3D Role-Playing Games as Language Learning Tools

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Abstract

Leveraging the experiential cognition and motivational factors of 3D games, we conduct a pilot study that utilizes Ever Quest 2 *as pedagogical learning tool for English as a second language (ESL) students. We combine the benefits of massive multiplayer online role-playing games (MMORPGs) and second language methodology to create a digital learning environment for second language acquisition (SLA). Rather than using traditional computer-assisted language learning (CALL) software, we explore the immersive, virtual environment of* Ever Quest 2 *as ESL participants assume virtual identities and engage in social interactions within the game world. We suggest that language becomes a crucial artifact for character development and completion of game tasks in the virtual world. Preliminary results demonstrate that* Ever Quest 2 *intermediate and advanced ESL students increase their English vocabulary by 40% as result of game play interactions with non-playing characters (NPCs). Furthermore, intermediate and advanced ESL students practice their conversational skills with playing characters (PCs), generating a 100% increase in chat messages during eight sessions of game play. These results lead to the conclusion that MMORPGs can provide motivation and adequate language learning support for intermediate and advanced ESL students.*

Categories and Subject Descriptors (according to ACM CCS):
CCScatK.3.1Computer Uses in Education, Computer Aided Instruction

1. Introduction

Though video games have been criticized as being mindless entertainment with no educational value or content, Gee [Gee03, Gee04] and others argue that video games model effective learning practices [BDM05, Gee03, Gee04, Kos05, Mai02, Pre01]. Game play experiences foster learning in the virtual world as players accomplish game tasks. Pillay et al. [PBW99] support the theory that recreational video games engage players in complex cognitive processes that are employed in problem-solving tasks. Thus, video games increase players' cognitive abilities which transfer to learning in the real world [BDM05, Gee03, Gee04, Kos05, Nor93, Pre01, PBW99].

Game designers utilize motivation to entice players to numerous hours of game play [FSH04]. Players attribute successful game play to the following components:

1. freedom to explore an immersive, virtual environment that adapts to player's skills
2. clear goals and objectives that determine game progression
3. resources that enable players to complete game tasks
4. and visually displayed feedback (e.g. level of difficulty) that informs players' decisions and outcomes [BDM05, FSH04].

The components of game play are ideal for creating effective digital learning environments. If we replace "player" with "student," then we have the model for the active, constructive learner [BDM05, Gee03, Gee04, Kos05, Pia70]. Learning is an active, personal experience that allows the student to reflect on what they know (e.g. beliefs, ideas, misconceptions, etc.) and how this knowledge shapes their understanding of the world and sense of self [Pia70]. Game-based learning refers to embedded instructional content in video games [BDM05, Gee03, Gee04]. Though video games provide motivation for learning, game-based learning does not necessarily result in positive learning outcomes. Research shows that embedded instructional content does not necessarily lead to positive learning outcomes [EAB02]. In

contrast, game informed learning uses game play components to facilitate learning process. Game-informed practices give students an opportunity to learn concepts in a situated manner. For example, students who play video sports games (i.e. football) learn about the rules of the game and the social practices (e.g. huddle to discuss strategy) associated with the game. Rather than evaluating computer games for their educational content, Gee recommends emulating the characteristics of games for traditional and informal learning environments. Our research examines the novel application of role-playing games that support learning. Using a subset of game-informed practices, we conduct a pilot study using the Massive Multiplayer Online Role Playing Game (MMORPG) *Ever Quest 2* for second language acquisition.

2. Motivation

MMORPGs supply a social infrastructure that permits like-minded game players to form groups as evident in multiple user dungeons (MUDs) and other role-playing games [HB02]. The social practices that exist in MMORPGs model cultural norms that are emphasized in game playing activities and define the community of players [LW91]. In a similar manner, second language teaching methodology encourages foreign language students to participate in cultural practices associated with the target language [Kra91]. As a result, students develop proficiency in the target language as they communicate with native speakers. Video games represent computer-based, highly participatory, multi-media environments that engulf the player in a virtual world that appears to be real [FM95, Pan93, Sch02]. Therefore, video games can close the distance between foreign language students and contact with native speakers [Sch02].

Research shows that second language students interact more in virtual chat rooms and online discussions, suggesting that virtual environments create non-threatening learning environments [Bea92, Bea97, BE96, CO93, HB02, PW02, War96]. Additionally, online chat rooms promote a democratic learning environment that is conducive to both introverted and extroverted learners, evolving into learner-centered environments in which students of different language levels accept more of the responsibility for developing target language proficiency [Bea92, Bea97, BE96, CO93, HB02, Kel92, Ker95, PW02, War96].

MMORPGs supply authentic environments for learning, complete with sufficient opportunities for students to practice, develop and test their emergent communicative abilities. The practice of producing language that is evaluated for meaning by other role-playing characters constitutes authentic dialogue between native and non-native language speakers. Furthermore, computer games emulate the experiential approach of second language acquisition by providing an immersive learning experience. Moreover, text is displayed on the screen, giving visual cues to determine context of meaning and language content as well as identification of second language vocabulary. Thus, language becomes a necessary artifact of successful game play. MMORPGs are designed to create and support social networks of gamers. Powerful alliances play a key factor in gamers' abilities to defeat enemies and accomplish tasks that are virtually impossible to perform alone. MMORPGs sustain social interaction between players and serve as the catalyst for fostering students' grammatical and conversational competence as students chat in a foreign language while playing the game. Social interaction is a prerequisite to students' language proficiency. Without social interaction, students lack motivation, opportunities for practicing target language skills, and immediate feedback; all three components are crucial if students desire to increase their communicative abilities in the target language. Online role-playing games are transformed into computer assisted language learning tools for successful second language acquisition for novice, intermediate and advance language students [BDM05, Gee03, Gee04]. For these reasons, we believe that MMORPGs create an ideal learning environment for language students. Leveraging the sophisticated graphics and established customer base of Sony Online Entertainment (SOE) and Microsoft Corporation, we investigate the novel application of MMORPG *Ever Quest 2*.

3. Online entertainment Ever Quest II

Ever Quest 2 is a MMORPG, created and produced by SOE, that is set 500 years after the original *Ever Quest* game. *Ever Quest 2* supports authentic multimodal interactions using visual images, displayed texts and aural inputs for computer generated avatars. Prior to playing the game, players select a character from 16 species (e.g. dwarfs, barbarians, frogloks, etc.) 24 professions (e.g. assassins, berserkers, paladins, etc.), and 4 classes (e.g. mage, scout, fighter, and priest) with each species and class having specific strengths and weaknesses. Typical of role-playing games, players invest emotionally in successful character development of their virtual identity [Tur95]. For example, if the player selects the profession Paladin from the species of frogloks who are ideal members of the fighter class, then the player is represented as an amphibious avatar, short in height and possessing high intellect, agility and upper body strength. See figure 1. Frogloks are inherently noble and good, serving as valiant fighters while protecting their cohorts from danger. Three dimensional graphics depict the vast terrain of the virtual world of Norrath. Gamers interact playing characters (PCs), non-playing characters (NPCs), and objects labeled on the screen. NPCs do not accept or complete quests; they share information about quests and other characters with PCs. In contrast, PCs accept quests, engage in combat, and become friends or make enemies. Players advance from one level to another as they successfully complete challenges/quests and defeat powerful enemies. MMORPGs include infrastructure for virtual social interactions, players chat with one another, discuss game strategies and form alliances.

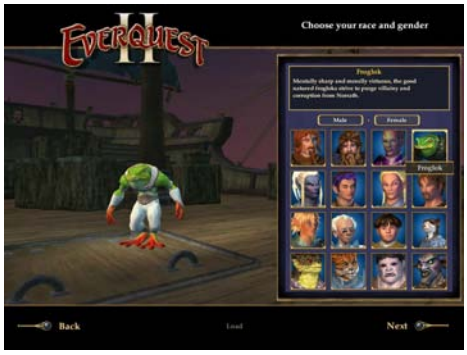

Figure 1: *Role play as a Ever Quest 2 froglok character.*

4. Methods

The purpose of this study is to identify the appropriate pedagogical strategy that enables us to leverage the benefits of gaming. Our research attempts to answer the following questions:

- As a result of game play, does *Ever Quest 2* increase ESL students'English proficiency and if so, how?
- Does *Ever Quest 2* provide adequate language learning support for ESL students of various backgrounds?
- What improvements or additional tools are required to transform MMORPGs into second language learning tools?

Initially five ESL students, ranging from high-level beginner to advance as defined by the Basic English Skills Test (BEST) assessment, participated in the pilot study. Participants completed a pre-game questionnaire that identified their native language and evaluated their computer literacy skills, experience playing games, and their confidence level in their ESL communication skills. Students were required to spend a minimum of 4 hours per week for duration of 4 weeks and played the game in groups of two. In addition, we kept a diary of observations per session and periodically queried participants for feedback about their game play experiences. The first week was comprised of tutorial sessions complete with documentation of game instructions, explanation of species, classes and professions of characters, and on-site assistance for exploring the virtual world of Norrath. We compiled a list of game play instructions along with a separate list of new vocabulary words and gave them to each participant. We reviewed the instructions for game play (e.g. explanation of inventory, examining objects, chatting, etc.) and asked each participant to demonstrate different game control actions. Each participant proceeded to accept their first quest, to develop the game character's combat skills. ESL students were encouraged to participate in combat as long as they wished and were eventually instructed to accept a second quest of their choosing. One student withdrew from the study due to inability to meet time commitments. Thus, data files consisting of game play activity and chat interactions were collected for 4 players, including eighteen hours of data per student.

After four weeks of game play, participants completed a post-game questionnaire. Using Perl scripts as natural langauge processing tools, we analyzed the data files for word frequency count for interactions with NPCs. Subsequently, we gave each ESL student a vocabulary assessment based upon each individual's game log files. Vocabulary words were randomly selected from each student's data files. We also analyzed the number of chat messages generated by each participant to measure the level of comfort and the degree of social interactions with other playing characters.

5. Data analysis and discussion

As a result of the pilot study, we have developed an appreciation for the complexity of using games for second language acquisition. Because all four students indicated on the post-game questionnaire and during the wrap-up interview that *Ever Quest 2* improved their English vocabulary skills, we decided to test each participants' acquisition of vocabulary words based on two factors: 1) vocabulary that was documented in each individual's game log activities and introduced during interactions with NPCs and 2) word frequency counts for each vocabulary word used by NPCs. To measure learning outcomes, we compared students' understanding of vocabulary words that were used once in conversation with vocabulary words that were used more than five times in NPCs' dialogue. All four participants accurately defined 35% or more of the vocabulary words that were introduced only once in conversations with NPCs. In comparison, participants achieved 55% or higher accuracy for words that were used more than five times during social interactions with NPCs. This suggests that the more NPCs model appropriate use of vocabulary words, the more ESL students develop the appropriate meaning in English. See figure 1.

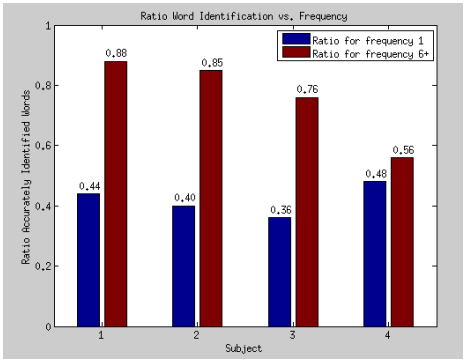

Figure 2: *ESL students' vocabulary results.*

The advanced ESL students expressed greater confidence in their English reading, writing and conversational skills

than their counterparts, generating 6 times more chat messages than the high-level beginner and 2.5 times more chat messages than the intermediate student. One student in particular generated an average of 60% more messages than any other participant. This same student exhibited a positive perception of the game's ability to assist with ESL acquisition and recommended *Ever Quest 2* as a pedagogical tool for ESL students. We offer that this student perceived the game in a positive manner despite her lack of experience playing computer games and took advantage of the faceless interactions to initiate questions with players outside of her group when she needed assistance. As suspected, the high-level beginner ESL student indicated low confidence level for English reading, generating an average of three chat messages per session. See figure 2.

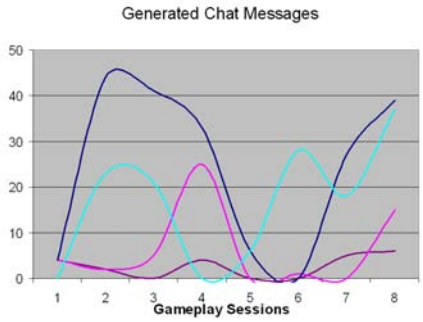

Figure 3: *Number of generated chat messages per ESL student.*

The ESL students in the study demonstrated diversity in computer literacy skills and ESL proficiency but all four had limited experience playing video games. Exposure to video games reduces the learning curve associated with manipulating game controls to navigate the virtual environment while lack of experience playing video games can oftentimes lead to frustrating game play experiences coupled with the task of comprehending visual, textual and aural information in the target language. One participant wrote, "This is hard," in her chat window during the first week of the pilot study whereas an advanced ESL student gave feedback that after she became familiar with game controls (i.e. arrow keys), she thought the game was fun.

As mentioned earlier, the diverse backgrounds in the participants' ESL communicative abilities produces the dilemma of determining how well suited *Ever Quest 2* is for ESL students of various levels. However, the ESL student who was on the border between high-level beginner and low-intermediate experienced difficulty with adapting to the virtual environment. This leads to the conclusion that *Ever Quest 2* fails to provide adequate supports (e.g. dictionary for translation) for even high-level beginner ESL students; this leads to cognitive overload as the participant attempted to balance game play navigation, comprehension of information displayed on screen and the use of a handheld dictionary for unfamiliar vocabulary. While the students were not discouraged from using dictionaries, only the high-level beginner repeatedly brought and used her dictionary during each game play session. This would enable us to determine the minimum proficiency level for participation in subsequent game studies. Pilot study results indicate that one student in particular generated 31% more messages than her advanced ESL peer, 73% more messages than the intermediate participant and 89% more messages than the beginner ESL student. This same student exhibited a positive perception of the game's ability to assist with ESL acquisition, specifically in the areas of vocabulary, reading comprehension and conversational skills. The different ESL proficiency levels easily suggest that each participant brings different learning needs to the game world of *Ever Quest 2*, a virtual environment that may lack the flexibility to support the needs of varying levels of ESL students. We realize that if the ESL student is to benefit from the immersive environment represented in role-playing games, the participant should possess a minimum of intermediate level knowledge of the English language.

Students offered suggestions to improve the language learning environment. Prior to level seven, NPC interactions included few aural outputs. As two of the subjects progressed to more advanced game levels (e.g. level 10) and proceeded to leave the Isle of Refuge, students expressed their appreciation for additional aural outputs for some of the NPCs that inhabit Qeynos. Students suggested that audio be included for all NPCs as this would help them to learn the pronunciation of new words. Multi-modal inputs are vital to students' ability to develop oral proficiency in the target language. We suspect that ESL students would experience greater learning outcomes if such built-in language supports were readily available during the game. As it stands now, participants rely on the feedback of other PCs as a means for self-reflection. We propose that ESL students who are not co-located may participate in more online discussions and hopefully improve their conversational skills. Thus, we are compelled to improve upon the design of video games as language learning tools and continue our efforts to collect data as ESL students communicate and live in the virtual world of Norrath.

6. Conclusion

As with the use of any technology for educational purposes, video games can be a blessing and a curse. Rather than blindly assuming that the benefits of games will transfer to learning in any domain for students of various backgrounds, both educators and designers of instructional technology must develop appropriate methodology for evaluating games as learning artifacts. We have proposed a methodology that evaluates MMORPGs as pedagogical tools for second language acquisition. Using Natural Language Processing tools

to analyze data files, we have conducted a pilot study of ESL students' game play activities and social interactions within the virtual world of *Ever Quest 2*. We posit that *Ever Quest 2* provides a rich environment that is well suited for building ESL students' vocabulary. Provided ESL students possess intermediate level English proficiency skills, *Ever Quest 2* has the potential to improve students' conversational skills as well. Beginner ESL students might benefit from a more traditional computer-assisted language learning environment, featuring structured learning modules that explicitly identify learning objectives and supply detailed explanations of the target language.

We perceive this pilot study to be the first step towards developing our own computer game for mainstream literacy skills. Though this study involves a small sample size, the results serve the purpose of illuminating the complex problems that intersect both game design principles and language learning strategies. Subsequent research involves modifying *Ever Quest 2* to better support second language acquisition while purposefully incorporating second language teaching methodology in the game design. Currently, *Ever Quest 2* supports plug-ins that can be customized for language learning goals and implemented in the game interface. One such plug-in would be an in-game dictionary that would assist ESL students with acquiring new vocabulary as well as English translation skills. Future work includes a more rigorous study of twenty or more intermediate and advanced ESL students who wish to improve their English proficiency skills. Students will need to be physically separated in an attempt to encourage more extensive use of chat logs to practice both conversational and writing skills. In addition, we have identified the need to periodically measure learning outcomes relevant to reading comprehension, vocabulary acquisition and conversational skills. To assist us with this endeavor, pre and post assessments of English proficiency skills in the four areas of reading, writing, conversation and listening skills are required if we hope to correctly identify learning outcomes attributed to game play.

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