Using Second Life to Educate in Agriculture: A Review of Literature

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Abstract

Second Life (SL), a 3-D virtual world developed by Linden Lab in 2003 (Linden Research, 2009a), has become an educational tool across disciplines. The integration of virtual environments into the traditional classroom setting as well as distance education programs is one mechanism of encouraging immersion. Due to the limited amount of research on the use of virtual worlds in agriculture, the authors used an integrative literature review to establish a basis for further research in the topic area. This study focused on reviewing current literature on SL, critiquing SL as an educational tool, and evaluating agriculture's presence in SL. SL is a relatively new tool that can provide students with the opportunity to use technical skills they learned in class, interact using asynchronous and synchronous communication, and participate in real-world simulations that would otherwise not be feasible. SL can actively engage students and provide them with opportunities to be immersed in the educational experience. The authors concluded that agriculture has been slow to adopt virtual education such as SL as an educational tool and more research is needed regarding effective and efficient use of virtual environments in the agricultural classroom.

Introduction

In 2005, the Association of American Colleges and Universities and its more than 1,100 cooperating institutions began an initiative, Liberal Education and America's Promise, to help college students gain a higher quality education (AAC&U, 2007). It is the goal of an institution of higher learning to provide students with a quality education at an affordable price; furthermore, it is the obligation of the institution to provide students with the knowledge they need to perform well and succeed in a competitive world (AAC&U, 2007). Therefore, AAC&U (2007) identified learning outcomes to guide and facilitate higher education, which included written and oral communication skills, critical thinking skills, knowledge of society and change, and practical and application skills. Because of the continued need to provide students with a foundation for success and a quality robust education (AAC&U, 2007), some educators are looking outside the box into a new world of education—virtual worlds (Jacobson et al., 2008).

The use of technology for instruction is of particular importance to agriculture students. Both graduates and employers agree that agriculture professionals should be competent in computer skills such as *"word processing, presentation graphics, spreadsheet analysis, database management, technical graphics, Internet use and electronic mail"* (Johnson et al., 2000, p. 27). Although students need to possess at least some of these basic skills for many of their classes, the instructor generally requires only limited use of instructional technology (Cox et al., 2011). In fact, Boyd and Murphrey (2001) found that agriculture students were interested in taking courses via distance education, even if they had no previous experience with this technology. In addition, technology has been used to successfully teach agricultural leadership courses at the university level, where "web-based students and the traditional students did not differ in their self-perceptions of how much they learned" (Koch et al., 2005, p. 78). Thus, it is critical to embrace new technologies and enable agriculture students to increase learning and experience through the use of new technologies such as SL.

To do this, individuals, learning institutions, governments, and profit and nonprofit organizations are using Second Life, a 3-D virtual world developed

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by Linden Lab in 2003 (Linden Research, 2009a), for both recreational and educational purposes (Kumar et al., 2008; Linden Research, 2009a) because it is flexible and more advanced than other virtual worlds (Linden Research, 2009a). SL has become an educational tool educators are using to bring the real world to the classroom (Bowers et al., 2009; Johnson, 2006). As more educators see the benefits of SL, it may become a more widely used teaching tool (Atkinson, 2008). *"Linden Labs has dedicated staff members whose focus is on how SL can be used for RL [Real Life] education."* (Baldwin, 2009, p. 32)

SL users create an avatar designed and manipulated to the users' preferences that will move and gesture similar to a human (Atkinson, 2008; Baldwin, 2009; Hargis, 2008; Hemp, 2006; Johnson, 2006; R. Martinez, 2007). Between July 2010 and September 2010, more than 750,000 SL users spent 105 million hours participating in SL activities and traded more than $150 million in Linden dollars—the SL currency (Linden Research, 2011). Therefore, SL becomes not only a place to make new friends but also a market place where users can buy, build, and create their own property (Atkinson, 2008; Hemp, 2006; Johnson, 2006; Kumar et al., 2008; Linden Research, 2009a; Pence, 2007-2008; Yellowlees and Cook, 2006). SL provides users the opportunity to use their creative minds and critical thinking skills as they build a virtual environment and become part of their second life (Baldwin, 2009; Foster, 2007). Users can communicate synchronously and asynchronously, transform their avatars into extravagant characters by using the multitudes of clothing designs and body styles (Atkinson, 2008; Hemp, 2006; Yellowlees and Cook, 2006), take part in virtual events, and build their own social networks and islands all in a separate life online (Baldwin, 2009; Hemp, 2006).

Theoretical Framework

Kearsley and Shneiderman's (1998) Engagement Theory was used as the theoretical framework for this study. Kearsley and Shneiderman (1998) theorize that, to learn, students must be engaged in meaningful, worthwhile activities while interacting with other students. Although such learning can occur without technology, technology enhances learning in a way that is hard to accomplish otherwise. The most engaging activities occur in an authentic setting while working on project-based, group assignments. Working in groups provides students with a diverse working environment, which helps them adapt to working in a diverse culture (Kearsley and Shneiderman, 1998). *"Students are intrinsically motivated to learn due to the meaningful nature of the learning environment and activities."* (Kearsley and Shneiderman, 1998, p. 20) SL provides students the opportunity to participate in authentic, collaborative settings on project-based assignments that promote learning through engagement, which are noted by Kearsley and Shneiderman (1998) as important components of the Engagement Theory.

Purpose and Objectives

Creating an educational environment that fosters learning and promotes hands-on activities and student engagement is important in agriculture. Therefore, this study reviewed the literature of incorporating Second Life into agriculture courses to enhance the traditional college learning experience and increase student engagement. The complexity of agricultural practices and mechanics can make teaching with case studies difficult; however, SL simulations can help bridge the gap between the classroom and real-world, hands-on experience. *"We believe that by utilizing the affordances of the Second Life platform to create experiences that are infeasible or impossible in the real world, educators can create superior learning experiences to those which do not offer virtual components"* (Mason, 2007, p. 14). Furthermore, the authors chose an integrative literature review on using SL to enhance the agriculture classroom and engage students in agricultural education. To accomplish this, the authors identified three objectives:

1. Review current literature on SL;
2. Critique the literature on SL as an educational tool; and
3. Evaluate agriculture's presence in SL.

Methods

SL is relatively new and few studies have been published; therefore, the authors of this study chose an integrative literature review to establish a basis for further research in the topic area. An integrative literature review requires researchers to do an extensive search of the literature and explain the need for a literature review (Torraco, 2005). *"The integrative literature review is a form of research that reviews, critiques, and synthesizes representative literature on a topic in an integrated way such that new frameworks and perspectives on the topic are generated"* (Torraco, 2005, p. 356). According to Torraco (2005), researchers can use an integrative literature review to analyze and address fresh topics.

Because SL did not debut until 2003, the majority of the literature found was published within the last 10 years. The researchers used published articles to locate additional sources used in the research. Peer-

reviewed and non-peer-reviewed articles were used in the study because minimal peer-reviewed articles related to using SL in education and agriculture were available.

This study used Second Life, virtual worlds, technology-enhanced education, Second Life in education, Second Life in agriculture, Second Life as an educational tool, and barriers to Second Life as the keywords to search the literature base. Additionally, Google Scholar, Texas A&M University Library, Linden Research website, ProQuest database, Journal of Extension, Journal of Agricultural Education, and NACTA Journal were searched to establish the literature review.

Results

Second Life in Education

The mass amount of online social networking sites and desire for instant feedback have, without a doubt, impacted the way people communicate and interact with others around the world and, quite possibly, impacted and changed the way educators teach this generation of college students (R. Martinez, 2007; Rhoades et al., 2008; Walker, 2009a). Educators must communicate and interact with their students on a familiar level, which includes various types of new media and technologies (R. Martinez, 2007). According to Jarmon et al. (2009), SL "contributes to the facilitation of life-long learning"; "has the potential to generate feelings of co-presence and connection among participants in and outside of virtual worlds"; and "provides a context for considering how new technologies have the potential to enrich the lives of older adults" (p. 221). Therefore, SL provides users the chance to collaborate with others and share experiences through online engagement (Jarmon et al., 2009). Because of the flexibility, engagement, and collaboration opportunities of 3-D virtual worlds, such as SL, educators see virtual worlds as a way to further enhance the educational experience of on-campus and distance education students (Bowers et al., 2009; Jarmon et al., 2009; Johnson, 2006).

Although some may perceive SL as a game, the atmosphere is conducive to learning and to conducting virtual world educational simulations (Hargis, 2008). Advantages and flexibility within SL provides users a variety of educational settings and online learning centers. More than 700 institutions around the world have already taken advantage of this environment (Linden Research, 2009a, 2009b). The massive response to and use of SL by higher education institutions confirms that the virtual world successfully combines technology with education (EDUCAUSE, 2008).

The implementation of SL in education has occurred successfully in numerous disciplines (Boulos et al., 2007). Universities including Harvard, a SL educational pioneer (Zhang, 2007), and Stanford use SL to teach courses in campus buildings replicated in the virtual world (Atkinson, 2008; Baldwin, 2009; Hargis, 2008; Johnson, 2006; Macedonia, 2007; Zhang, 2007). Additionally, Elon University, in Elon, North Carolina, hosts a writing-intensive course in SL (Atkinson, 2008). Students at Johnson and Wales University use the business plans they write for a course and implement them in SL, which gives the students a chance to test their plans and discover positives and negatives of the plan (Mason, 2007). Virtual worlds have helped students understand business by role playing different business scenarios (Foster, 2007).

Furthermore, the medical field has benefitted from the use of SL by teaching students about real-life conditions, medical practices, and health awareness (Boulos et al., 2007). Yellowlees and Cook (2006) evaluated the use of SL to educate people about psychosis hallucinations. They recreated a SL replication of the inpatient medical facility of the University of California, Davis, Medical Center and used actual patient hallucinations descriptions taken from audio and digital scripts. Throughout the simulation, participants encountered a variety of hallucinations, including voices, newspapers, guns, etc., ending with a survey to identify their experience in the simulation. More than 69% of visitors viewed the simulation as increasing their knowledge of both auditory and visual hallucinations, and more than 82% encouraged their friends to experience the simulation (Yellowlees and Cook, 2006). Yellowlees and Cook (2006) use the hallucinations simulation to help medical students understand what patients suffering from psychosis experience to enhance future patients' treatment. Because SL is still a new technology, Linden Lab has provided educational institutions with the opportunity to explore the virtual world with free land for a semester (Baldwin, 2009; Johnson, 2006).

Institutions are not alone using SL as an educational tool. Libraries, museums, and historical sites are recreating similar experiences for virtual world users (Atkinson, 2008). *"While virtual worlds are not new, development of teaching and learning within those environments may provide innovative opportunities to engage learners in highly social and interactive online experiences"* (Atkinson, 2008, p. 17).

At the University of Michigan-Dearborn, the School of Management used SL to add to the experience of the traditional college classroom and connect students to information technology (Johnson,

2006). The School wanted something more than just another trend; they wanted a complement to students' education. SL provided students the feel of a campus in an online atmosphere (Johnson, 2006). According to Hargis (2008), SL is an enhancement to traditional curriculum; it gives students an opportunity to experience the coursework at another level. Baldwin (2009) hypothesized that *"…using a virtual world such as SL would enable my students to gain experience that [they] might not otherwise have, giving them meaningful material about which to write and consequently improving student writing on both low and high-risk assignments"* (p. 16). However, Murphy et al. (2005) wrote that, although new technologies have given students more variety and options when taking online classes, written communication may always be the chosen form because it has been the primary means of communication in the past.

Rhoades et al. (2008) documented that many students use blackboard and online learning technologies in the classroom and more common new media including Facebook in their personal lives. However, few students have yet to adopt such technologies as SL in their personal lives let alone their academic lives (Rhoades et al., 2008). Yet, today's students live in a world full of virtual environments (Macedonia, 2007). Students are actively using new technologies; therefore, educators need to identify opportunities to incorporate such technologies in the classroom (Rhoades et al., 2008). The Internet is a widely used social network, but some students may find it hard to view new technology as a way of learning and not just as a means of social communication (Rhoades et al., 2008). Using new technologies in the classroom can assist institutions in the preparation of students for career areas where they are required to use new technology and can attract students who are looking for a program using cutting-edge technology (Rhoades et al., 2008; Walker, 2009a). Baldwin (2009) claimed that SL is a legitimate educational tool: *"It is my responsibility, as an instructor, to tap into these different modes of literacy and learn to meet the students where they are comfortable in order to challenge them to go beyond their comfort zone"* (p. 35).

Cornell University, the University of Maryland, the University of Tennessee, and Utah State University created a Virtual Field Trip that combined interacting, learning, and exploring (Jacobson et al., 2008). The Virtual Field Trip designers created a web-based, 3-D environment using a variety of media including maps, photos, video, etc. (Jacobson et al., 2008). Although a Virtual Field Trip does not give students the hands-on experience they would gain if they physically visited the site and explored the culture and environment, it does give them the opportunity to learn through different types of media within a virtual world and visualize what it would be like to visit the location (Jacobson et al., 2008). Virtual Field Trips provided a comfortable atmosphere for students to interact with each other while learning through a 3-D educational exercise (EDUCAUSE, 2008).

Additionally, Jacobson et al. (2008) explained that the Virtual Field Trip was not designed to teach the basics of the course but rather add an additional structure that helped the students understand issues related to soils and development. The 3-D environment had museums and agriculture interest areas for students to visit and gain more insight into Mexican culture and its contribution to both traditional and nontraditional agriculture. Likewise, students could stop at the library to pick up information about Mexico's history. Students were encouraged to picture themselves in Mexico and experience it as if they had taken a field trip to the country (Jacobson et al., 2008).

Students can sit in a classroom and learn about a particular subject, but when they immerse themselves into a simulation, they become familiar with the experience and begin to understand it (Weusijana et al., 2007). SL allows student to learn through first-hand experience instead of learning about something in textbooks, case studies, etc. (Weusijana et al., 2007). L. Martinez et al. (2007) followed up with the students and instructors in a study at a university in Mexico and found that students were satisfied with learning in SL, but thought SL was slower than the traditional classroom.

Furthermore, Atkinson (2008) looked at the different types of communications in SL and ways for students in online classes to participate in asynchronous and synchronous communication. Alarifi (2008) and Lucia et al. (2009) revealed that SL fosters successful synchronous communication and social interaction while keeping students motivated to learn simultaneously. Atkinson (2008) and Zhang (2007) found that virtual worlds use different types of media (e.g. ranging from voice and email communication to classroom material distribution) to communicate and enhance the students' experience. Educators provide students with information via note cards, images, landmarks, and URL links to improve the learning environment and simulate a traditional classroom (Alarifi, 2008; Atkinson, 2008; Johnson, 2006). According to Girasoli and Hannafin (2008), asynchronous audio/visual communication used in educational settings allows students the chance to

formulate what they are trying to say and lessens the anxiety of speaking face-to-face with peers. While audio/visual tools arouse critical thinking skills and motivation in students, the true possibilities of computer-supported learning have yet to be discovered (Girasoli and Hannafin, 2008).

A 2008 New Media Consortium Survey of Educators in Second Life reported that more than 70% of the 358 respondents are now using SL in the classroom, which is up from 54% in 2007 (Levine, 2008). Additionally, 12% reported that they have taught a class fully in SL, which was also up from 2007. Furthermore, educators reported being more familiar and experienced with SL than they were in 2007, and 24% reported that educational activities in SL were a positive experience for them (Levine, 2008). Bowers et al. (2009) surveyed post-secondary instructors currently using SL as an educational tool, or who had used it in the past, to determine the value of SL in an educational environment. Of the 251 instructors contacted, 162 responded representing 25 disciplines, and about half of the respondents taught in the area of communications, education, or computer technology (Bowers et al., 2009). Of the 162 respondents, more than 90% plan to use SL again in the classroom. It was noted that instructors who used SL as the main source to carry out a class liked it better than the instructors who used it only as an addition to a class (Bowers et al., 2009).

According to Bowers et al. (2009) and Walker (2009a), students often work with case studies, etc. because it is not feasible to teach real world experiences in a traditional classroom setting. Mason (2007) stated that SL can help students overcome problems in the classroom because they can do projects otherwise not feasible due to limited resources. Furthermore, SL provides students an opportunity to be creative and work hands on with different types of scenarios. They can explore and integrate old and new knowledge and formulate new ideas and perceptions (Hargis, 2008; Mason, 2007). *"... [A]n effective authentic learning project provides students with challenging, collaborative, multidisciplinary problems, along with support to meet these challenges."* (Mason, 2007, p. 15)

Use of Second Life in Distance Education

According to Linden Research (2009b), SL has become a path to creating a new type of distance learning environment. SL encourages students to participate, provides distance education students a sense of belonging and interaction with classmates, and provides students the opportunity to practice using technical skills in an environment unlike any other (Baldwin, 2009; Linden Research, 2009b; L. Martinez, 2007; Walker, 2009a). It is a means to mix the traditional on-campus classroom setting with distance education to provide students with a strong interactive classroom (Alarifi, 2008; Johnson, 2006). According to Foster (2007), SL enhances communication among students especially in a distance education course and makes them more eager to learn. *"... [I]ts [SL] application in distance education still looks very promising to many educators and researchers because of its unique features and associated benefits brought by the virtual reality tool"* (Zhang, 2007, p. 3).

Even though distance education students in the counseling program at Regent University in Virginia were satisfied with the interaction provided, faculty and staff felt the program needed more application and practice. Therefore, Regent faculty built a "simulated counselor training facility" (Walker, 2009a, p. 4) in SL because it provided students with much more intense interaction where they could communicate immediately (Johnson, 2006; L. Martinez et al., 2007). Distance education in virtual worlds gives students the opportunity to explore new technologies and interact with their peers, which is often lost in a traditional distance education setting (Walker, 2009a). Often times, because of the constraints of a distance education program, counseling students do not have the opportunity to practice their techniques in an instructor-controlled environment. Virtual environments lessen this problem because students can carry out the counseling simulation in a SL environment (Walker, 2009a). Because distance education has become an educational norm in today's society, it is important to discover ways students can interact with other students in particular classes and still get the same quality of education via distance (Walker, 2009a).

Alarifi (2008), Joseph (2007), Levine (2008), and R. Martinez (2007) each stated that collaborating, networking, and building of new knowledge is a benefit in SL. In SL, students can interact with people from around the world and collaborate on projects with experts from other disciplines (Alarifi, 2008). Additionally, students are able to gain knowledge of other cultures and become more diverse by networking with a variety of people (Pence, 2007-2008; Zhang, 2007). SL gives students the opportunity to create a distance-learning environment and experience that only face-to-face interaction could provide before virtual worlds were introduced (Walker, 2009a). *"Do not underestimate the distance learning potential of Second Life, especially when used in conjunction with voice and web-based tools."* (Joseph, 2007, p. 12)

Agricultural Presence in Virtual Education

A review of the Journal of Agricultural Education, the North American Colleges and Teachers of Agriculture Journal, and the Journal of Extension revealed limited research published regarding the use of SL as an educational tool in agriculture.

Rhoades et al. (2008) found that agriculture students do use technology such as email in typical and atypical classroom settings but few of them use new technologies such as SL. However, more than 10% of the 317 agricultural students implied that they wanted instructors to integrate SL into the classroom. Although students claim they wanted to use SL in the classroom (Rhoades et al., 2008), very few agricultural programs reported use of technologies to teach course materials.

Schroeder-Moreno (2010) reported the use of a student lounge and a farm tour in teaching an agroecology course online. Woods (2010) described the use of SL to teach the topic of foodborne hazards using a virtual kitchen that was created on an eXtension SL island named Morrill Island. The author reported that participants expressed that they had a positive experience and the educational content was useful (Woods, 2010). While there is only limited published research of the use of SL by agricultural Extension, it should be shared that eXtension maintains two islands within SL.

Boyd et al. (2006) studied the use of a virtual simulation focused on international development where students were requested to make decisions at each stage of the simulation. The virtual simulation activity and the required follow-up reflection affected student's learning (Boyd et al., 2006). Additionally, Rhoades et al. (2009) examined a virtual approach to teaching greenhouse agrisciences courses using a simulation that involved the use of multimedia materials and found that students were satisfied with the approach and improved student competencies. However, it is important to note that in both of these cases the virtual approach described is different than the immersion experience that occurs through the use of SL as a virtual world.

Kloepper et al. (2010) used SL as an educational tool in an Introduction to Animal Science course at Redlands Community College in El Reno, Oklahoma. Because RCC does not have a poultry program, it collaborated with Auburn University to create Eagle Island and teach introductory animal science students about the poultry industry (Kloepper et al., 2010). Students tour the poultry processing facility and learn about food safety. Students can visit the "Virtual Chicken Museum," "Egg Processing Facility," and "Research Unit" (Kloepper et al., 2010, p. 45-46) in 3-D to learn more about the female poultry reproductive organs and poultry production. Students are expected to communicate, to gather information throughout the simulation, and to ask the Auburn faculty questions about the poultry industry (Kloepper et al., 2010).

According to Jacobson et al. (2008), because of the changing needs in today's undergraduate population, educators face the obstacle of modifying courses and programs to accommodate students. To increase the enrollment in agronomy programs across the nation and implement the learning goals outlined in the Liberal Education and America's Promise initiative (AAC&U, 2007), instructors are working to connect natural sciences and courses that attract and retain a wide variety of students in agriculture (Jacobson et al., 2008). For example, Jacobson et al. (2008) used Virtual Field Trips to familiarize students with the impact of urbanization and agriculture production while incorporating connections to social issues, and The Ohio University uses SL to teach users about food selection based on the health impacts (Boulos et al., 2007).

Barriers to Using Second Life in Education

The opportunities of SL are many, but to evaluate the effectiveness of the tool in the education realm, the opportunities of the platform must be compared to the barriers (Warburton, 2009). Atkinson (2008) and Warburton (2009) reported that SL could be overwhelming at first because it is advanced and anything goes. Baldwin (2009) compared it to visiting a foreign country because of all the things to learn about the culture of SL; however, most new technologies have experienced the same type of judgment (Atkinson, 2008). Barriers include technical difficulty, identity, culture, collaboration, time, economic, standards, and scaffolding persistence and social discovery (Warburton, 2009). Technical issues can be a barrier hard to overcome in SL because a wide variety of technical difficulties can occur including the Internet connection, hardware, graphic cards, avatars, and navigation (Alarifi, 2008; Warburton, 2009; Zhang, 2007). If students experience technical difficulties, they can be disconnected from not only SL but also class discussion (Martinez et al., 2007). Moreover, although some may consider SL to be among the social networks, the social aspects of the platform are not as friendly as one might think (Warburton, 2009). Unlike Facebook and other social networks, connecting with and making friends is not as easy in SL (Warburton,

2009). Furthermore, identity and security issues can be a barrier because users have the freedom to change their appearance and alter their identity, which could create communities of uncertainty and frightened users (Alarifi, 2008; Hargis, 2008; Johnson, 2006; Warburton, 2009). As with any new technology, SL has barriers and disadvantages to its adoption; however, the use of SL as an education tool may depend upon how the educators adopt the technologies and not on the usability of the new technologies (Atkinson, 2008).

Discussions/Conclusions

Three-dimensional virtual worlds are bringing possibilities to the classroom that educators may have never considered. Just as counseling educators use virtual worlds to create and recreate traditional counseling settings (Walker, 2009a), colleges of agriculture could use SL to teach agriculture, conduct real-world simulations, and imitate research without leaving the classroom or lab. However, few educators of agriculture have chosen to embrace and utilize SL at this point. Many opportunities exist for educators to use SL as a technology supplement to the classroom (e.g. participate in virtual tours around the world, prepare for study abroad trips by researching and exploring specific parts of the world, join real-world simulations, interact with experts from various agriculture programs through synchronous and asynchronous communication, explore the internal organs of livestock animals through virtual replications, or learn about extension, crops, and plants at the state fair in SL). Agriculture, broadly defined, has been slow in its adoption of SL even though multiple disciplines use SL as an extension of the classroom. Chemistry professors have islands designated to display molecular models where students can explore and experiment with science while other professors teach English in SL.

Agriculture's use of SL, either inside or outside of the classroom, is limited. Perhaps educators in agriculture do not see the benefits of SL in education and, therefore, are slow to adopt the technology. Although SL can be used in many facets of agriculture, one can argue that not all programs within agriculture may benefit from the use of SL. However, many programs could use the technology to add value to the classroom.

The literature review reported in this study offers a new perspective regarding the use of SL as an educational tool for agriculture. The perspective includes consideration of the following aspects: faculty and student adoption rates, effectiveness of SL, availability of hardware and software, and efficiency of SL. If 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. Faculty and students must view the new technology as useful and be ready and willing to adopt it (Johnson, 2006), and universities must be willing to incur the cost affiliated with full implementation of a product that will broaden their courses and include SL in the curriculum (Alarifi, 2008; Johnson, 2006). Alarifi (2008) and Zhang (2007) found that the technicalities of SL are high and, because of the lack of university support, it could be hard to implement SL on campus. However, Pence (2007-2008) noted that even with lack of support educators can take advantage of the educational tools in SL. Nevertheless, Jacobson et al. (2008) concluded the Virtual Field Trips designed to enhance student learning about urbanization and agriculture production was worth the cost because of the educational benefits the students obtained. Institutions can address SL security and adaptation to culture by providing students with orientation and online learning sessions (Alarifi, 2008; Atkinson, 2008; Baldwin, 2009). Additionally, according to Alarifi (2008), Hargis (2008), and Johnson (2006), SL islands can be secured so that only enrolled students and faculty can enter a particular island.

A limited amount of research is available regarding the use of SL as an educational tool, and a minimal amount of literature was found on using virtual education in agriculture. Not enough research has been done to show evidence that virtual worlds and new technologies such as SL have a place in the educational world (Walker, 2009a). Consequently, more research needs to be conducted on the effectiveness and use of new technologies (Rhoades et al., 2008). Research should be conducted on using SL across the agriculture discipline and the need to integrate new technologies, such as SL, into the agriculture classroom to enhance student engagement and participation. Additionally, research needs to be conducted on how instructors integrate SL into the curriculum (Alarifi, 2008; Bowers et al., 2009; Walker, 2009b). Colleges of agriculture across the country could use SL simulations in class and evaluate acceptance by faculty and students of such integration. As SL is integrated into courses, the opportunity for experimental research comparing SL to traditional methods, i.e. role play and case studies, will be available. Furthermore, researchers should explore students' learning styles in SL and compare them to student learning styles in traditional learning environments.

Technology has changed and continues to change in today's society (Alston and English, 2007). Faculty and staff at agricultural institutions need to stay abreast of the changing technology and find new ways to integrate new technologies into the classroom. Exposing students to new technologies and new media, such as SL, could assist students in building their experience (Rhoades et al., 2008). *"As the 'net generation' enters into higher education, it is our challenge as educators to be prepared to offer students the type of engaging education that will not only help them learn but will also help them in their search for a career"* (Rhoades et al., 2008, p. 177).

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