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An Examination of Usability of a Virtual Environment for Students Enrolled in a College of Agriculture

Theresa Pesl Murphrey[1], Tracy A. Rutherford[2], David L. Doerfert[3],
Leslie D. Edgar[4], and Don W. Edgar[5]

Abstract

Educational technology continues to expand with multi-user virtual environments (e.g., Second Life™) being the latest technology. Understanding a virtual environment's usability can enhance educational planning and effective use. Usability includes the interaction quality between an individual and the item being assessed. The purpose was to assess the usability of "AgriCulture Island" in Second Life™ to identify possible issues, understand of the severity of these issues, and how they could be effectively addressed in order to use Second Life™ as a teaching tool. The framework allowed the identification of constructs that further defined usability related to assessing a virtual environment. Both quantitative and qualitative methods were employed including pre/post questionnaires, observations, and a focus group session. The study engaged 12 participants during summer 2012 from a college of agriculture. Findings revealed that participants accepted Second Life™ more after initial exposure. Additionally, participants indicated the experience felt "real" and they could sense others in the environment. Observation data provided a picture of participant interaction with the virtual environment. Elements documented were assistance needs, satisfaction, confusion, and deviation from task. The importance of understanding educational technology usability cannot be underestimated. This study adds to the educational technology literature and provides recommendations for use.

Keywords: technology, usability, education, Second Life™, virtual environment

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[1] Theresa Pesl Murphrey is an Associate Professor in the Department of Agricultural Leadership, Education, and Communications at Texas A&M University, 236 Agriculture and Life Sciences Building, College Station, TX 77843–2116, t–murphrey@tamu.edu.
[2] Tracy A. Rutherford is a Professor and Associate Department head for Undergraduate Programs in the Department of Agricultural Leadership, Education, and Communications at Texas A&M University, 268 Agriculture and Life Sciences Building, College Station, TX 77843–2116, rutherford@tamu.edu.
[3] David L. Doerfert is an Associate Chair and Professor in the Department of Agricultural Education and Communications at Texas Tech University, MS 42131, Room 109, Lubbock, Texas 76409–2131, david.doerfert@ttu.edu.
[4] Leslie D. Edgar is an Associate Professor in the Department of Agricultural Education, Communications, and Technology at the University of Arkansas, 205 Agriculture Building, Fayetteville, AR 72701, ledgar@uark.edu.
[5] Don W. Edgar is an Associate Professor in the Department of Agricultural Education, Communications, and Technology at the University of Arkansas, 205 Agriculture Building, Fayetteville, AR 72701, dedgar@uark.edu.

The potential for utilization of technology to facilitate learning continues to expand due in part to increased interest in online learning. Born and Miller (1999) reported that while perceptions of online degree programs varied, faculty were supportive of the increased development of online courses. Specific to this discipline, Roberts and Dyer (2005) reported that more than two-thirds of agricultural education departments provided courses via distance education. Based on the identified interest of learners towards online learning and departmental promotion of online courses, the question arises as to how to ensure the ability of courses to meet learners' needs of cognitive achievement. Leggette, Witt, et al. (2012) reported that the use of Second Life™ (a multi-user virtual environment) was able to encourage experiential learning in both resident and distance learners. These studies illustrate continued efforts towards the profession's National Research Agenda priority of creating "meaningful learning environments" (Doerfert, 2011, p. 9).

Narrowing this research priority to online learning environments, it has been documented that students receive several benefits from taking courses online, including developing and refining computer skills and their evaluation of Internet resources (Alston & English, 2007). "Feedback and immediacy, communication and interaction, and social presence" have been identified as elements preferred by students participating in online courses (Murphrey, Arnold, Foster, & Degenhart, 2012, p. 24). Social presence is a theory related to the value of communication between individuals at a distance (Pritchett, Naile, & Murphrey, 2012). As such, distance education can benefit from the use of technologies such as Second Life™ (SL) to reduce the disconnect felt by students in online classes by bringing the classroom to them (Ritzema & Harris, 2008). "The promise of SL in education revolves around community, and the connecting of individuals through a new, avatar-driven interface…offer[ing] an immediacy of experience and companionship" (Yee & Hargis, 2010, p. 205).

The use of a virtual environment enables an instructor to be "…able to offer a completely in-world learning experience and attract students from across the world, as well as secure an instructor from a different part of the country (or world)" (Yee & Hargis, 2010, p. 213). "…[I]nstead of participating in a distance classroom by watching videos and submitting homework by email, SL enables students to attend lectures in a 3D classroom, sharing this environment with the other fellows" (De Lucia, Francese, Passero, & Tortora, 2009, p. 232).

The three-dimensional nature of virtual environments such as SL can enable "effective tools for social interaction," becoming especially realistic regarding the "type of inter-personal interactions available" (Sreedharan, Zurita, & Plimmer, 2007, p. 227). The emphasis on social interaction and the ability of SL to provide social interaction was also present in the literature (Boulos, Hetherington, & Wheeler, 2007; De Lucia et al., 2009).

A 2009 study revealed "the virtual environment successfully supports synchronous communication and social interaction" (De Lucia et al., p. 232). In fact, "it has been demonstrated that better participation in computer conferences can be encouraged through online activity which is purposeful, authentic and embedded deeply with the program" (Boulos et al., 2007, p. 240). Murphrey, Rutherford, Doerfert, Edgar, and Edgar (2012) reported "it will be critical to present the technology in a way that enables students to easily comprehend the educational benefits of using the technology" (p. 68). Further, "[i]f universities implement virtual worlds such as SL, they need to consider faculty and student adoption, effectiveness of SL in education, availability of hardware and software, and cost" (Leggette, Rutherford, Sudduth, & Murphrey, 2012, p. 35). Understanding and recognizing the usability of a virtual environment can enable educational planning and thus, directly impact student engagement and learning.

Although literature regarding the educational value of SL is limited, much potential exists with this technology (Leggette, Rutherford, et al., 2012). While agricultural educators as a whole have not taken advantage of virtual environments such as SL, these tools offer many opportunities and benefits to education that other disciplines such as chemistry and English have utilized (Leggette, Rutherford, et al., 2012). At the graduate level, students in an agricultural crisis communications course "found [Second Life™] to be a valuable educational tool" (Leggette, Witt, et al., 2012, p. 132).

Conceptual Framework

The conceptual framework for the study was based upon usability. While it is important for students to see value in educational technology that is selected for use, it is also critical that the technology be determined to be usable because "usability" will impact the education process. The initial review of literature revealed the need to expand the study's conceptual framework to include the overarching concept of usability in the context of educational technology. This was accomplished through an extensive review of the literature that allowed the identification of constructs to further define and clarify usability as it related to assessing a virtual environment. Graphical user interfaces (GUIs) have proven usability evaluation methods, but due to the vast differences between GUIs and virtual environments (VEs), these methods may not, and are most likely not, suitable for studying VEs (Bowman, Gabbard, & Hix, 2002).

Usability relates to the quality of the interaction between an individual and the item being assessed. As shared by Hix and Hartson (1993), "[u]sability is related to the effectiveness and efficiency of the user interface and to the user's reaction to that interface" (p. 3). Shneiderman (1992) identified usability using a list of measurable human factors that included "time to learn…speed of performance…rate of errors by users…retention over time [and] …subjective satisfaction" (p.18).

A usability study conducted by Ritzema and Harris (2008) reported that 76.5% of participants found SL to be moderately easy to use, ranking the program "three or less" (p. 115) on a scale of one (easy) to five (difficult). Respondents to other studies reiterated the idea that SL would be valuable to learning environments, especially those that emphasize experiential learning (De Lucia et al., 2009; Jarmon, Traphagan, Mayrath, & Trivedi, 2009). Additionally, training and support for users, personalization options, and flexibility of SL also contributed to positive experiences with the interface (Cych & Maloney, 2010; Grunwald, Ramasundaram, Bruland, & Jesseman, 2007; Hewitt, Spencer, Mirliss, & Twal, 2009).

Previous studies revealed that students indicated that using SL as part of their coursework was difficult, some of which was due to usability issues (Sanchez, 2007). Three major factors that can inhibit participation in SL include technology constraints, time limitations, and lack of training/education in the use of SL (Cych & Maloney, 2010; de Freitas, 2008; Hewitt et al., 2009). The current study sought to further evaluate the use of SL and investigate its usability for students in agricultural education.

Multiple concepts emerged to further define and explain the concept of usability. Bowman et al. (2002) identified overarching aspects to include "navigation, selection, or manipulation" (p.420). Satisfaction was identified as a critical element of usability by multiple authors (Bowman et al., 2002; Fernandes, Ferreira, Cunha, & Morgado, 2010; Slone, 2009). In addition, Bowman et al. (2002) identified elements of usability that included the ability to learn, task accuracy, speed of task completion, and error count. Slone (2009) reported topics that included "(a) visibility of system status, (b) match between the system and the real world, (c) user control and freedom, (d) consistency and standards, (e) error handling, (f) recognition rather than recall, (g) flexibility, (h) privacy, (i) minimalist design, (j) help and documentation, (k) skills, and (l) pleasurable and respectful interaction with the user" (p. 181). Fernandes et al. (2010) reported topics that included "effectiveness, efficiency, and satisfaction" (p. 2). "Task analysis is a critical activity in usability engineering" (Bowman et al., 2002, p. 417). Thus, elements of confusion and deviation from the task were included in concepts to be observed.

Purpose and Objectives

The purpose of this study was to assess the usability of *AgriCulture Island* in SL in order to identify usability issues agricultural students could encounter and add to the understanding of the severity of those issues and how the issues could be addressed in order to use SL as a teaching tool. *AgriCulture Island* is a unique space within SL that was created with the purpose of providing course-related agriculture-based simulations. Generally, a SL environment is accessible by anyone with an SL account. To create a safe and secure learning environment, *AgriCulture Island* was intentionally designed to prevent outside individuals and organizations from accessing the simulation and maliciously impacting the learning experience. To improve the authenticity of the simulation, a United States coastal county that represented the diversity of agriculture in both urban and rural settings was selected as a design model. This allowed the SL designers to draw upon current, historical, and statistical (e.g., United States Census Bureau) data sources in creating the environment and increasing the authenticity for each simulation.

Research objectives for this study were: (a) determine agricultural students' perceptions of *AgriCulture Island* in SL prior to interacting or using SL, (b) determine agricultural students' perceptions of *AgriCulture Island* in SL after interacting or using SL, (c) document aspects of *AgriCulture Island* in SL that decrease satisfaction, and (d) identify elements of *AgriCulture Island* in SL that require explanation and training to encourage usability. All further references to SL in the context of the study refer to the setting of *AgriCulture Island* within the SL environment.

Methods and Procedures

We applied a one-group pretest-posttest design that utilized both quantitative and qualitative data collection aligned with the objectives of the study. From this design, data collection involved four steps: (1) pre-assessment, (2) observation of the use of SL, (3) post-assessment, and (4) group discussion with participants. Quantitative data collection methods included pretest and posttest questionnaires and observation counts during the treatment while qualitative methods included rich treatment observation notes and the posttest focus group session. Institutional Review Board approval was received to conduct the research.

A greater number of evaluators allow an increased number of issues to be identified and also "provide[s] a better indication of their severity" (Kantner & Rosenbaum, 1997, p. 154). Therefore, multiple evaluators were utilized in this study. Additionally, observation of individuals performing identical tasks in a controlled environment allowed the collection of measurable data (Kantner & Rosenbaum, 1997) because laboratory testing collects actual user experiences.

Participants were recruited from an agricultural communications and journalism course at Texas A&M University during the summer of 2012. A recruitment letter explaining the purpose of the study was sent out and respondents volunteered to participate. The study engaged 12 participants. The number of participants was deemed acceptable based upon the work of Fernandes et al. (2010) who reported that defining the number was "a matter of intense discussion in the usability community" ("Test Participants", para. 3) and suggested that assessing perceptions of usability could be accomplished with smaller numbers of participants (i.e., 5-10) unless the goal is to run statistical tests.

Participants were predominantly white (91.7%) and female (66.7%). The majority of them were 21-30 years of age (75.0%) with the remaining 25% being 18-20 years of age. All participants were enrolled in an undergraduate program in a college of agriculture.

Regarding technology use, all but one participant (91.7%) had taken at least one online course prior to the study and five participants (41.7%) had taken five or more online courses in the past. All participants classified themselves as "intermediate" computer users. Participants reported spending much time using computers weekly with 58.3% spending 6-10 hours per week on the computer and 33.3% said they spent more than 10 hours per week using computers.

Prior to the student participants entering the room, computers were equipped with an operational headset and microphone and tested to ensure that the virtual environment (i.e., SL) program was working correctly. It is critical that the "experimental application/interface must be robust and bug-free, so that the session does not have to be interrupted to fix a problem" (Bowman et al., 2002, p. 407). Thus, it was important to conduct the usability study after the environment under study had been used by multiple individuals to ensure an error-free environment. In fact, the environment evaluated as part of this study had been used by three separate sets of students prior to the study.

As a pretest, participants completed a questionnaire that was administered in the room. The questionnaire collected data on the participant's background and demographic information, technology use (i.e., number of online courses taken, hours spent using a computer weekly, and self-classification of computer ability), perceptions and opinions of SL, and technology acceptance.

The research team consisted of a facilitator to guide participants through the treatment task list, three assistants to answer questions and assist participants as needed, and three observers to record information about participants as they completed the required tasks. Each observer was assigned four participants to observe. Participants were instructed to raise their hands if they had a question and an assigned assistant, who was competent in the use of SL, responded to their question. Observers, who had been briefed on the observation process prior to the session, were provided with a chart to record all observations based on the conceptual framework of usability.

Computers utilized for the treatment portion of the study were numbered and participants were identified by computer number rather than by their name. This provided anonymity for the participants. After completion of the pretest questionnaire, participants completed a list of basic activities utilizing an avatar created in SL. See Table 1 for a listing of tasks completed by participants.

Table 1

Description of Tasks Observed During Usability Examination of AgriCulture Island in SL.

Tasks
1. Set up or log on to avatar account
2. Teleport to first location
3. Put on clothing with "edit my outfit" command
4. Teleport to specific location
5. Walk to hospital, enter hospital, take elevator to second floor
6. Navigate out of hospital to front steps
7. Run from hospital to school gym
8. Fly from school gym to city hall
9. Enter city hall; sit in chair
10. Use cameras and "view" command to view own avatar sitting
11. Take photo of own avatar sitting
12. Get information from file cabinet
13. Go to Extension office
14. Have conversation with another avatar
15. Logoff from Second Life™

Observers noted each participant's performance on each task with respect to specific criteria based on the study's conceptual framework. Observation categories along with how they were operationally defined can be viewed in Table 2.

Table 2

Observation Terms Used During Usability Examination of AgriCulture Island in SL

Observation Item	Definition
Number of requests for assistance	number of user requests for help to complete a task
Observed satisfaction	smiling, nodding, and/or positive comments
Observed confusion and/or disappointment	frowning, making negative comments, and/or long pauses
Observed deviation from task list	user doing a task, either more advanced or rudimentary, that is not one of the tasks listed on the instruction sheet
Navigation	ability of user to find and go to a location by walking, running, and flying
Selection	ability of user to put clothing on their avatar and accept items
Manipulation	ability of user to manage on-screen windows that appear and use cameras
Task is accurate and complete	observe that the user completed a task correctly
Time spent to complete task	write down time that user began and finished each task
Speed	observe if user completed the task list earlier than others, around the same time as others, or later than others

After completion of the task list, participants completed a posttest questionnaire that sought their opinion of task difficulty, their opinion of SL, and their opinion related to technology acceptance using a Likert-type scale ranging from one (easy) to five (difficult). In addition, each of the three observers recorded their thoughts and observations in both text and using audio reflection in order to capture a robust description. The audio reflections were then reviewed and comments were noted for each task within the observation sheets.

Finally, participants gathered for a short focus group discussion about their experience. The questions for discussion included "What was your overall reaction to using SL?" and "What recommendations would you have for instructors utilizing this technology?."

Findings

Agricultural Students' Perceptions of *AgriCulture Island* Prior to Using Second Life

No participants reported having an opinion about SL prior to the study. Two-thirds indicated that they "do not know enough about it" to have an opinion and the remaining one-third had heard of the program but again reported that they "do not know enough about it" to form an opinion. Ten of the 12 participants had no opinion when asked for their overall opinion of SL. The remaining two indicated that they were "neutral" about SL. However, 75.0% of the participants thought SL would have a sense of social presence, indicating that they understood that SL involved real-time interaction online with others.

Agricultural Students' Perceptions of *AgriCulture Island* After Using Second Life

Although 25% of participants still held a "neutral" opinion of SL after using the program, the remaining respondents had some degree of a positive opinion. Three individuals (25%) had a "somewhat positive" overall opinion, four (33.3%) had a "positive" opinion, and two (16.7%) had a "very positive" overall opinion of SL after completing the task list. All participants indicated that SL had a sense of social presence.

Based on responses to the post-assessment, the most difficult task for participants was to "navigate to a certain location by running" (Task 7) with an average difficulty of 2.83 (on a scale of 1 to 5 with 1 denoting easy and five denoting difficult). The easiest task was to "set up avatar or log onto your avatar" (Task 1) with an average difficulty of 1.17. The overall ranking of tasks from easiest to most difficult was: set up/logon to avatar, have conversation, navigate by flying/locate information (both 2.33), navigate by walking, and navigate by running. The only task that was ranked "difficult" by a participant was having a conversation (1 person).

A review of responses to Likert-type questions related to technology acceptance associated with SL (Table 3) revealed that participants were more accepting after exposure but did not show an increase in belief that SL would be easy to use. Means and standard deviations have been provided for each statement in Table 3 to allow comparison of responses. While t-tests are commonly used as inferential statistics, t-tests were employed to deepen our understanding of the data. We found no significant difference between students' pre and post responses to statements regarding usability. Comparison of means and frequencies revealed that participants increased in their belief that use would be clear and understandable after exposure but did not show an increase in belief that SL would be easy to use. As seen by participants' change in ratings, their acceptance remained positive although through experience, their assessment of the technology and its ease of use declined. No change was seen towards participants' ability to operate the virtual world.

Table 3

*Pre and Post Assessment Responses related to Technology Acceptance During the Usability Examination of AgriCulture Island in SL (*N *=12)*

Statement	Disagree		Somewhat Disagree		Neutral		Somewhat Agree		Agree		Strongly Agree	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
[a]My interaction with virtual worlds would be clear and understandable.												
	0	0	0	0	5	4	5	4	2	3	0	1
[b]It would be easy for me to become skillful at using virtual worlds.												
	0	0	0	1	0	2	4	4	8	4	0	1
[c]I would find virtual worlds easy to use.												
	0	1	0	1	1	1	8	4	3	4	0	1
[d]Learning to operate virtual worlds is easy for me.												
	0	2	0	1	6	3	6	2	0	3	0	1

Note: No responses fell in the "strongly disagree" category, therefore that category was not included in the table. Mean scores and standard deviation scores (*M*/*SD*) were calculated based on a 7 point Likert scale with a range of 1 = Strongly Disagree to 7 = Strongly Agree: [a] Pre: 4.75 / .75; [a]Post: 5.08 / 1.00. [b]Pre: 5.67 / .49; [b]Post: 5.17 / 1.12; [c]Pre: 5.17 / .58; [c]Post: 5:00 / 1.41; [d]Pre: 4.50 / .52; [d]Post: 4.50 / 1.62.

Second Life Aspects that Decrease Satisfaction or Require Explanation/Training

A summary of all observations was compiled and reviewed by the researchers. Categories of "assistance needed," "satisfaction," "confusion," and "deviation from task" were the most noted areas observed. A summary of instance counts and number of students involved is provided in Table 4.

Participant Comments Shared about Second Life During Group Session

During the 30-minute focus group session that followed the actual use of SL, participants had the opportunity to respond to the questions "What was your overall reaction to using SL?" and "What recommendations would you have for instructors utilizing this technology?" Participants overwhelmingly responded that they believed that being in a group setting while they learned about SL had a positive impact on their comfort with the program. A few items that were suggested included a guide sheet of commands and group learning sessions in a face-to-face classroom session for orientation.

As a group, the participants indicated that they did not plan to continue to use SL unless it was required for a class. More than one participant indicated that it would depend on how SL would be used as to whether they felt it would have educational value. All participants indicated that the experience felt "real" and that they could sense other people in the environment. They found it an enjoyable experience overall but felt they would need more instruction to be proficient.

Table 4

*Instances Counts Observed for Each Task During the Usability Examination of AgriCulture Island in SL (*N*=12).*

	Assistance	Satisfaction	Confusion	Deviation	Time to Complete
	# instances: # students				# minutes: # students
1. Set up or log on to avatar account	13: 8	3: 3	2: 2	5: 5	5 min: 1 6-7 min: 7 11-12 min: 4
2. Teleport to first location	13: 9	6: 5	9: 9	5: 5	2 min: 3 4-5 min: 6 7-9 min: 3
3. Put on clothing with “edit my outfit” command	14: 9	5: 4	3: 3	6: 6	6-7 min: 8 8 min: 2 10 min: 2
4. Teleport to specific location	2: 2	5: 3	3: 3	5: 5	1-3 min: 8 4 min: 4
5. Walk to hospital, enter hospital, take elevator to second floor	2: 1	2: 2	6: 6	2: 2	1-2 min: 4 3-5 min: 8
6. Navigate out of hospital to front steps	1: 1	-	-	2: 2	1 min: 11 2 min: 1
7. Run from hospital to school gym	13: 7	4: 4	5: 5	9: 7	1-3 min: 4 4-5 min: 4 6-7 min: 4
8. Fly from school gym to city hall	-	3: 3	4: 4	1: 1	1-2 min: 9 3 min: 3
9. Enter city all; sit in chair	4: 4	3: 3	3: 3	2: 2	1-3 min: 12
10. Use cameras and “view” command to view own avatar sitting	5: 3	1: 1	2: 2	2: 2	1 min: 9 2 min: 3

Table 4 Continues

Table 4 Continued

	Assistance	Satisfaction	Confusion	Deviation	Time to Complete
	# instances: # students		# minutes: # students		
11. Take photo of own avatar sitting	-	1: 1	-	1: 1	1-2 min: 12
12. Get information from file cabinet	11: 8	-	6: 6	2: 2	1-2 min: 6 3 min: 6
13. Go to Extension office	6: 5	2: 2	5: 5	2: 2	2-3 min: 12
14. Have conversation with another avatar	4: 2	3: 3	1: 1	5: 5	1-2 min: 8 3-5 min: 4
15. Logoff from SL	4: 4	-	2: 2	8: 8	1 min: 11 2 min: 1

Conclusions and Discussion

The population of this study was represented by predominantly undergraduate, white, female participants creating limitations to the study given the lack of diversity. However, it was concluded that the participants possessed a high level of technology awareness and perceived themselves to be competent in the use of technology that is supported by prior research (Murphrey, Rutherford, et al., 2012). It was also concluded that while the participants reported a high use of technology, they were not familiar with SL. This is not surprising given that participants were recruited purposely in an effort to attract a group of participants with limited exposure to SL in an effort to accurately measure usability of the environment without the influence of prior experience. Based on the finding that 75% of the participants expected SL to exhibit social presence, it was concluded that the participants understood the nature of SL as an environment in which one could interact. This finding supports prior research (Boulos et al., 2007; De Lucia et al., 2009; Sreedharan et al, 2007) that indicates the potential of SL for social interaction.

Based on the finding that participants' opinions of SL became more positive after the use of SL, it was concluded that participants were not overwhelmed by difficulty in using the program and could see potential application or value in using the technology. Overall, technology acceptance in regard to SL in this study moved in a positive direction. All participants were either neutral or in agreement that the use of SL would be "clear and understandable" while the majority of the participants agreed that it would be easy for them to become skilled at using the technology. Given that two participants indicated that learning to operate the SL environment would not be easy, it was concluded that the perception of "ease of use" varied.

In relation to the element of task difficulty, it was concluded that difficulty in navigation varied depending on the type of navigation being used (i.e., walking, running, flying, or teleporting). In addition, based on the findings reported in the Likert-scale questions related to task difficulty in which only one participant indicated any level of difficulty with having a conversation, it was concluded that as long as technology is setup appropriately, the use of audio will not present a challenge for students.

Observation data provided a robust picture of the interaction of participants with the SL environment. As revealed in findings displayed in Table 4, there was great variation in regard to each task. Requests for assistance were more prominent towards the beginning of the activity, during set-up, and logon to SL, and then reduced until activities such as “running” or “obtaining information from file cabinets” were requested. It was concluded that participants required more assistance with the tasks related to changing mode of movement and also in regard to selection as it related to information gathering.

Findings related to the element of satisfaction revealed that there were more signs of satisfaction early in the activity than later in the activity. In fact, the highest numbers of instances related to satisfaction were associated with movement tasks. This is not surprising given that movement gives one a sense of control in a virtual environment. It was concluded that encouraging movement within the environment can increase satisfaction.

The concept of “teleporting” appeared to be the task that participants found most confusing with nine of the 12 participants displaying signs of confusion during this task. Once again (similar to satisfaction) movement (regardless of method) was revealed to cause more confusion than other steps. It was concluded that the process of movement within the SL environment (especially those outside of normal human movement), and overall direction can be an important element that impacts the usability of SL.

“Deviation from task” varied across the tasks but was documented as occurring more predominantly during setup, in putting on clothing, during running, and during the conversation task. This was not surprising given the characteristics of these tasks. During setup and in putting clothing on an avatar there are decisions made by the participants; decisions can lead to deviation from task. It was concluded that tasks that involve decisions have a higher likelihood of deviation from task. It was also interesting that the highest number of instances of deviation was during the final task of logging off. It was concluded that participants were using this opportunity as one last chance to experiment with the environment.

Time to complete each task ranged from a minimum of one minute to a maximum of 12 minutes for any given task. In summing the total range of times per task, it was found that completion of all tasks ranged from approximately 26 minutes to 70 minutes (when considering times as a whole and not connected to any particular participant). It was concluded that time required to engage in the use of SL could vary widely for participants.

It is important to note that this study was conducted in a lab setting, meaning that usability was tested in an environment in which the technology had been tested prior to use. This enabled the focus of the study to remain on the interaction between the participants and SL rather than technology issues (e.g., microphone issues) that can occur when users are in their own environment.

Implications and Recommendations

The importance of understanding the usability of educational technology cannot be underestimated. Lack of usability can decrease use of the program, especially for coursework (Sanchez, 2007). It is not sufficient to merely “ask” students if they find a technology useful. Careful study is required to determine what scaffolding might be necessary to utilize educational technology such as SL in order to successfully use the technology to enable educational effectiveness. The results of this study revealed that students do encounter issues with SL but that the issues are not insurmountable as to completely negate use of the technology. In fact, observations revealed that students are capable of utilizing SL successfully. This supports Ritzema and Harris’s (2008) conclusion that most participants find SL to be moderately easy to use. Assistance with items such as navigation and information collection could enable a more pleasant experience. Students engaged in university settings are typically a generation that is familiar and willing to try out technology. However, as revealed in this study, the applicability of the technology will be the key to adoption and acceptance.

This study focused specifically on the “usability” of *AgriCulture Island* – a virtual environment housed in the SL platform. Results revealed that students had a greater interest and belief that learning could occur through the use of SL after use of the program. However, based on comments in the focus group session, it was clear that in addition to usability – purpose and relevance are critical elements and should be taken seriously.

In regard to addressing usability issues, it is recommended that students be provided an opportunity to test their skills and signup for one-on-one consultations or group sessions – not only in the virtual environment but also in face-to-face settings. Lack of training has been shown to inhibit participation in SL, so this could be a viable method for increasing participation (Cych & Maloney, 2010). It was obvious through observation that the students felt comfortable with technology but needed direct face-to-face interaction as they learned how to use the system. It is believed that as students become more comfortable with the virtual environment, they would gain greater value from the use of the program.

It is further recommended that additional research be conducted to compare uses of SL across disciplines and document the types of encounters and uses that students believe to be most beneficial. While one can assume that simulations might be the most relevant and purposeful, this should be documented through careful study. We believe that programs such as the one investigated will continue to evolve, change, and form into new and creative mechanisms for learning. These technologies should continue to be studied in order to guide effective use of technology and help others to utilize these tools in the best way possible with the least disruption to learning. The opportunities for application of virtual environments is limitless, yet as seen in this study, purpose and relevance will be key once usability issues are addressed and overcome.

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