The use of virtual simulations in a laptop-based university

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Abstract

Traditional teaching-and-learning environments often do not address the learning needs of today’s “millennial” generation of students who prefer team work, experiential activities, structure and the use of technology. In fact, millennial students view technology as a necessity, both in life and in learning and highly regard “doing rather than knowing”, making interactive, experiential learning, a necessity for their educational success. Recently, there has been a push on the development of interactive simulations for educational and training purposes and such simulations are being incorporated into a large number of curriculums. To develop effective simulations that meet the needs of both millennial students, and educators, end users’ views and perceptions of simulation use in the classroom must be assessed and accounted for. We must develop an understanding of the sentiments and demand for simulations in teaching and learning. Such information provides valuable input into the development of simulations and ensures their use and integration within the classroom. In order to assess this, a single institution, survey study consisting of a two part survey (one geared towards students and the other to faculty) was developed and conducted at the University of Ontario Institute of Technology (UOIT), a laptop-based university, that prides itself on the use of technology in the classroom, to gauge users perceptions of virtual simulations. Results indicate that students and faculty alike do appreciate the use of virtual simulations but care should be taken to ensure that the simulations are relevant to the course material and that educators are familiar with the use of the simulations to assist students should any problems arise.

Keywords: Virtual simulations; learner-centered teaching; serious games; interactive learning; laptop-based university; millennial students.

1. Introduction

Traditional teaching-and-learning environments are often quoted by the millennial generation as “boring” as they do not address the unique learning needs of this generation (Hanna, 2003 p.44). Millennials see technology as a
necessity, both in life and in learning (Mangold, 2007). They do not appreciate or learn as much from passive learning which most often occurs in lecture style teaching, but instead they prefer to be actively involved (Sinclair & Ferguson, 2009). This high level of interactivity is not easily captured in traditional teaching/learning environments; however the more recent use of simulations through virtual reality and videogame based technologies have been noted as one of the most effective means of promoting interactivity and active involvement in learning (Cowen & Tesh, 2002). In contrast to traditional teaching environments whereby the teacher controls the learning (e.g., teacher centered), simulations offer a learner centered approach to education whereby the player controls the learning through interactivity and learns via an active, critical learning approach (Stapleton, 2004). Learners are able to actively work through problems while acquiring knowledge through practice. Simulations inherently support experiential learning by providing students with concrete experiences and active experimentation (Kolb, 1984; Squire, 2008). By designing the scenario appropriately, a problem-based learning approach can be realized (Savery & Duffy, 1995). With these experience-based, instructional methods, faculty work as facilitators, facilitating the experience and subsequent knowledge acquisition. These experience-based methods incorporate more complex and diverse approaches to learning processes and outcomes; allow for interactivity; allow for cognitive as well as affective learning; and perhaps most importantly, foster active learning (Ruben, 1999). The active learning inherent in virtual simulations is believed to be a more effective method of obtaining and retaining information than traditional passive forms of learning (Sprengel, 1994). In addition, virtual simulations allow learners to experience situations that are difficult (even impossible) to achieve in reality due to a number of factors including cost, time, and safety concerns. Specifically, virtual learner scenarios can be designed which allow trainees to work through complex situations (i.e., community wide disasters), which are difficult to simulate in reality and in a real-life situation may not allow for optimal teaching-learning moments.

To develop effective virtual simulations, the views and perceptions of both the end users (learners) and educators regarding simulations in the classroom must be assessed and accounted for. Here we present the results of a survey that was designed to assess both faculty and students’ perception of educational simulations at the University of Ontario Institute of Technology (UOIT, see http://www.uoit.ca), a laptop-based university, that encourages the use of technology in the classroom. Results indicate that students and educators alike do appreciate the use of virtual simulations but care must be taken to ensure that the simulations are relevant to the course material and that educators are familiar with the use of the simulations to assist students should any problems arise.

The remainder of the paper will review the methodology used, including a description of subjects, the survey and methods of delivery, in addition to the results for both the student survey as well as the educator (faculty) survey. This will then be followed by a brief discussion and overview of future work.

2. Methods

A survey study consisting of two parts (one part, the student survey was geared towards students and the other, the faculty survey, was geared towards educators/faculty) was designed and developed using Survey Monkey (http://surveymonkey.com) and conducted at the University of Ontario Institute of Technology (UOIT). The survey was made available to all students and faculty members via a link on an institute-wide internal course management system known as “MyCampus”. Inclusion criteria for participating in the survey included current enrolment in a course or program at UOIT (for students) and currently teaching a course at UOIT (for educators). During the period that the survey was executed, the student population at UOIT was 5500 and there were a total of 158 full-time faculty, and 87 part-time faculty employed. However, this total does not take into account the actual fraction of enrolled students within each semester which could be quite different each term due to part-time enrollment, summer course offerings and fast-track programs (UOIT, 2009). For this reason, we did not anticipate a response rate close to 5500 (100%) as the survey was only run over the course of two months, March 01 – April 30 2009, thus not all students would have been captured during this time period. It was also anticipated that the response rate for faculty would be less than 100% as not all faculty teach every term and are therefore less likely to frequent MyCampus during a term in which they are not teaching. In addition, to ensure non-biased feedback from the students and faculty there was no incentive provided to complete the survey and there was no effort taken to promote the survey other than the availability of the link on “MyCampus”. The survey was kept completely anonymous; respondents were not required to provide their name and were simply asked to provide their current Faculty/program affiliation and age.
The student and faculty surveys were comprised of seven and 10 items respectively in addition to demographic data which included age and program/course of enrollment (student survey) or program/course taught (faculty survey). The survey included both open-ended and close-ended questions. For close-ended questions, subjects were given a list of responses and asked to select their choice(s). Questions requiring a simple yes or no response were followed by an open-ended question in which faculty and/or students were asked to expand/explain their response. A team of two student research assistants, and three faculty members reviewed the surveys for content validity prior to releasing the surveys. Following the completion of the study, responses to each question were analyzed by the researchers at the level of individual items.

3. Results

In total, 232 (4%) students and 18 (13.6%) faculty members completed the respective surveys. Although the response rate for students was very low, it is important to remember that the total number of enrolled students at UOIT (5500) was used to calculate this rate however this number does not accurately reflect the total number of students enrolled in, and who had access to MyCampus between March 01 and April 31 2009. For this reason, the response rate for students is largely under-represented. 29.4% of the faculty participants were between the ages of 20-25, 29.4% were between the ages of 31-35, and 23.5% were between the ages of 36-40, representing a very diverse group of educators with respect to age. Not surprisingly, the vast majority of student participants (80.2%) were between the ages of 18-22. Seventeen percent were between the ages of 23-30 and 2.5% of student participants were older than 31. A graphical summary of both the student and faculty surveys results are provided in Figures 1 and 2 respectively. For both surveys, the graphical summary includes responses to the “closed-ended” questions only (the question and the break-down of the responses are both provided). Questions that required participant input in the form of an opinion statement or explanation are not included.

4. Discussion

When asked about their learning preferences, 42% of the 202 students stated that they prefer a “doing and reading combination” followed by 31% who prefer a “doing and listening combination”. This is consistent with learner characteristics of millennial students and is very promising for a virtual learning teaching tool whereby the emphasis is placed on “doing” and active participation. These results further highlight students need to have a practical, hands-on component to follow the theory they are reading and or being taught. As one student commented:

- “Teaching theory with no practical component is useless, and it’s harder to retain information without it.” (Anonymous Survey Participant, March 2009)

When asked about their prior experience with simulations in the classroom, 137 students stated that they have in the past, or are currently using simulations in their courses. Of these 137 students, 78% found them to be useful and aided them in grasping course theory. When given the opportunity to elaborate on why they found simulations to be useful, common responses varied along the following:

- “Clarified things for me and showed cause and effect” (Anonymous Survey Participant, March 2009)
- “Gave me an understanding of the real life situation” (Anonymous Survey Participant, March 2009)
- “Interesting way to learn. I really enjoy it” (Anonymous Survey Participant, March 2009)

Of the 18 faculty respondents, 50% stated that they have either used a simulation in the past or are presently using a simulation in their course. Of the 50% whom stated they use simulations in conjunction with their course material, 72% stated that the simulation added ‘value’ to their course. The 50% of faculty who have not integrated simulations into their course were given an opportunity to explain why. The responses did not vary greatly and the most common reason reported for not using a simulation in their classroom was lack of availability of one. Furthermore, of the 50% who have not used simulations, or are currently not using a simulation in their course, when asked if they would use one if it was available, it was not surprising that 66% responded that they would fully
integrate a simulation into their course if one were available with another 22% stating they would allow students to “play around with the simulation as an extracurricular tool” but they would not use it as part of their course for evaluating the students.

![Chart](chart1.png)

Figure 1. Student survey results.

![Chart](chart2.png)

Figure 2. Faculty survey results.

5. Summary

In this paper we have presented the results of a survey conducted at the University of Ontario Institute of Technology to gauge students’ perceptions on simulation use in the classroom and for learning. Results confirmed students’ appreciation for the use of simulations in the classroom. However, care must be taken when incorporating simulations into the classroom. More specifically, i) simulations must be relevant and connected to the course material as the simulations will lose their appeal if they don’t relate to course material in a clear way, and ii) simulations must be user friendly and the instructor must be familiar enough with it to assist students with any questions/problems they may encounter to avoid confusion.

Based on the student and faculty survey results, several recommendations for using and integrating simulations into a course/curriculum were generated. It was stated that in order for a simulation to be successfully integrated into a course, the following needed to be considered.

i) The simulation must “feel” as though it is being linked to the course material.
   a. Simulations lose their appeal if they don’t relate to course material in a clear way.
   b. If the simulation is not tied to the students’ grades, students believe that there is no benefit in using the simulation.
ii) The simulation must be user friendly.
   a. Instructors who were “unfamiliar” with the simulations being used led to confusion that turned students away from the simulations.
   b. Most courses run for 4 months which leaves little time to become familiar with a complex simulation. This could actually take away from course theory as more time is spent explaining the simulation then the theory that coincides with it.
   
iii) Linking to the above two key success factors emerges the need for faculty/educators to be able to:
   a. Integrate the simulation into their course material
   b. Be able to use the simulation themselves and understand the fundamentals of the simulation. In other words, to be able to explain the use of the simulation to students and answer any questions student may have should they arise.

Future research needs to consider the perceptions and use of simulations at other institutions and how these findings compare to the findings presented here from a lap-top based university. Finally, this information is highly valuable when considering the development of simulations for teaching and learning.

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