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A Second Life for KAU Practicum Courses: Computer science undergraduates create Virtual Worlds in Second Life

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Abstract: paper is part of a three-year research agenda on using virtual worlds in Higher Education. Broadly speaking, the researchers propose that a virtual world, like Second Life (SL), can be used as a highly responsive and motivating learning environment to deliver university practicum courses if a solid framework of best-practice instructional design is implemented. Specifically, this paper investigates how a Project-Based Training Program in Second Life supports the acquisition of competences constituting core requirements in the Practicum Course taught in the Faculty of Computing and Information Technology at King AbdualAziz University. The results of the study indicate a positive response to the administration of this Training Program via SL on the part of the students as well as the participating trainers.

Keywords: Virtual Worlds, Second Life, Project-Based Learning, practicum courses

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I. Introduction:

A. Background

Constant evolution in ICTs motivates educational institutions to explore the potential of various e-learning solutions in enhancing their online course offerings. Though most Higher Education institutions, which offer Distance or Blended Learning programs, depend heavily on well-established technologies like LMSs, Virtual Classrooms, and e-Exam systems, they are continuously seeking the creation of an optimal, highly engaging and motivational e-learning environment which can support problem-based and project-based learning as well as enhance socialization, critical thinking and teamwork skills. After all, universities prepare learners for the real world where the aforementioned competences are crucial to the success of the individual.

The need for discovering ways to maximize learners' engagement with learning becomes even more prominent in online programs/courses that require the implementation of a "learning-by-doing" model: Research, Practicum, and Professional Development or Vocational Training Programs/courses are just examples of how hard it is—yet mandatory--for higher education institutions to cope with and invest in e-learning research.

The Deanship of e-Learning and Distance Education (DeLDE) at King Abdulaziz University (KAU) recognizes the necessity of contributing to supporting faculties in the design and testing of e-learning solutions that have great potential for improving teaching and learning practices in KAU. In its pursuit of realizing this role, DeLDE decided to address one of the academic concerns articulated in KAU's Second Strategic Plan (1413-1435 A.H.): i.e. the need for designing "advanced" Practicum Programs for KAU students which help them practice skills related to their specialization, and vocationally prepare them for the future.

Educational institutions interested in improving their online offer, have started doing research on teaching and training in internet-based, multiuser virtual environments (MUVEs) as spaces where active learning can take place enhanced with visual aids, simulations, role-play, interaction, collaboration, etc. Metaverse or Virtual Worlds (like Second Life, Open Sim, There, Active Worlds, Kaneva, etc.) are primarily immersive, social environments characterized by the following: a) their existence is not dependent on the user's presence, b)their populations are visually represented by "avatars", c) they are three dimensional, and d)have voice interaction as a major feature (Dickey, 2005; Robbins-Bell, 2008).

Second Life (SL) is the most engaging, advanced, and visually appealing of these worlds and still the most highly populated. Linden Labs, the developers of this world had indicated that almost more than 600 universities have islands on their grid, which is a testimony to SL's popularity as a platform. DeLDE has previously conducted research in SL (Al-Malki et al, 2013) about its potential as a learning environment in comparison to CENTRA, KAU's previous virtual classroom system and concluded that SL has features which can be used in e-learning to enhance learners' engagement and collaboration

B. Related Literature

Second Life's models and simulations of real-life situations, objects, and environments offer rich learning experiences which educators can invest in to bring a sense of life,

immediacy, and authenticity to their practices. Varvello et al (2008) define Second Life as a multi-featured, 3D environment which is created by Linden Labs in 2003 and populated by user avatars that interact with other objects or each other. Among SL's basic features, Tay (2010) and Lucia et al (2008) claim that interaction between avatars has established an opportunity for socializing, hence becoming one of the prominent features of virtual worlds. Veerapen (2011) defines Second Life, as "a persistent, non-gaming, collaboratively user-produced, mediated, virtual world, which permits multiple users, represented through avatars, to interact synchronously with one another and the environment".

Users in SL interact with each other through different communication tools which are available in-world such as: voice chat, text chat, instant messaging. There are as well a host of other features which facilitate collaboration like in-world groups, direct streaming to well-known social networks like Facebook, Twitter, and Linked in, accessible user profiles, etc.

In recent studies, learning design and training in SL become a major focus. In a case study prepared by Linden Labs on Loyalist College's involvement in SL, the emphasis is placed on how a real-life simulation helped prepare Guards on US-Canadian border. It is reported that the scores of the "critical skills tests", used to measure students' progress had risen up from "56% success in 2007, to 95% at the end of 2008 after the simulation was instituted" (Hudson and deGast-Kennedy, 2009). Esteves et al (2009) reported the relative success and potential of implementing a problem-based learning model in SL to help learners acquire programming skills. Campbell (2009) investigated the SL environment for Problem-based learning, where pre-service teachers were trained to "develop an activity that could be taught to a high school class," and reported how those pre-service teachers were open to the technology and highly engaged.

C. Research Objectives and Questions

DeLDE's current project in SL is part of a three-year research agenda on the topic of virtual worlds. Basically, in this paper, the researchers propose that harnessing the capabilities of a virtual world, like Second Life, within the framework of best-practice instructional design can improve the quality of Practicum courses taught at KAU. Therefore, this paper aims to investigate how a Project-Based, Training Program in Second Life supports the acquisition of competences constituting core requirements in the Practicum Course taught in the Faculty of Computing and Information Technology at King AbdualAziz University. The research addresses the following questions:

a. Does SL constitute a suitable learning environment for teaching/learning the "Professional Development Skills" component in KAU's Practicum courses?
b. How far does SL support the project-based Learning component in KAU's Practicum courses?
c. Does students' engagement with a field-specific project in SL contribute to their motivation and overall satisfaction with the Practicum course?

II. Methods:

A. Data Collection

The data collected for this research came from the following resources:

1) Learner Profile Survey, which was conducted at the beginning of the project. The aim

was to collect data on students' learning styles and preferences which might have affected their progress in learning.

2) End-of-Session Reflection (e-from), which individual students had to fill immediately after each session.
3) Weekly Reports, in which students reflect on the concepts and skills they have learned during the week. These were filled by group members.
4) End-of-Program Survey, which consisted of 61 Likert –scale items. These items measured students' overall satisfaction with: 1) The Professional Development component, 2) in-world Trainers' Support 3) the Project component of the program, and 4) the Training Program as a whole.
5) Final Project Report, which group members had to fill and submit explaining the rationale of their project, and their accomplishment with a video recording documenting their progress and product.

B. Participants

The participants were 30 computer science undergraduate students from the faculty of Computing and Information Technology at KAU. These students came from different departments. Some of them came with a theoretical knowledge of programming, while others had actual practice. They were divided into 4 groups with members ranging from 5-10 students.

C. Instructional Design

Informed with best practices in instructional design, DeLDE training unit in the Female campus designed the Practicum Training Program for the computer-science students enrolled in the project. They used the Learner Profile's output to commence the Analysis stage in the design of instructional content, where students' prior knowledge and dominant learning styles were taken into consideration.

We decided then on adopting a project-based learning model because we noted how computer science practicum courses lack such an element especially in contexts which simulated real-life situations, and how students' profiles expressed their interest in learning-by-doing. In this adopted model, learners were expected to gain knowledge and master competences by working for an extended period of time to investigate and respond to complex questions, problems, or challenges (Jones et al, 1997; Thomas et al, 1999).

The design stage involved setting up the Training Program's Objectives, Learning Outcomes, Timeline, Content, Structure, Instructional Strategies, and Assessments. Basically, the five-week, Training Program consisted of two mandatory components:

1) Professional Development Component: a weekly, one-hour session in SL about Professional Development topics. The covered topics included: Time Management, Decision-making, and Effective Leadership.
2) Project Component: a group-based, programming project which students have to execute in SL. The groups meet with their assigned supervisors for one-hour (or more) during the week to plan the project, create and script objects, and test their functionality.

Upon completion of the Training Program requirements, students were able to:

a. Contribute to in-world discussions about professional development skills.

b. Complete in-world quests and tasks related to the professional development topics.
c. Successfully execute these tasks within the allotted time.
d. Use the professional development skills they have learned in planning for, building, and presenting their Virtual World Project.
e. Collaboratively work with members of their group to fulfil the requirements of the Virtual World Project.
f. Successfully complete their Virtual World Project in second life within the allotted time.
g. Showcase their projects in SL to in-world visitors.

The trainers decided to use various teaching strategies which were suitable to the virtual environment and which were used to engage students during the sessions. Among these, the most prominent were brainstorming, open discussions, written reflection, etc. The Assessments designed were basically structured, in-world Tasks and Quests which students had to fulfil after each session, and which reinforced the skills they have been introduced to. Students were required to reflect on their learning via end-of-session reflection, Weekly, and Final Reports.

During the Development stage, we started with setting up the learning environment to support our design. Two SL islands were prepared as learning environments. The First (Noora EFL Lab) was used to deliver the professional development sessions. Auditoriums were prepared with presentation tools. The Second Island (Project Showcase) was the Project area and showcase region for students' projects. It was rented as an empty region which students has to set up from scratch. Activity objects were built and placed in the assigned destinations for students. Notecards, student SL groups, and inventory objects related to the course were created as well.

D. Procedure

The Implementation stage started with the trainers meeting with the trainees onsite and in SL during the first week of the program. The idea of delivering Practicum online via SL was explained to enrolled participants during an onsite session; where the trainers explained the structure of the course, delivered the syllabus, clarified the required activities, and discussed the project component. Students were divided into groups ranging from 5-10 members per group, and started brainstorming about ideas for the project requirement. The Orientation session in-world was basically training in using the SL tools and features.

The trainers and students met in-world once a week for five weeks (2 hours per week).

1) The first hour (5:00 -6:00 pm) was devoted to a presentation on a professional development skill. Students' progress in learning concepts and applying them was measured by their execution of timed tasks and quests in-world. Each of these tasks has a specific purpose communicated to students via a task sheet/notecard, which is submitted to them at the beginning of each SL session.
2) The Second hour (6:00 -7: 00 pm) was devoted to the project component of the Practicum.

To keep track of students' commitment to tasks and projects, trainers required students to fill in a weekly report corresponding to each session in which they discuss what they have

learned and what kind of difficulties they have encountered. They were asked as well to fill in e-forms directly after each session to reflect on their experiences in SL.

The Evaluation stage involved a number of requirements which students had to achieve. On the fifth week of the SL training, for example, students were required to showcase their projects to trainers, mentors and visitors of SL, who evaluated their performance. Peer Evaluation of projects was required as well.

At the end of the course period in SL, students were asked to fill an end-of-program survey and submit a final group report on their project with a video recording. Also, they were interviewed about their projects and the time they spent in SL.

Trainer-student interaction was not restricted by the pre-assigned times mentioned earlier. Group supervisors met with their groups on agreed-upon dates, so they can support students and help them if they encounter problems in designing or coding their projects.

III. Findings and Discussion:

Analyzing responses received from students via the end-of-program survey demonstrated the following results:

1. The items requesting students' input on the professional development component of the Training Program indicated the following:

a) The main objectives of the self-development topics were clear to 93% of the students and have added value to their practicum experience.

b) 86.2% of the students agreed that the professional development topics are important to include in any practicum course in KAU since they helped them practice skills needed in the future workplace.

c) 48.3% of the students found that their training on self -development topics in SL have a better impact on them in gaining the skills they needed than face-to-face training.

d) A detailed analysis of students' responses to the type of assessments used with individual topics in SL showed that:

   1) Tasks for the "Time Management" topic were clear to 48% of the students, and 38% of them have completed their tasks successfully.
   2) Tasks for the "Decision-making" topic were clear to 51.7%, and 58% of them have completed their tasks successfully.
   3) Tasks for the "Effective Leadership" topic were clear to 44.8%, and 44.6% of them have completed their tasks successfully.

e) 62% of the students agreed that the group project was the most effective way to implement the professional development skills they have learned. Also, between (58-51%) of the students agreed that communication, group discussions, and simulations were effective learning methods with such topics. However, sequential tasks (Quests) were considered effective for only 31% of the students.

As indicated by the results in the first section of the survey, there is a highly positive evaluation of the Professional Development component of the Training Program in SL, and a desire that this particular component be a mandatory requirement in practicum training for all

KAU courses. Students, however, struggled with Tasks and Quests in SL as these required them to move without guidance in-world looking for clues and field-related information, which they were not used to in their previous training experiences.

2. Responses to survey items inquiring about the assistance provided by the trainers showed a highly positive evaluation of trainers' support and online presence, which are essential requirements in online learning.

a) 80% of the students agreed that they have been provided by all supporting materials and training content which will help them build their projects.
b) 87% of the students agreed that project supervisors have provided them with complete support during task execution, project builds, and follow-ups, giving them timely incentives (feedback and prizes).

3. Survey items asking about students' evaluation of the experience gained by building a project in SL yielded the following results:

a) 79.3% of the students agreed that building their projects have improved their ability to program and design.
b) 44.8% of the students agreed that the projects were related to their field of study, and 52% have reported their improved ability in programing for virtual worlds using LSL (Linden Scripting Language).
c) The learning environment in SL was motivating to 62% of the students to complete their projects, and it was suitable for experimentation and implementation to 86% of them.
d) Determining project idea was easy for 65% of the students.
e) 93% of the students have spent extra hours in SL than it was assigned to complete their projects.
f) 86.2% of the students believe that their SL projects will have effective role in enriching the KAU's knowledge society.

As indicated in the previously outlined results, the project-based learning model proves to be engaging, motivating, and contributed to the development of new, field-related skills (programming and design).

4. Regarding the program in general, the survey responses indicated an overall satisfaction with the experience in SL as well as a desire to pursue other projects in the same learning environment:

a) The program has benefited 69% of the students. 70% of the students enjoyed the experience in general and more than 72% support training in SL.
b) Even though that the work was in groups, we found that 76% of the students have expressed themselves through their activity and design contribution. Also, 62% of the students would like to follow up their work on their projects and market its outcomes. Moreover, 55% of the students prefer to do follow up work on programming, designing and training in SL.
c) 76% of the students have imagined themselves in a new area of work that is related to virtual worlds.

Conclusion:

The results outlined in this paper present the tip of the iceberg of an untapped educational potential, Virtual Worlds. Project-based learning need a total and motivating engagement with hands-on experiences and challenges. Therefore, virtual worlds like SL offer a learning space where such challenges can be designed in an authentic way. For the computer-science students who enrolled in this Training Program, the skills they learn become 3D and visually appealing. Asked to create a virtual world of their choice, the students created four wonderful projects (a Tourism Site, an Islamic Inventions Interactive Gallery, an e-Library that is connected to KAU library, and an interactive Gallery about Prophet Mohammed p.b.u.h).

It was not just the visual design that was appealing, but as well the skills which students demonstrated in scripting their projects from scratch.

It is essential that the instructors or trainers who decide to teach in SL should 1) be trained on effective instructional design for Virtual Worlds, 2) be prepared for instruction and course delivery in the SL environment which includes setting up their roles as learning facilitators, 3) constantly make the learning resources available to students in-world, and 4) be trained on how to evaluate students' performance in the SL environment.

The researchers encourage the implementation of SL as a learning platform but while taking into consideration the necessity of proper training and instructional design. We, as well, call upon KAU faculty to research the educational potential of Virtual Worlds and in particular how it can be applied to realize specific learning outcomes in specific courses that are suitable for project-based learning like KAU's practicum courses.

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