1	1.920	0.166
		Online	16.7	8.3	18	7	25			
		Total			20	10	30			

Interactive labs. The second area of concentration was to assess the use of Second Life as a collaborative suite. The final concept area contained two separate statements: one survey statement sought to evaluate student opinion related to the value of integrating online students with on-campus students; the other statement, an open-ended statement, sought general feedback from the students on their experiences with the Second Life VIE environment.

First concept area – Interactive labs

The first concept area focused specifically on the interactive labs that were created for this course. Responses from the first surveyed statement (see Table 10) shows a distinct difference between the online and on-campus students with (75.0%) of the online students agreeing that the interactive modules proved helpful versus (38.9%) of the on-campus

students agreeing with the same statement.

Responses for the second surveyed statement coincide with results from the first statement indicating more usage and interaction from the online students than those from the on-campus section. Over half of the online students (53.1%) had six or more virtual collaborations with other students compared to only two students (11.1%) from the on-campus section.

The third statement in this concept area assessed whether the student’s virtual interactions with other students were helpful in their studies. Although nearly half (43.2%) of the online students indicated they choose to have no interaction with other students, a significant number of those interacting (40.9%) agreed that those interactions were helpful. Of the on-campus students (27.8%) choose to interact with others virtually. One student from the on campus group indicated that he/she felt

that the virtual interactions with the other students were not helpful.

In evaluating independence or association between online and on-campus students within the first concept area, all three statements were considered.

Statement 2: “While reviewing the Interactive Modules in Second Life, did you ever collaborate with other students?” For Statement 2 from the four responses ('Never', 'On one or two occasions', 'On three to five occasions', 'On six to ten occasions', and 'Eleven or more occasions') an evaluation based on collaboration or not. Responses for this statement were: 1. Never; 2. ‘On one or two occasions’, ‘On three to five occasions’, ‘On six to ten occasions’, and ‘Eleven or more occasions’. The hypotheses established for this statement were as follows:

Ho: Collaboration with other students while reviewing the Interactive Modules in Second Life is independent of type of section (Online or On-campus) that the students are in.

Ha: Collaboration with other students while reviewing the Interactive Modules in Second Life is associated with type of section (Online or On-campus) that the students are in.

For Statement 2, resulting analysis on the chi square statistic ($\chi^2 = 1.196$) and a corresponding probability ($P=0.274$) were below the conventionally accepted significance level of 0.05, so the null hypothesis that the two distributions are the same is verified (see Table 11). Based on these results, the null hypothesis that collaboration with other students while reviewing the Interactive Modules is independent of type of section (Online or On-campus) that the students are in is accepted.

Statement 3: “Interacting with other students while reviewing the Interactive Modules helpful in your studies?” Responses for this statement were: 1.Strongly Agree, Agree; 2.Undecided,

Disagree, Strongly Disagree. The hypotheses established for this statement were as follows:

Ho: The student perception that interacting with other students while reviewing the Interactive Modules was helpful in their studies is independent of type of section (Online or On-campus) that the students are in.

Ha: The student perception that interacting with other students while reviewing the Interactive Modules was helpful in their studies is associated with type of section (Online or On-campus) that the students are in.

For Statement 3, resulting analysis on the chi square statistic ($\chi^2 = 0.1920$) and a corresponding probability ($P=0.166$) were below the conventionally accepted significance level of 0.05, so the null hypothesis that the two distributions are the same is verified (see Table 11). Based on these results, the null hypothesis that the student perception that he student perception that interacting with other students while reviewing the Interactive Modules was helpful in their studies is independent of type of section (Online or On-campus) that the students are in is accepted.

Second concept area – Second life as a collaborative site

The second area canvassed in the final survey focused on the use of Second Life as a collaborative site. Student responses (see Table 12) to the first surveyed statement in this area displays an obvious divide between the online and on-campus students with regard to the usefulness of the virtual team sessions with (45.5%) of the online students agreeing that the virtual team sessions proved helpful, while only two of the on-campus students (11.1%) indicated that the sessions were helpful.

The second and third surveyed statements in this area further demonstrate this division between on-campus and online students.

Table 12: Survey results for second concept area: Second life as a collaboration site.

Statement	Concept Being Canvassed	Responses	Total Population		Online Students		On-Campus Students	
			No.	Percent.	No.	Percent.	No.	Percent.
4. Throughout the course, several optional virtual team sessions were conducted that included students from both On-line and On Campus sections; these virtual team sessions proved helpful as study aides?	Second Life as a Collaboration Site	1. Strongly Agree	12	19.4%	12	27.3%	0	0.0%
		2. Agree	10	16.1%	8	18.2%	2	11.1%
		3. Undecided	23	37.1%	16	36.4%	7	38.9%
		4. Disagree	8	12.9%	4	9.1%	4	22.2%
		5. Strongly Disagree	9	14.5%	4	9.1%	5	27.8%
5. Through the course, did you ever take part in unscheduled or impromptu Secondlife collaborative sessions with one or more students in the course?	Second Life as a Collaboration Site	1. Never	15	24.2%	9	20.5%	6	33.3%
		2. On one or two occasions	16	25.8%	9	20.5%	7	38.9%
		3. On three to five occasions	12	19.4%	9	20.5%	3	16.7%
		4. On six to ten occasions	10	16.1%	8	18.2%	2	11.1%
		5. Eleven or more occasions	9	14.5%	9	20.5%	0	0.0%
6. Outside of scheduled class activities, did you used Secondlife to meet with other students during the semester?	Second Life as a Collaboration Site	1. Never	45	72.6%	29	65.9%	16	88.9%
		2. On one or two occasions	8	12.9%	7	15.9%	1	5.6%
		3. On three or four occasions	5	8.1%	4	9.1%	1	5.6%
		4. On five or more occasions	4	6.5%	4	9.1%	0	0.0%
7. Second Life is an effective platform for conducting academic meetings?	Second Life as a Collaboration Site	1. Strongly Agree	12	19.4%	12	27.3%	0	0.0%
		2. Agree	20	32.3%	11	25.0%	9	50.0%
		3. Undecided	6	9.7%	2	4.5%	4	22.2%
		4. Disagree	8	12.9%	5	11.4%	3	16.7%
		5. Strongly Disagree	4	6.5%	2	4.5%	2	11.1%
		6. Not Applicable, Online Centra	5	8.1%	5	11.4%	0	0.0%

Responses indicate that only two students in the on-campus section took part on unscheduled virtual sessions compared to seventeen students (27.5%) from the online sections with nineteen of the students (30.6%) engaging six or more times throughout the semester. Results of the fourth surveyed statement is of significant interest here; with over half of the population (51.7%) agreeing that Second Life is an effective platform for conducting academic meetings.

In evaluating independence or association between online and on-campus students within the second concept area, Statement 7 was considered.

Statement 7: “Second Life is an effective platform for conducting academic meetings?” Responses for this statement were: 1.Strongly Agree, Agree; 2.Undecided, Disagree, Strongly Disagree. The hypotheses established for this statement were as follows:

Ho: The student’s perception that Second Life is an effective platform for conducting academic meetings is independent of type of section (Online or On-campus) that the students are in.

Ha: The student’s perception that Second Life is an effective platform for conducting academic meetings is associated with type of section (Online or On-campus) that the students are in.

For Statement 7, resulting analysis on the chi square statistic ($\chi^2 = 2.393$) and a corresponding probability ($P=0.122$) were below the conventionally accepted significance level of 0.05, so the null hypothesis that the two distributions are the same is verified (see Table 13). Based on these results, the null hypothesis that the student’s perception that Second Life is an effective platform for conducting academic meetings is independent of type of section (Online or On-campus) that the students are in is accepted.

Table 13: Chi square results for Statement 7.

	Statement	Category	Expected		Observed			df	Chi-Square	Probability
			1.	2.	1.	2.	Total			
57	Second Life is an effective platform for conducting academic meetings?	On-campus	11.5	6.5	9	9	18	1	2.393	0.122
		Online	20.5	11.5	23	9	32			
		Total			32	18	50			

Third concept area - Online & On-campus students

The final statement presented in this survey concentrated on the perceived value added to the experience by bringing together both on-campus and online students. To accomplish this, the survey included two statements: one closed-ended statement with ordinal responses and the other an open-ended statement. The results of this survey area are summarized in Table 12. The statement in this area sought to gain an overall perceived value of the educational experience that the students received by incorporating both on-campus and online students together. The student responses indicate that a large segment of the on-campus students (44.4%) agreed that the experience added value to their course with four students choosing to use Second Life versus Centra for class sessions, twelve of them (70.6%) agreed that the involvement added value to their educational experience.

In evaluating independence or association between online and on-campus students within the last concept area, statement 8 was considered.

Statement 8: “Throughout this semester, online (distance education) students were given the opportunity to have synchronous class sessions with on-campus students. Including online students in an On-Campus Class through Second Life added value to your educational experience?” Responses for this statement were: 1.Strongly Agree, Agree; 2.Undecided, Disagree, Strongly Disagree. The hypotheses established for this statement were as follows:

Ho: The student’s perception that including online students in an on-campus class through Second Life added value to their educational experience is independent of type of section (Online or On-campus) that the students are in.

Ha: The student’s perception that including online students in an on-campus class through Second Life added value to their educational experience is associated with type of section (Online or On-campus) that the students are in.

For Statement 8, resulting analysis on the chi square statistic ($\chi^2 = 2.440$) and a corresponding probability ($P=0.118$) were below the conventionally accepted significance level of 0.05, so the null hypothesis that the two distributions are the same is verified (see Table 15). Based on these results, the null hypothesis that the student’s perception that including online students in an on-campus class through Second Life added value to their educational experience is independent of type of section (Online or On-campus) that the students are in is accepted.

Case Findings and Recommendations

To date, one of the most common methods for learning centers on reading about a specific subject and then letting the words become similes for future physical (real) experiences. The challenge then for academics is to improve on that scenario. Virtual worlds provide us with direct experiences that can challenge our senses bringing us closer to a ‘real world’ experience. According to Heiphetz and Woodill (2010), the “more realistic the virtual world or simulation, the more we learn from the experience” [9].

Table 14: Survey results for third concept area: Online & On-campus students.

Statement	Concept Being Canvassed	Responses	Total Population		Online Students		On-Campus Students	
			No.	Percent.	No.	Percent.	No.	Percent.
8. Throughout this semester, online (distance education) students were given the opportunity to have synchronous class sessions with on-campus students. Including online students in an On-Campus Class through Secondlife added value to your educational experience?	Value of Online with On-Campus	1. Strongly Agree	10	16.1%	8	18.2%	2	11.1%
		2. Agree	10	16.1%	4	9.1%	6	33.3%
		3. Undecided	8	12.9%	2	4.5%	6	33.3%
		4. Disagree	4	6.5%	3	6.8%	1	5.6%
		5. Strongly Disagree	3	4.8%	0	0.0%	3	16.7%
		6. Not Applicable, Online Centra	27	43.5%	27	61.4%	0	0.0%

Table 15: Chi square results for Statement 8.

	Statement	Category	Expected		Observed			df	Chi-Square	Probability
			1.	2.	1.	2.	Total			
58	Throughout this semester, online (distance education) students were given the opportunity to have synchronous class sessions with on-campus students. Including online students in an On-Campus Class through Secondlife added value to your educational experience?	On-campus	10.3	7.7	8	10	18	1	2.440	0.118
		Online	9.7	7.3	12	5	17			
		Total			20	15	35			

Training students in project management tools, methods and techniques often necessitates the use incorporation of multiple delivery approaches to meet established course objectives. Lectures, case studies, practical exercises, and teaming activities are all common elements; then couple that with the need to present the course to two distinctly unique student populations [online and on-campus] and the effort can appear insurmountable. But in this complexity can dwell a solution. Today's project managers are having to work in a more globalize environment with team members more often than not geographically dispersed from each other requiring team members to collaborate virtually [10] [11]. The ability to collaborate virtually is not limited to the online learners but is required of all project management students.

The preparation and structuring of this course delivery poses several challenges in developing and presenting a viable blended course framework (12). The use of virtual teaming sessions and self-paced online case studies; incorporation of in-world interactive learning modules; assessment of impromptu, in-world, e-learning sessions in the form of informal student interactions; and use of online text and voice chat capabilities appeared daunting at first but

eventual came to fruition. Based on the results of the survey's and the collective observations throughout the development and delivery of the course, the following findings and recommendations are presented:

(1) The "Initial Second Life Experience Survey" provided a great deal of information regarding the early (22.3%) of the students not seeing any value in the interaction. Of the seventeen online student interactions of the students with the virtual world environment Second Life. It also yielded important preliminary data about student backgrounds, initial learning curves, early avatar interactions, and student thoughts regarding the effectiveness of the virtual world medium. Overall the initial learning curve did not appear too steep to gain the needed skills to conduct basic interactions within the virtual environment with only a select few students taking more than an hour to train prior to their first virtual world session. Avatar appearance did not appear to be distracting and resemblance to the student was not deemed essential to the whole interactive process. With regard to a code of conduct, student did expect some level of appropriate conduct within the virtual world. Finally, over half of the students indicated they were likely to use the second life environment in the future.

(2) The second 'End of Semester Survey' assessed the effectiveness of the virtual interactive labs, Second Life as a collaborative site, and value of integrating online with on-campus sections. Responses regarding the interactive labs were mixed at best with the biggest complaint being the desire to have the slide presentations in hard copy rather than online in a video format. To minimize lag, audio was stripped from the slides which may have accounted for part of this concern since the students were left with just a visual presentation verses one with audio and video.

(3) The online students appeared more willing to collaborate with virtual teams than the on-campus students, with many of the on-campus students questioning why the need for virtual interaction in the first place. A small percentage of the students utilized the virtual environment on their own outside class yet over half of the students felt the site was effective for conducting meetings. In class, students consistently reiterated their understanding of the need to be proficient in this type of technology to better prepare for future virtual business collaborations.

(4) Finally, from a course delivery and management perspective the challenges were huge. This was a first time effort at the institution with regard to blending both online and on-campus sections utilizing this type of technology. Data analysis indicates it might be valuable to further define and develop the educational value of merging online and campus students in class work experiences using this kind of technology. This is just one area for future research revealed by the preliminary data gathered in this project.

(5) Development of the interactive lab as well as the teaming and lecture labs took significant effort over the course of the semester prior to delivering this course but the real win here is that the virtual environments, tools and techniques are now available for easy replication and incorporation into other course

efforts. Although many of the document presentation glitches in Second Life that surfaced throughout the course of the semester were rectified, their very presence most assuredly had an impact on the student's final survey responses.

As a final observation, it became very apparent throughout the semester that students had their own preferences for what tools and online communication channels they were comfortable with in the classroom. Clearly, the on-campus students, as a whole, did not see value in bringing online students to their classroom. Yet on the other side, many online students were eager to engage and interact with their on-campus counterparts. Although beyond the scope of this current study, one might ask the question why students had these differing perceptions of value and evaluate the blending of on-campus and online students further.

References

1. Rad, Parviz F and Levin, Ginger. Achieving Project Management Success Using Virtual Teams. Boca Raton, FL : J. Ross Publishing, 2003.
2. Project management with virtual teams?. Krejci, Gerhard P. 3, Wiesbaden, Germany : Gruppendynamik Und Organisationsberatung, 2009, Vol. 40. 10.1007/s11612-009-0086-7.
3. Lipnack, Jessica and Stamps, Jeffrey. Virtual teams: Reaching across space, time, and organizations with technology. New York, NY : John Wiley & Sons, Inc., 1997.
4. Virtual project management . Lebedieva, O., Matvijkiv, O. and Lobur, M. Polyana-Svalyava, Ukraine : CADSM' 2011, 2011. CAD Systems in Microelectronics (CADSM), 2011 11th International Conference The

Experience of Designing and Application of. pp. 364-365.

5. Babbie, Earl. *Survey Research Methods*. Belmont, CA : Wadsworth Publishing Company, 1990.
6. Czaja, Ronald and Blair, Johnny. *Designing Surveys: A Guide to Decisions and Procedures*. Thousand Oaks, CA : Pine Forge Press, 1995.
7. Lesko, Charles and Pickard, John. *Design Considerations for Virtual Classroom and Laboratory Environments*. San Antonio, TX : American Society for Engineering Education, 2009.
8. Lind, Douglas A., Mason, Robert D. and Marchal, William G. *Basic Statistics for Business and Economics*. New York City, NY : McGraw-Hill, 2000.
9. Heiphetz, Alex and Woodill, Gary. *Training and Collaboration with Virtual Worlds: How to Create Cost-Saving, Efficient, and Engaging Programs*. New York, NY : McGraw-Hill, 2010.
10. Casarez, Vince, et al., et al. *Reshaping Your Business with Web 2.0: Using the New Collaborative Technologies to Lead Business Transformation*. New York, NY : McGraw-Hill, 2009.
11. Larson, Erik W and Gray, Clifford F. *Project Management: The Managerial Process*. New York, NY : McGraw-Hill, 2011.
12. Rossett, Allison, Douglis, Felicia and Frazee, Rebecca V. *Strategies for Building Blended Learning*. learningcircuits.org. [Online] July 2003. [Cited: August 21, 2011.] <https://files.pbworks.com/download/nStd>

6zxaHf/ablendedmaricopa/1240589/Strategies%20Building%20Blended%20Learning.pdf.

13. The use of 'exploratory learning' for supporting immersive learning in virtual environments. de Freitas, Sara and Neumann, Tim. 2, Cambridge, MA : Computers & Education: An International Journal, February 2009, Vol. 52. 0360-1315.
14. *Immersive Interfaces for Engagement and Learning*. Dede, Chris. 5910, Washington, DC : Science, January 2009, Vol. 2. 1095-9203.
15. Garrison, D. Randy and Vaughan, Norman D. *Blended Learning in Higher Education: Framework, Principles, and Guidelines*. San Francisco, CA : John Wiley & Sons, Inc., 2008.
16. The Pennsylvania State University. What is Blended Learning? <http://weblearning.psu.edu/>. [Online] 2009. [Cited: December 16, 2010.] http://weblearning.psu.edu/blended-learning-initiative/what_is_blended_learning.

Biographical Information

Dr. Lesko is currently serving as Assistant Professor in the College of Technology & Computer Science at East Carolina University. His current research focus is on implementation of immersive 3-D technologies into the virtual workplace and classroom. He has an extensive career managing and leading technological innovation in the workplace; his past experiences bring to the table a heavy technical background with a strong management and leadership base. He has over (18) years of experience in systems integration and project management fields. He can be reached 252-737-1907 or at leskoc@ecu.edu.