The Impact of Multi-Players Serious Games on the Social Interaction among Online Students versus Face-to-Face Students

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Abstract: There are few attempts in the education field that investigate the use of serious games as an instructional tool.

In this paper, collaborative virtual environment (CVE) will be used to build up multi-players serious games (MPSGs) platform to investigate how MPSGs promotes social interaction among students. Furthermore, we extend our analysis to how significantly MPSGs affects online students’ social interaction as opposed to social interaction among face-to-face students.

A MPSG platform called The Village of Belknap was developed in Second Life for our experimental analysis. Then, statistical analysis using ANOVA has been to verify the effectiveness of the proposed approach. We obtained promising results about how MPSGs may affect the social interaction among various groups of students.

Key-Words: Collaborative Virtual Environment, Second Life, Educational Games, Serious Game, Role-Playing Game, Avatar.

1 Introduction
The new generation of students spends a great amount of time online everyday. These students handle their lives differently. They are heavy users of technology such as computers, Internet, cell phones, and computer games. Another type of these technologies is Collaborative Virtual Environment (CVE) where people interact with each others for hours through their avatars. The CVE can be used as a platform to implement multi-players serious games (MPSGs). Millions of users spend on average 22 hours a week interacting with each through playing the multi-players games [5, 12]. Most of educators believe that the best way to teach students about history and literature is to introduce the assigned topics in their real environment. Since the real environments are not available all the time, the virtual environments can be effective alternative. In such virtual environments, students will be forced and encouraged to behave, speak, think and write in the same way of such era of time.

In the current work, we were concerned with examining how the use of MPSGs as educational tool can enhance students’ social interaction with their classmates. There are two main reasons for conducting this research. First, examine the effect of MPSGs on improving students’ perception of
social interaction. Second, validate the positive effect of MPSGs as effective educational tool. It worth mentioning that there is no current research that examines the difference between the effect of using MPSGs in face-to-face classes and online classes on students' social interaction.

This paper is organized into nine sections. The second, third and fourth sections will present a comprehensive idea about educational serious games, CVE, and Second life respectively. The fifth and sixth sections will introduce the methodology and the results. The seventh, eighth, and ninth sections will include the discussion, the limitation of the study and future research, and the conclusion.

2 What is Education Serious Game?
Educational computer games are games that are designed to teach about certain subject, expand concepts, reinforce development, understand a historical event or culture, or assist in learning a skill [13]. Serious games are educational games “that do not have entertainment, enjoyment, or fun as their primary purpose” [7, p.21]. The idea of serious game was initiated by the founders of the Initiatives of Education Arcade and Serious Games. They suggested that the development of serious games should be a collaborative task among subject matter experts, educators, and commercial game developers in order to combine video game design with constructivist learning methods for non-entertainment purposes (Fig 1).

The use of serious games implies several educational advantages that can encourage researchers and educators to stand behind the use of serious games as a strong teaching tool. These advantages are:
- Supporting the development of a number of various skills such as strategic thinking, planning, communication, collaboration, group decision making, and negotiating skills [6, 11].
- Enhancing knowledge acquisition and retention rate [2, 8].
- Tailoring learning experience according to learner characteristics, learning style, and rate [1].
- Facilitating learning to take place within a context that is meaningful to the game [4, 11].
- Supporting team building [4].

3 What is CVE?
CVE emerged as a new and interactive 3-D learning environment. CVE is defined as a computer generated multi-user three dimensional interface in which students can experience other participants as being present in the environment [9]. In such environments, students are situated in the same time as well as the same virtual space. Students also interact with each other and express their non-verbal behaviors through the use of their personal avatars.

4 Second Life
Second Life is an Internet-based 3-D CVE where we developed “The Village of Belknap” game. Linden Labs, the creator of Second Life, defines it as a “3-D online persistent space totally created and evolved by its users” [10]. In Second Life, students navigate, interact, and view the world through their personal avatars. One of the main advantages of Second Life is allowing students to change the appearance of the avatar any way they want. Students communicate via typed chat, voice chat and pre-recorded animations such as dancing, crying, and typing.
5 Methodology

This study examined the impact of using MPSGs on students’ perceptions of social interaction with their classmates. The students participated in a MPSG called "The Village of Belknap". After completing the game, students were asked to respond to a series of statements measuring their perceptions of the quality of social interaction with their classmates. The independent variable was the type of the section with two levels: face-to-face section and online section. The dependent variable was the perceived quality of social interaction. The researchers were not able to predict a certain direction of the results.

Participants

Twenty subjects from the University of Louisville participated in the experiment. Participants were 9 (45%) males and 11 (55%) females ranging in age from 18 to 23 years. They were of mixed age, gender and educational backgrounds. Participants were drawn from English 301, "British Literature" course. Participation was voluntary; incentives for participation were provided at the discretion of the instructor.

5.2 Experimental Design

One-way ANOVA was used to analyze the collected quantitative data of students’ perceptions of social interaction. The goal of using one-way ANOVA is to examine whether the average difference between the face-to-face and the online groups was statistically significant or not. The two levels of the independent variable were:
- Face-to-face section. This included the students who were enrolled in the face-to-face section and played the MPSG.
- Online section: This included the students who were enrolled in the online section and played the MPSG.

5.3 Instrument

The Relational Communication Questionnaire (RCQ) developed by Burgoon and Hale (1987) was utilized. The questionnaire was used to collect quantitative data regarding students’ perception of the quality of social interaction. The RCQ addresses the immediacy/affection, similarity/depth, receptivity/trust, composure, formality, dominance, and equality. The RCQ questionnaire consists of 19 items with a five-point Likert scale with response options ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire yields a total score that ranges from 19 to 95 with a higher score indicating a better perception of the quality of social interaction. The overall internal consistency reliability of the questionnaire is =.70. Alpha ranged from a low of .52 equality factor to a high of .81 for the immediacy/affection factor.

5.4 The MPSG and Task

Playing the MPSG was specifically tailored to help students understand the course material. A MPSG called The Village of Belknap was created (Fig 2 and 3). By completing the game, the students will be able to describe a fourteenth-century village and the roles of its residents, reflect attitudes appropriate to the social role of their character, and make a historically appropriate argument about joining the Peasants’ Rebellion.

Fig 2. Snap Shot of the Village of Belknap Game

Fig 3. Snap Shot of the Village of Belknap Game
Before starting the game, the students were asked to:

- Choose a village identity for their avatar from the following list: king, queen, noble women, knights, miller, gentry merchant, gentry merchant wife, woman who runs the brewery, peasant farmers (both men and women); monk;
- Choose some appropriate fourteenth-century clothing for their avatar;
- Update their Profile to reflect their new fourteenth-century role

During the game students:

- Meet and chat with the other villagers; click on the other avatars and read their fourteenth-century profiles; interact with the other characters in a way that is appropriate to the social role of their character in fourteenth-century English village culture.
- Create a note card. In order to learn how to create a note card, students should go to Bulletin Board and follow the directions. On their note card, they should describe a Ricardian belief about the social class structure (e.g., enclosure was a violation of the traditional rights of the peasantry). Then, they should post their note on the Bulletin Board.
- Go to the tavern at the top of the hill and sit down at a table. They discuss whether the men of the village should join the Peasants' Rebellion. Everyone should contribute to the debate, using arguments that reflect the various fourteenth-century attitudes toward justice, the social hierarchy, and the tensions of the times. The students should make an argument that your character would be likely to make.
- When the village has come to a decision, the students would learn about their fates by going to the Bulletin Board area and rolling the dice.

In order to grade students' performance, the instructor recorded students' game sessions. She recorded the chat and the instant messages on her hard drive. So conversations during the game are not private. In addition, the instructor took “snapshots” of the group to have a record of avatars and costumes.

5.5 Procedures

One week before playing the game, the instructor sent an email to the students to remind them with the time of playing the game and motivated them to participate in the survey. She explained to them the purpose of the survey. She also informed them that extra credit points would be awarded as an incentive. At the day of playing the game, the instructor sent to the students again the same email as a reminder. In addition, students were sent a hyperlink to the online survey via email deployed using Zoomerang, an online survey tool. Participation in the survey was completely voluntary and there were no negative ramifications for students who chose not to participate. An announcement was also posted in Blackboard. The survey was completely anonymous, so students who participated in the survey were asked to inform the instructor of their participation via email to receive the extra credit points. Students were given a week to complete the survey.

6 Results

The researchers expected that playing the MPSG and the facilitation of more avenues of communication and interaction among students would increase the students' social interaction with their classmates. But, we did not determine whether the game would have a greater influence on the perception of social interaction of the face-to-face students or the online students.

6.1 Demographics

Gender. Of a total of 20 participants, there were 9 male students and 11 female students. In the face-to-face section condition, there were 4 males and 6 females. In the online section condition, there were 5 males and 5 females. The ratio between males and females in the two conditions was close to each other.

Age. Ages ranged from 18 to 23. The average age of students was 20.30 years (SD = 1.45). The majority of the participants (75%) indicated their age between 18-20 and 25% were between 21-23 years old. In the face-to-face section condition, there were 9 participants between the age of 18 to 20 and 1 participants of the age between 21-23 while in the online section condition, there were 6
participants between the ages of 18 to 20 and 4 participants between the ages of 21 to 23.

6.2 Descriptive Data

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<th>SD</th>
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<th>Max</th>
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<tr>
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<td>8.05</td>
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Table 1. Descriptive Results of the Survey

Table 1 reports the descriptive data for the students’ level of social interaction which was measured in this study. Table 1 shows the mean (illustrated in fig 4), standard deviation, and minimum and maximum score for each condition.

The descriptive data shows that the participants’ ratings of the RCQ ranged from 55 to 80 among all participants. The scores ranged from 55 to 78 in the face-to-face section condition and from 60 to 80 in the online section condition. The online group showed more consistent scores with standard deviation of 6.62 than the face-to-face group which had a bigger standard deviation 9.07.

![Fig 4. Mean values of students’ responses](image)

Fig 4. Mean values of students’ responses

Fig 4 demonstrates the relationship between the mean value of the students’ responses to the social interaction survey and the type of the section. The figure shows that the students’ perception of social interaction was higher in the condition of online section (M = 67.39) compared to the face-to-face section (M = 63.20). The results indicated that the students’ social interaction with their classmates was influenced by the type of the section. Although the results indicated that students in the online section experienced a higher perception of social interaction than the students in the face-to-face section, they did not show whether the difference between the mean values was statistically significant or not. Therefore, we conducted a one-way between subjects ANOVA to test the significance of the difference between the mean values (Table 2).

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Table 2. Results of One-way ANOVA

The results of ANOVA test indicates that there was no significant difference between the perception of social interaction of students who were enrolled in the online section and the students who were enrolled in the face-to-face section. Although table 2 indicated that there is a difference between the two groups, ANOVA test confirmed that this difference is not statistically significant. The findings revealed that both groups enjoyed their interaction with their classmates through playing the MPSG. Both groups feel comfortable and more involved in the interaction process during playing the game.

7 Discussion

This experiment intended to examine if playing a MPSG influenced the social interaction among students who were enrolled in the online section of the course differently from students who were enrolled in the face-to-face section of the course. Overall, there was no statistical significant difference between the perceptions of social interaction of the two groups.

Research conducted by Mansour and Bennett (2008) and Mansour and El-Said (2008) found that both students who were enrolled in the online section and the face-to-face section and played the MPSG experienced higher perceptions of social interaction than their peers who did not play the game. Finding no significant difference between
the two groups in this experiment confirmed the importance of the existence of an active channel of interaction among the students whether in the online courses or in the face-to-face courses. Also, the results validated the claim regarding the importance of the existence of a shared place for online students to meet together. By providing places for social interaction and relationships beyond the workplace, multi-players games have the capacity to function much like the hangouts of old [12].

These results can be interpreted that the students who were enrolled in the online section, found playing the game as an opportunity of facilitating a type of interaction that is not available by the nature of the online courses. They used the avatars as a way to represent themselves to others. In addition, they used avatars to express their feelings. This means that online students found their social interaction through the game as an alternative to their unavailable face-to-face interaction. In addition, the use of the virtual environment provided students with the experience of being together in the same place which considered one of the main prerequisites of a successful social interaction.

Regarding the face-to-face students, the majority of them expressed that playing the game led to a strong positive impact on their social interaction with their classmates. Playing the game promoted students to extend their interaction with their classmates outside the walls of the classroom and may form a type of lasting friendship.

In general, playing the game helped both face-to-face students and online students to understand and interact with the course material in a different way. The continuous interaction among students can help them to discover shared values and goals among them. This discovery can support the building of a shared understanding and a sense of community. The results indicated that using MPSGs as an educational tool sustains students' interests and provide a more natural learning environment. Playing the game and acting a certain role in the game motivated students to have an open discussion with their classmates, to present and defend ideas, and to exchange diverse beliefs. In summary, playing MPSGs can support students to build new experiences, problem-solving skills, and to create a social learning environment.

8 Limitation of the Study and Future Research
The major limitation of this study was that it only took into consideration the perception of social interaction of students who voluntarily accepted to participate in completing the questionnaire. This means that there is no accountability for the perceptions of social interaction from the perspective of students who did not participate in completing the questionnaire.

Future studies may investigate several other issues. First, future research may explore how the personal characteristics of the students and their previous experience in playing computer games can influence their perception of social interaction. Second, the researchers may investigate how the role that students play in the game can affect their behaviors in their real lives.

9 Conclusion
The literature demonstrated and this study confirmed that social interaction for both face-to-face students and online students is a critical element in the learning process as well as in students' cognitive development. The results of this study indicated that teachers should not only present the information and materials to students but also to integrate technological tool such as educational multi-players serious games that promote social interaction and critical thinking among students.

In summary, this research demonstrated that facilitating new channels of social interaction is not only important for online students but also for face-to-face students. The limited amount of empirical research in the area of educational serious games and the relationship between playing games and promoting social interaction makes this study one of particular importance to the literature.
10 References


