Second Life in education: A review of publications from its launch to 2011

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Abstract
The purpose of this review was to explore how Second Life (SL) has been discussed, investigated and applied in education from its launch to present. Two research questions guided the review: (1) what are the annual publication number and its percentage of empirical studies?; (2) what are the characteristics of the empirical studies regarding the academic levels, subject areas, pedagogical frameworks, evolution of research foci, research methods and sample sizes? A total of 107 papers from 68 refereed journals were reviewed. The findings of the review indicated that SL research has outgrown merely envisioning SL for educational purposes and switched to empirical explorations. Most of the empirical studies were conducted in college settings. The research had been most frequently carried out in teacher education, language education, business, hospitality and tourism and computer disciplines. The most recent research focus was to find out issues, problems and factors that might affect SL-based learning as well as the relevant solutions. This study can contribute to the discussion on the instructional use of SL by providing researchers with a summary of previous attempted studies. Several recommendations for future research are provided based on the findings.

Introduction
The attempt of integrating technological innovations into instruction has accompanied the development of education since the first decade of the 20th century (Saettler, 1968). For example, the invention of mobile technologies in 1970s triggered a trend of mobile learning (Cui and Wang, 2008). In the past two decades, the popularity of computer games has prompted the investigation of game-based learning (Dickey, 2007). While mobile learning and game-based learning are still attracting researchers’ attention (eg, Wang, 2010; Wang and Burton, 2010; Wang, Chen and Fang, 2011; Wang, Locke and Burton, 2011), the use of multiuser virtual environments (MUVEs) for learning has generated extensive discussion in recent years. MUVEs have been in existence since the late 1970s when it was still text-based (Livingstone, Kemp and Edgar, 2008). Riding on the back of the continued advances in computing and networking technology, the simple text-based MUVEs have evolved into persistent, real-world similar, three-dimensional (3D) virtual worlds where multiple users can participate simultaneously to interact...
with each other and the environment through their graphical representations known as avatars (Jennings and Collins, 2007; Smart, Cascio and Paffendorf, 2007).

In the past two decades, 3D MUVEs have been increasingly developed, adopted and investigated as educational environments (De Lucia, Francese, Passero and Tortora, 2009). On one hand, millions of dollars have been invested to develop educational MUVEs, such as Harvard University’s River City, Indiana University’s Quest Atlantis and North Carolina State University’s WolfDen virtual campus. On the other hand, some existing MUVEs were explored, evaluated and adopted for educational purposes, such as Active Worlds, Second Life (SL) and AppEdTech (AET) Zone. SL is currently the most mature and popular 3D MUVE being used in education (Dickey, 2011). While sharing common features with other 3D MUVEs, SL is also unique as being an open-ended virtual world in which users are provided with tools and guidance to design, create and manipulate the in-world environment (Brown, Hobbs and Gordon, 2008; Hew and Cheung, 2010; Ralph and Stahr, 2010). SL users can design and dress their avatars, own properties, construct buildings, build vehicles and socialize or do business with other users from around the world. Users can even develop an entire island from scratch (eg, Wheeler, 2009). In other words, SL is created entirely by its users (Guadagno, Muscanell, Okdie, Burk and Ward, 2011). Consequently, it is believed that SL can be applied to any context (Hew and Cheung, 2010).

SL experienced phenomenal growth in 2006 (Bell, Peters and Pope, 2007), so was the explorations of SL in education (Foster, 2007; Luo and Kemp, 2008). SL is now considered by many people as the next-generation technology tool for education (Singh and Lee, 2008). First, SL provides users with innovative ways to construct, communicate and collaborate (Campbell and Trobe, 2009). People who are separated by distance can engage in social activity of learning in SL.

Practitioner Notes
What is already known about this topic
- Second Life (SL) is currently the most mature and popular virtual world being used in education.
- SL has been used by educators to teach and supplement classes.
- There are rich anecdotal stories, conference presentations and scholarly publications concerning what educators have been doing in SL.

What this paper adds
- An overview of the development and evolution of SL-related research in education from its launch to present.
- Answers to questions, such as “is the educational implementation of SL still in its infancy?,” “what were the subject areas and academic levels that have been explored by researchers?” and “has the research foci evolved throughout the years?”
- Assistance to researchers for identifying and locating areas for future explorations.

Implications for practice and/or policy
- There are studies, reports and stories that exemplify how SL can be used for language teaching, business, hospitality and tourism, computer studies and so on.
- Educators and researchers in K-12 and adult education can pay more attention to using SL as an instructional tool.
- Educators and researchers in the fields such as chemistry and mathematic can explore more about the instructional use of SL.
(Bronack, Riedl and Tashner, 2006). For example, international collaborators can gather together in a park, a lab or a coffee shop in SL to discuss their projects. In addition to computer-mediated, text-based or audio-based communication, people can make a stronger presentation of their ideas by providing digital documents, by conducting virtual experiments or by constructing 3D artifacts along with real-time, nonverbal communication cues, such as gestures and emotional states. Second, the use of avatars can decrease the feeling of social disconnection, which makes SL a potential medium for distance education (Inman, Wright and Hartman, 2010; Wang and Lockee, 2010). Avatars might represent individuals from foreign countries; this also creates an unusually easy international forum (Pence, 2008). Third, SL has the potential to support study through the use of in-world artifacts of realistic and detailed design that might be otherwise expensive or impossible in real world (eg, Molka-Danielsen, Deutschmann and Panichi, 2009; Vrellis, Papachristos, Bellou, Avouris and Mikropoulos, 2010; Wheeler, 2009).

Some educators have taught entire courses in SL, whereas others have used SL to supplement their classes (Sussman, 2007). Gerald and Antonacci (2009) summarized three types of teaching uses of SL. First, for courses dealing with gaming, online communities and emerging technologies, students can study the SL technology itself. Second, using SL as a communication medium, this use of SL focuses on delivering lectures, making presentations and conducting discussions in SL. Third, SL can also be used as a learning space for in-world learning activities, such as role-playing, interactive simulations and educational games.

It is the ninth year since SL was launched by Linden Lab in 2003. Anecdotal stories, conference presentations and scholarly publications abound concerning what educators have been doing in SL. Given that SL might continue to be part of the educational discussion, a comprehensive review of studies concerning how SL has been discussed, investigated and applied by educators might be necessary and timely. Such a review can provide an overview of the development and evolution of SL-related research in education. It answers questions, such as “is the educational implementation of SL still in its infancy?,” “what were the subject areas and academic levels that have been explored by researchers?” and “has the research foci evolved throughout the years?” Answers to these questions can help researchers identify and locate areas for future explorations as well as prevent them from reinventing the wheel.

This study was guided by two research questions: (1) what are the annual publication number and its percentage of empirical study?; (2) what are the characteristics of the empirical studies in term of the studies’ academic levels, subject areas, pedagogical frameworks, evolution of research foci, research methods and sample sizes?

**Method**

*Search and selection procedures*

The search for relevant literature involved a two-step process. In the first stage, the researchers searched relevant papers in electronic databases using the keyword search “Second Life.” The researchers used four databases: Education Research Complete, Education Resources Information Center (ERIC), Teacher Reference Center and Women’s Studies International. The choice of these databases in itself was also the result of a database search—the authors searched the university library system for databases using the function search databases by subject with the subject keyword education. In order to control the quality of the literature, the authors also refined the search results with the option scholarly (peer-reviewed) journals, which automatically screened out magazines and conference papers. This round of search got 180 hits. Because this review focused primarily on research papers published in scholarly peer-reviewed journals, books, book reviews, web page-based discussions and conference presentations were excluded from the data set. After deleting unwanted search results, such as book reviews, the number of relevant papers was narrowed to 91. The choices of four databases were believed reasonable and representative for
several reasons. First, topics of Education Research Complete covered all levels of education from early childhood to higher education and all educational specialties, whereas ERIC specializes in 16 different educational areas with more than 1.3 million records dating back to 1966. Second, Teacher Reference Center and Woman’s Studies International provide good supplements to Education Research Complete and ERIC by covering the most popular teacher and administrator journals and the core disciplines in Women’s studies. Third, together, these databases cover more than 5160 journals. Last, some of the databases were also frequently used by researchers in their review studies (eg, Hew and Cheung, 2010; Inman et al, 2010).

In the second stage, the researchers used the “snowball” method—searching for journal papers that were cited in some of the papers that were already selected. This step yielded an additional 25 papers. Among them, 16 papers that were from refereed journals were included in the final data set. Altogether, a total of 107 papers from 68 journals were selected as the final data set for this study.

Data analysis
The basic unit of analysis was each individual paper. The data analysis was conducted through a summary table developed by the researchers. The summary table included two sections. The first section dealt with the first research question. Information about a paper’s title, year of publication, journal’s name and type (whether it was an empirical study) was collected. The second section collected information that was relevant to the second research question, the characteristics of the empirical studies. Therefore, information that was related to a study’s academic level, subject area, pedagogical framework, focus, research method and sample size was collected.

Results and discussion
Trends of the publication
This study first identified the number of publications in each year and whether a study was a conceptual discussion or an empirical research study. As shown in Table 1, among the 107 papers, one was published in 2006, 10 were published in 2007, 24 were published in 2008, 48 were published in 2009, 21 were published in 2010 and three were published in 2011. It indicated an increase of the number of publications from 2006 to 2009.

The number of publications reached the peak in 2009 and started to decrease after 2009. The publication peak might be due to the domed trajectory when a new medium enters the educational scene—a great deal of initial interests and enthusiasm about the effects it is likely to have on instructional practices followed by the fading of the interests (Reiser, 2001). The publication peak might also be due to the dedication of a few journals on the specific topic in 2009. In 2009, five journals published 21 out of the selected 49 papers. For example, British Journal of Educational Technology alone published seven of them.

The number of publications in 2011 was not representative because it was truncated to May 2011 when the research was conducted. In addition, there were no papers published from 2003

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of publication</th>
<th>Number of empirical studies</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2007</td>
<td>10</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>2008</td>
<td>24</td>
<td>11</td>
<td>45.8</td>
</tr>
<tr>
<td>2009</td>
<td>48</td>
<td>20</td>
<td>48.8</td>
</tr>
<tr>
<td>2010</td>
<td>21</td>
<td>15</td>
<td>71.4</td>
</tr>
<tr>
<td>2011</td>
<td>3</td>
<td>3</td>
<td>100</td>
</tr>
</tbody>
</table>

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to 2005. This finding was, by and large, consistent with the claim that the exploration of SL in education started from 2005 (Foster, 2007; Luo and Kemp, 2008). Considering the time required to conduct a study and to turn the study into a publication, it was understandable why there were no papers published in 2005 also.

Among the 107 papers, 50 (46.7%) were empirical studies, 54 (50.5%) were pure conceptual discussions and the other three (2.8%) were review and content analysis studies. The percentage of empirical studies, in general, increased from 2006 to 2011. In other words, the studies have outgrown the phase of envisioning the use of SL for educational purposes and landed on the phase of empirical explorations after years’ evolution. Some of the empirical studies were not reported in a rigorously written style. That is to say, they were either in the form of anecdotes that shared SL-based teaching experiences with no preset research questions or in the form of reports that did not have all the elements that an empirical research paper normally have, such as method, study design, participants and results. However, there was a decrease of the percentage of the non-rigorously written empirical studies through the years. This percentage decreased from 63.6% (seven out of 11) in 2008, 40% (eight out of the 20) in 2009, to 18.4% (four out of 15) in 2010. It indicated that the design and report of the studies were getting more mature through the years.

In regard to papers published in 2008, considering the limited number of the publications \(n = 24\), especially the number of the rigorously written empirical studies \(n = 4\), this finding seconded Luo and Kemp’s (2008) statement that “in 2008, the exploration of SL in higher education is in its infancy, and the literature on the educational application of SL is mostly presented in the format of conference proceedings” (p. 150).

**Characteristics of empirical studies**

This study also investigated the characteristics of the empirical studies after they were identified and separated from other studies. The researchers located and analyzed these empirical studies’ academic levels, subject areas, pedagogical frameworks, research foci, research methods and sample sizes. Appendix A lists the empirical studies that were included in the review.

**Academic levels**

Almost all the studies were conducted on the college level. It might be because SL only opens for people who are 18 years old and above. For users who are between 13 and 17 years old, Linden Lab has created a teen version of SL that is referred as the Teen Grid or Teen SL. As shown in Table 2, participants of the studies were mostly college students \(n = 22\), followed by graduate students \(n = 9\) and instructors or staff \(n = 8\). Some studies had mixed participants, such as mixed college and graduate students \(n = 6\) or mixed instructors and students \(n = 3\). Only two studies had SL users as their participants, and one study focused on senior citizens.

**Subject areas**

According to the literature, library science was one of the education fields that pioneered the exploration of using SL for educational purposes. The exploration of using SL in the provision and

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**Table 2: Participants of the empirical studies**

<table>
<thead>
<tr>
<th>Participants</th>
<th>Number of papers</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>College &amp; graduate students</td>
<td>6</td>
<td>2009, 2010</td>
</tr>
<tr>
<td>Instructors &amp; students</td>
<td>3</td>
<td>2008, 2009</td>
</tr>
<tr>
<td>SL Users</td>
<td>2</td>
<td>2008, 2010</td>
</tr>
<tr>
<td>Senior citizen</td>
<td>1</td>
<td>2008</td>
</tr>
</tbody>
</table>

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distribution of library service started in April 2006 (Luo and Kemp, 2008). The findings of this study supported this claim. Publications on this specific topic started from 2007 but with only two empirical studies.

As shown in Table 3, the most investigated subject fields were teacher education, language education, business, hospitality and tourism, computer studies and interactive learning environment. The rest of the empirical studies did not focus on specific subject areas but general skills, such as students’ critical thinking and argumentation skills (e.g., Ho and Ong, 2007). This finding was not consistent with what was found by Livingstone and Kemp in 2007 (as cited in Penfold, 2008). They found that the most common uses of SL to be in computer studies, science subjects and humanities, architectural studies, urban planning, graphic design, anatomy, natural sciences, law, languages, programming, literature, art and tourism.

**Pedagogical frameworks**

As Luo and Kemp (2008) pointed out, a summary of the pedagogical approaches employed in SL-based learning can bring educators closer to this new instructional tool and lay the ground for delivering education via SL. Among the 50 empirical studies, 24 studies discussed the pedagogical approaches that they explored in conjunction with SL. The findings were consistent with what Inman et al (2010) found that researchers looked into SL mostly for its potential to foster constructivist ($n = 12$) and experiential ($n = 2$) learning, such as collaborative learning, community of inquiry, authentic learning, action learning, project-based learning, situated cognition and problem-based learning. In addition, this study also found that some studies ($n = 4$) examined the successfulness of SL in motivating learners. They referred to motivation theories, such as efficacy theory, flow theory and engagement theory.

**Evolution of research foci**

The foci of the empirical studies could be grouped into five categories (see Appendix B): explore; perceptions and adoption; evaluate; exemplify; and affect. These categories were created based on the analysis of the studies’ statements of research purposes. The studies’ purpose statements and the relevant statements were coded for themes and eventually became the categories. For example, an author stated, “My goal is to present a landscape of pedagogical applications that will spark ideas and help others visualize how SL might be used in an academic, public, or school library” (Sanchez, 2009, p. 21). This study’s focus was grouped as exemplify.

<table>
<thead>
<tr>
<th>Subject areas</th>
<th>Number of papers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher education</td>
<td>7</td>
</tr>
<tr>
<td>Language education</td>
<td>5</td>
</tr>
<tr>
<td>Business</td>
<td>5</td>
</tr>
<tr>
<td>Hospitality and tourism</td>
<td>3</td>
</tr>
<tr>
<td>Computer studies</td>
<td>3</td>
</tr>
<tr>
<td>Interactive learning environment</td>
<td>3</td>
</tr>
<tr>
<td>Information system</td>
<td>2</td>
</tr>
<tr>
<td>Interdisciplinary communication</td>
<td>2</td>
</tr>
<tr>
<td>Media and art education</td>
<td>2</td>
</tr>
<tr>
<td>Library</td>
<td>2</td>
</tr>
<tr>
<td>Psychology</td>
<td>1</td>
</tr>
<tr>
<td>Healthcare</td>
<td>1</td>
</tr>
<tr>
<td>Biotechnology</td>
<td>1</td>
</tr>
<tr>
<td>Civil engineering</td>
<td>1</td>
</tr>
</tbody>
</table>

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The first category, explore, indicated that studies in this group aimed to explore SL for five purposes: exploring the potentials of SL to support the learning of some skills, exploring whether SL was appropriate for delivering some courses, exploring SL’s possibilities of being certain types of learning environment, exploring the effects of some instructional strategies on other things such as learners’ engagement in the context of SL and exploring tools, methods and strategies that can be used to support SL-based learning. This group of studies was most popular. They spread out from 2007 to 2011. The foci of the second category, perceptions and adoption, were to find out students or instructors’ attitudes, perceptions and adoption of SL as a learning environment. These studies were conducted mainly in 2008 and 2009. The third category was labeled as evaluate. For example, some researchers designed, created or developed virtual properties, such as virtual labs, virtual campuses and virtual educational simulations in SL. Their foci of studies were to evaluate the effectiveness of these virtual properties. Most of these studies were conducted in 2009. The keyword of the fourth category was exemplify, which indicated that the foci of these studies were to provide examples (eg, how SL was used for teaching certain courses) to readers who were also interested in using SL for teaching. These studies were conducted mainly in 2009 and 2010. The fifth category, affect, indicated that these studies aimed to identify factors that could affect SL-based learning activities, such as gender differences, technical issues and motivation. Most of these studies were conducted in 2010 and 2011.

Figure 1 illustrated the focus evolution throughout the years. It indicated that researchers started from investigating the acceptance of the potential SL users including both instructors and students to evaluating the successfulness of early attempts. After that, researchers tried to encourage educators to use SL by providing examples. The most recent focal point of researchers was to find out issues, problems and factors that might affect SL-based learning and the possible solutions. In addition to the evolution of focus, exploring the potentials of SL for different learning purposes have been carried out through these years, and it might continue being emphasized in the future. Moreover, 2009 had the most various study foci including explore, attitudes and perception, evaluate, and exemplify. It was also consistent with the finding that the number of publications reached its peak in 2009.

Research methods

About 50% of the empirical studies employed multimethod data collection approach. Multi-method research, as defined by Hunter and Brewer (2003), is “the practice of employing different types or styles of data-collecting methods within the same study or research program” (p. 577). This definition indicates that multimethod studies include studies that employ both quantitative and qualitative data collection methods or multiple forms of either qualitative or quantitative methods (Creswell and Plano-Clark, 2007). In this study, data sources of the empirical studies that employed multimethod data collection approach were usually a combination of surveys, interviews, SL chat logs, screen captures, researchers’ observation, participants’ work, participants’ emails, participants’ reflections or logs, pretest and posttests and peer evaluation. In addi-
tion, survey was the most popular data collection method for all the empirical studies. A total of 34 (68%) studies reported using survey as the only or one of the data collection methods. Questionnaires were used to collect qualitative data, quantitative data or a mix of quantitative and qualitative data.

With regard to the type of the studies, as shown in Table 4, 25 (50%) studies employed qualitative research designs, including 21 case studies, two phenomenological studies, one longitudinal study and one narrative study. Sixteen (32%) studies employed four types of quantitative research design, including seven descriptive studies, four correlational studies, three quasi-experimental studies and two experimental studies. The rest, nine (18%) studies, employed mixed methods study design in which both quantitative and qualitative data were collected and analyzed in a single study in order to combine the strength from both research methods while reducing the weakness of either approach (Creswell, Clark, Gutmann and Hanson, 2003; Creswell and Plano-Clark, 2007).

Sample sizes
Sample sizes of the studies in each year were grouped into five categories: very small \((n < 10)\), small \((n = 10–20)\), medium \((n = 21–50)\), big \((n = 51–100)\) and very big \((n > 100)\). Because of the limited number of studies in 2007 \((n = 1)\) and 2011 (truncated), the sample sizes of studies in these 2 years were excluded from the discussion. Other than these 2 years, as shown in Table 5, studies in 2008 tended to have medium sample sizes (54.5%). Studies in 2009 showed a clearer trend of sample sizes, i.e., most studies either had medium sample sizes (50%) or very small sample sizes (38.9%). The sample sizes of studies in 2010 were spread more evenly to cover all five categories with slightly more studies having very big sample sizes (33.3%). In general, the sample sizes of studies did not indicate a general trend through the years. It might be because researchers recruited participants mostly based on the accessibility of the participants, such as recruiting students in the classes that they were teaching instead of setting an ideal sample size in mind ahead of time and sticking to it throughout their explorations.

**Conclusion**
This study reviewed 107 peer-reviewed journal papers published in 2006–2011 on SL’s educational applications in order to explore how SL is discussed, investigated and applied in education.

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**Table 4: Types of studies**

<table>
<thead>
<tr>
<th>Qualitative study</th>
<th>Number of papers</th>
<th>Quantitative study</th>
<th>Number of papers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case study</td>
<td>21</td>
<td>Descriptive study</td>
<td>7</td>
</tr>
<tr>
<td>Phenomenological study</td>
<td>2</td>
<td>Experimental study</td>
<td>2</td>
</tr>
<tr>
<td>Longitudinal study</td>
<td>1</td>
<td>Quasi-experimental study</td>
<td>3</td>
</tr>
<tr>
<td>Narrative study</td>
<td>1</td>
<td>Correlational study</td>
<td>4</td>
</tr>
</tbody>
</table>

**Table 5: Number of participants**

<table>
<thead>
<tr>
<th>Number</th>
<th>2007</th>
<th>2008 (%)</th>
<th>2009 (%)</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very small ((n &lt; 10))</td>
<td>1</td>
<td>7 (38.9)</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Small ((n = 10–20))</td>
<td>1</td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Medium ((n = 21–50))</td>
<td>1</td>
<td>6 (54.5)</td>
<td>9 (50)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Big ((n = 51–100))</td>
<td>2</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Very big ((n &gt; 100))</td>
<td>1</td>
<td></td>
<td>3 (33.3)</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
from its launch to present. A total of 50 empirical studies were analyzed in order to summarize the current research regarding their academic levels, subject areas, pedagogical frameworks, evolution of research foci, research methods and sample sizes. The findings of this review can provide insights for educators and researchers into the use of SL in education and the conducting of future research.

First, the findings of this study indicated that the educational implementation of SL is no longer in its infancy. Research has outgrown the phase of merely discussing or envisioning how SL should or could be used for educational purposes and switched to empirical explorations. As Fang and Lee (2009) concluded, the research studies on SL have been widened and deepened.

Second, the empirical studies were mainly focused on college level with limited attention paid to K-12 and adult education, which was consistent to what was found by Hew and Cheung (2010) in their review of empirical studies on the use of 3D immersive virtual worlds in education settings. This finding suggested that future research should be carried out to explore using SL to support and improve K-12 and adult education.

Third, the most investigated subject areas were teacher education, language education, business, hospitality and tourism, computer studies and learning environment, which indicated the lack of explorations on some subject areas, such as chemistry and mathematics. This finding was different to what was found by Livingstone and Kemp in 2007 (as cited in Penfold, 2008). They found the most common uses of SL to be in computer studies, science subjects, architectural studies and so on. The inconsistency between these two studies indicated that using SL to support education has gained increasing attentions from areas other than polytechnic.

Fourth, similar to the findings of other studies (eg, Inman et al., 2010; Luo and Kemp, 2008), this study also found researchers explored SL mainly for its potential to foster constructivist and experiential learning, including collaborative learning, community of inquiry, authentic learning, action learning, project-based learning, situated cognition and problem-based learning.

Fifth, the research foci have evolved throughout the years from investigating instructors and students’ acceptance of SL as an instructional tool to providing examples of SL-based classes. The most recent focal point of researchers was to find out issues, problems and factors that might affect SL-based learning and the possible solutions.

Sixth, studies employing qualitative research methods overnumbered studies employing quantitative research methods. There were only seven descriptive studies and two experimental studies. This finding is different from Hew and Cheung’s (2010). They found that most studies were descriptive research and experiment. This finding is also different to that of Fang and Lee’s (2009) review, which found most that studies were relying on descriptive methods. In addition, a multi-method data collection approach was prevalent in the studies, whereas survey questionnaires were the most popular data collection instruments.

Last but not least, the findings of this study indicated that research attempts that focused on students’ or instructors’ acceptance of SL is redundant. However, explorations on the potential of using SL to support teaching and learning of a specific subject might still be in time.

Despite its informing nature, this study was not without limitation. It had two major limits. First, although the researchers put forth their best efforts to locate all relevant publications, it is possible that some studies were missed and were therefore not included. Second, the study only reviewed publications from refereed journals; therefore, publications from other possible sources were excluded.
References


## Appendix B

### Table A1: Categories of studies foci

<table>
<thead>
<tr>
<th>Category</th>
<th>Foci</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Explore</strong> 2007–2011</td>
<td></td>
</tr>
</tbody>
</table>
1. enhancing students’ critical thinking and argumentation skills (Ho and Ong, 2007)  
2. the construction of identity and development of intercultural literacy (Diehl and Prins, 2008)  
3. creating innovative learning experiences (Good, Howland and Thackray, 2008)  
4. providing a more comfortable “learning through doing” experience (Broadribb and Carter, 2009)  
5. the nature and process of project-based learning approach in SL (Jarmon, Traphagan, Mayrath and Trivedi, 2009)  
6. delivering Library and Information Science education (Luo and Kemp, 2008)  
7. supplementing an undergraduate nursing course (Tao, Lim and Watkins, 2010)  
8. how reference service was provided in SL (Luo, 2008)  
9. the usefulness of SL as an action learning environment (Wagner and Ip, 2009)  
10. the success of SL in enabling an engaging learning environment (Hornik and Thornburg, 2010)  
11. viability of SL being an educational platform/from the perspective of a group of students in an Islamic society context (Abdallah and Douglas, 2010). |
| **SL as a context** |  
12. the effects of teacher conversational feedback on learner’s engagement and participation in SL (Deutschmann and Panichi, 2009)  
13. the effects of individual teaching practice and collaborative teaching practice on the change of pre-service teachers’ teaching efficacy in SL (Cheong, 2010) |
| **Tools, methods, strategies for SL** |  
14. the transferability of the Jigsaw and Fishbowl collaborative learning techniques to the SL platform (Andreas, Tsiatsos, Terzidou and Pomportsis, 2010)  
15. using the flow theory in understanding the impacts of virtual experiences of SL on students’ attitudes towards virtual learning (Huang, Backman and Backman, 2010)  
16. the usefulness and relevance of the 5-stage model for SL (Salmon, Nie and Edirisingha, 2010)  
17. using the Global Virtual Education (GloVEd) a model to evaluate students’ meaningful learning experience in SL (Keskitalo, Pyykkö and Ruokamo, 2011)  
18. best practice for designing and creating applications for a senior population while also promoting computer and Internet use among seniors (Seals et al, 2008) |
| **Perceptions & Adoption** 2008–2009 |  
1. the students’ perception of using SL as a learning environment (Haycock and Kemp, 2008)  
2. the students’ and instructors’ perspectives of using SL as a potential learning environment (Mennecke, Hassall and Triplett, 2008)  
3. the students’ reaction and perception about learning in SL (as a learning environment) (Cheal, 2009)  
4. the students’ perception of using SL as an instructional tool in teaching online or blended tourism and hospitality (Singh and Lee, 2008)  
5. the students’ reaction and perception of SL-based lectures (Baker, Wentz and Woods, 2009)  
6. the students’ perspectives of using SL for EFL teaching (Wang, Song, Xia and Yan, 2009)  
7. the instructors’ adoption SL as a training and development tool (Taylor and Chyung, 2008)  
8. the instructors, the students, and the technologists’ perspectives of the impact of SL on learning (Storey and Wolf, 2010)  
9. teachers’ reflection of their initial development in SL (O’Connor and Sakshaug, 2009) |
Table A1: Continued

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| Evaluate 2009  | **Evaluate . . .** 1. a virtual biosciences laboratory developed in SL by looking at students’ reactions and perceptions to it (Cobb, Heaney, Corcoran and Henderson-Begg, 2009)  
2. a virtual campus created in SL by find out how a virtual campus on SL can increase peer to peer interaction, group work and communication, easing the knowledge and experience sharing among the community members (De Lucia, Francese, Passero and Tortora, 2009)  
3. an educational simulation created within SL in order to assist pre-service teachers (PSTs) in gaining more experience managing student behavior (Mahon, Bryant, Brown and Kim, 2010)  
4. three graduate, teacher-education, online courses that were conducted part in SL. (Eillen A. O’Connor, 2009) |
| Exemplify 2009–2010 | **How SL was used for teaching certain courses** 1. teaching and learning in a hospitality and tourism (Penfold, 2008)  
2. teaching language (Blasing, 2009)  
3. teaching programming (Cargill-Kipar, 2009)  
4. (the pedagogical advantages) information system education (Dreher, Reiners, Dreher and Dreher, 2009)  
5. project-based interdisciplinary communication course (Jarmon, Traphagan and Mayrath, 2008)  
6. teaching into an introductory computer course (Y. Wang and Braman, 2009)  
7. teaching digital photography (Nie, Roush and Wheeler, 2010). |
| Projects in SL | 8. four examples of pedagogical applications of SL to spark ideas and help others visualize how SL might be used in an academic, public, or school library (Sanchez, 2009)  
9. a SL project designed to engage students in active learning through hands-on experiences and teamwork (Schiller, 2009)  
10. a SL project in which students created marketing plans for products that will be marked project in SL (Tuten, 2009)  
11. a technology mentoring experience aimed at teaching faculty members to use SL (Silva, Correia and Pardo-Ballester, 2010) |
| Organizational Collaboration | 12. collaboration between Georgia State University in the United States and Yantai University in China to explore various facets of EFL learning within SL (C. X. Wang, Song, Stone and Yan, 2009)  
13. a joined force of different universities to create opportunity for music students to organize concerts in SL (Greenberg, Nepkie and Pence, 2009) |
| Affect 2010–2011 | **What affects SL-based activities** 1. how technical issues have been encountered, and in some cases overcome, by academics using Second Life for research or student teaching (Kirriemuir, 2010)  
2. factors that affected the effectiveness of the SL activities through seven SL activities (Mayrath, Traphagan, Jarmon, Trivedi and Resta, 2010)  
3. the pragmatics of integrating virtual worlds for teaching and learning for K-12 education (Dickey, 2011)  
4. whether traditional gender role expectations influence behaviors in SL. (Guadagno, Muscanell, Okdie, Burk and Ward, 2011)  
5. the correlation between motivation for using SL and virtual consumption (Shelton, 2010)  
6. the existence of cognitive presence, social presence, and teaching presence in SL. (Burgess, Slate, Roja-LeBouef and LaParairie, 2010) |