Using Role-Playing Games for Teaching History and Literacy

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Abstract: Role-playing games set in immersive virtual environments can leverage student interest in narrative and fantasy to motivate learning in literacy and history. This paper describes an educational role-playing game designed to run on a typical PC. The game is set in a virtual medieval village, and incorporates a mystery quest that can only be solved by successfully unraveling a series of challenging written and verbal clues. Game-related workbook activities which are integral to game play are also described. The full paper presents the results from an in-class pilot test of the game with 5th grade students. Though it is difficult to evaluate the long-term benefits of game play in the classroom from a single class experience, these preliminary findings suggest that games can be used to motivate students, reinforce recall and provide an opportunity to apply language skills acquired in class.

Introduction

For the last decade, many professions and trades have used games to improve workplace skills (Stone 2002). Recently, there has been a growing interest in exploring the educational potentials of game playing in K-12 education (2001; Kirriemuir & McFarlane 2003; Shaffer, Squire, Halverson, & Gee 2004). From the perspective of teachers and educators, “serious games” need to motivate students to develop new skills and knowledge in reading and math. For developers of educational games that incorporate three-dimensional virtual environments, there is the expectation that providing a high level of immersion and involvement can stimulate students’ learning (Squire 2005, Johnson 2010). Littlewood (2004) argues that the best learning tasks call for a high level of task involvement by the learner. Immersive games, such as those employing true 3D virtual reality or even quasi-3D virtual environments, require the user to be an actively involved participant in the game to be successful. Other motivating factors in game play design include competition, social interaction, problem solving and opportunities for free exploration (Gee 2003).

In order to create successful educational games, designers must focus on their learning objectives. Johnson, Hoher, Ohlsson & Gillingham (1999) note in discussing their collaborative virtual reality learning project that in using true 3D virtual reality (VR) learning environments the learning goal must be important, the learning goal must be difficult, the learning goal must be plausible and enhanced by the use of VR.

When games using virtual environments are being created for classroom use, developers need to consider:

1. Virtual environment learning must be based on research in educational practice (Kirriemuir & McFarlane 2003; Johnson et. al. 1999, Johnson 2010);
2. Virtual environments (VEs) should be designed for collaborative learning (Johnson et. al. 1999, Johnson 2010);
3. VE should support wandering or walking through the space (Johnson et. al. 1999, Johnson 2010);
4. There should be a metaphorical reference to some aspect of the physical world to enable students to interact in a real-life setting (Li & Maher 2000);
5. Audio, text, video, object behavior, and navigation should support different learning styles (Li & Maher 2000);
6. The virtual world experience should be critical to the problem-solving task.

For role playing games to be educationally, they must be well designed. Although research indicates that the appeal of playing games in the classroom is not universal, it is very widespread (Kirriemuir & McFarlane, 2003). Building on this interest in games, teachers need to play an active role in the use of games in the classroom. Furthermore, student directed learning is key (Kirriemuir & McFarlane 2003).
This paper describes a study that explored the use of a role-playing virtual environment game, *Knight Elimar’s Last Joust*, developed to enhance student acquisition of language skills and Medieval history. A key tenet of language instruction that guided the game’s development was that it not be the central focus; instead the instruction was guided by the principle that “learners use language as a means to an end” (Lee, 2000, p. 31). An important aspect of task-based instruction (Swan 2005) that is central to the game, *Knight Elimar’s Last Joust*, is that it is learner-centered (Willis 1996; Skehan 1998; Willis 2003). In playing this game, the mastery of language skills is critical to advancing through the game. Though learning language is not the explicit goal from the player’s perspective, the game is a means to a desired end.

There is evidence that language acquisition can be facilitated by engaging in computer-based role-playing in virtual worlds. Virtual reality systems incorporating role-playing have been used extensively in the U.S. military for language instruction. In the *Tactical Language Training System*, students are introduced to Arabic, Farsi, and Levantine languages and culture through participation in a virtual world (Johnson et al. 2004, Johnson 2010). In these worlds, students have an opportunity to be immersed in a game space where they interact with animated characters in settings based on urban and rural life found in Iraq. An interactive story environment engages the learner; animated characters provide feedback on both pronunciation and dialogue. Speech recognition technology, which focuses on the most likely responses, gives the student feedback on appropriate responses with native speakers. This approach shows promise even with students having limited prior experience in foreign language instruction (Johnson et al. 2004, Johnson 2010).

For first language acquisition, role-playing games that offer relevant task-based learning activities for teaching language skills need to be structured so that students adopt roles within an immersive world, as this typically increases student engagement (Mikropoulos 2006). The mere process of wandering in an environment and encountering others, much like a tourist in a new city, can offer a valuable learning experience.

**Test Case: Knight Elimar’s Last Joust**

In creating the game *Knight Elimar’s Last Joust* for this research, students receive reinforcement through their English-language interaction with animated characters in a virtual medieval city. When tourists are making the Grand Tour through foreign cities, they make note of both linguistic and cultural data. These data may be preserved as memories and embodied in collections of photos, post cards, and memorabilia (Settekorn 2001). Similarly, in the virtual world we have created for teaching language skills, the student traveler will need to use their powers of observation in combination with their language skills to find landmarks in the search for the clues needed to reach a successful conclusion in the game.

*Knight Elimar’s Last Joust* uses a treasure-hunt game structure embedded in a medieval narrative and acted out in a medieval town. (Medieval Studies is within the social studies curriculum for grade 5). Students assume a virtual character and are asked to solve a mystery about a knight’s armor that has gone missing using a sequence of audio clues. The game begins outside the city gate of a medieval walled city, based on today’s Rothenburg ob der Tauber. Standing in front of an equestrian statue students are introduced to the game. The horse, now missing his knight, provides the prologue narrative where students are introduced to the mission of the game: “to help a knight ‘Elimar’ find his missing armor”. Upon entering each level of the game students wander through streets, plazas and architectural spaces and must look for the part of the armor named in a previous clue. For example, after given the first sample clue, “breastplate”, the gates to the city open into a plaza with a central fountain where students begin looking for breastplates. When close to this piece of armor, it will light up an audio clue will play. Other pieces of armor include: the sword, gauntlet, greave, and sabaton [Figures 1 and 2]. The clue will loop as long as the student remains in close proximity to the object. To keep students from moving on to the next clue before listening completely to the audio clip, students are prevented from leaving their current position until the clue has played. Each clue provides critical information for solving a crossword puzzle or the word search in the workbook, provided to each student at the beginning of the game. With the workbook, students work through the riddles to get their next clue. Students record information in a printed workbook, rather than in the game itself, which solved several problems in the development of the game, and offered additional advantages:

1. Because the game does not actually capture student responses, fewer resources were required to create the actual VE (virtual environment). In addition, changes to the story line can be easily accommodated by merely changing audio tracks, characters and clues.
2. Security issues were eliminated, as data are recorded in a hard copy workbook that only researchers and teachers can access.
3. The use of a workbook helps students develop language skills – in solving the game’s mystery students learn about synonyms, anagrams and crosswords.
4. Writing skills are practiced in recording clues and events; students must be careful note takers to be successful.
5. The workbooks help students learn about European culture and literature - during the course of the game students are introduced to medieval myths and stories, architecture, poetry, and medieval texts.

Typing in the correct answer to each word problem associated with each level activates a window with a picture of that piece of armor and its name. This action also plays an audio clue revealing some historical fact about this piece of armor. With each correct answer, the piece of armor appears in the lower left side of the screen. Upon the completion of the game the student has assembled the entire suit of armor. If they are not able to find the next clue, students may follow Knight Timeme, Elminar’s arch enemy [Figures 1 and 2]. After about 9 minutes of wandering through the game, Timeme will arrive at the gate where the next clue is revealed, after the gate opens to the next level. Approximately 45 minutes are allowed for playing the game. A series of hour glasses marks the time. An hour glass disappears each 9 minutes; the number of hour glasses indicates the amount of time remaining in the game.

Virtual World Construction

The virtual world of this game was created in a 3D modeling environment (StudioMAX) and imported into Virt tools, an interactive gaming application which makes it possible to deliver the game via the Web and does not require the use of special 3D video cards for game play. This feature makes it possible to run the game on a typical school computer.

Pilot Study Design

Testing of the first version of this game took place in a public middle school in Calgary, Canada over the course of a day. Two Fifth grade classes (10 students) participated in this study. At each session students were introduced to the game with a PowerPoint presentation that introduced to the objectives, story line and biographies of the characters. A PowerPoint slide presentation and demonstration was given on how to play through a clue using a sample question. Previous to the day of the testing session, a reading selection was given to the students which would prepare them for the game (in this study it was not possible to know how many of the students actually read the selection before the day of the test). Students were then given a test game to practice navigating and controlling game play in the virtual world; students played through the actual game in class.

A pre and post-test of terms was used to measure recall of terms used in the game. A research team member was present while students were playing the game to observe student interaction, time on task, engagement, motivation, and technical problems. Before playing the game, students filled out a brief survey that records age, gender, the number of hours they play video games each week, and their favourite video games. After being introduced to navigating in a pre-test virtual world, students played the game for approximately one hour. Following the game, students were asked to fill out a survey with a number of open-ended questions. After completing the post-game survey, a brief focus group was held to discuss what they liked and disliked about the game.

During the course of the game, a student’s progress through the game space is recorded as a position in space and time. Researchers can examine way-finding through a virtual space and determine if students followed the intended play path required to reach a successful conclusion to the mystery. Using the log files that record each student’s journey through the world, maps of paths through the game can be constructed. Examination of this record will also reveal which students had a course of action resembling a random walk and those who were directed by the clues received during the course of the game. Ultimately, it will be possible to analyze the underlying spatial patterns and improve general game play in future versions of this virtual world.

Findings

Roughly half the students were boys (60%) and half girls (40%). For both grades, the majority of the students had experience playing games at home. In this pilot study of 5th grade classes, the boys play video games for an average
of 9.8 hrs/wk, while the girls play video games 2.6 hrs/wk. When asked to name their favorite video games, all could name at least one game (average 3.3 games named). Game titles included most genres of games: Sport, RPG’s, strategy, puzzles, card, and mazes. Interestingly, there is a wide variety of games played by 5th graders in this test group. Many of the titles listed by 5th graders would be considered adult games. These include games rated T and M (ages 13+ and 17+): “The Sims”, “Warcraft”, “Halo” and “Grand Theft Auto”. Games that required physical activity were also popular with boys and girls, including Dance Dance Revolution and Rock Band.

On the pre- and post-tests, students were given a sheet and asked to name the parts of the armor collected during the course of the game. For the first question, no improvement in recall from the pre-test was measured because most of the students already knew the terms “helmet” (90%) and “sword” (80%). Some improvement in recall was noted for the definitions of the six others parts of the armor [Figure 1]. Based on answers in their notebooks, all of the students were able to complete the game. Therefore lack of time did not prevent them from learning the last term (sabaton).

**Figure 1:** Results of the post and pre-game test (left), View of the prologue of the game. (right)

Based on a preliminary analysis of the paths taken in the game, after several clues, several students learned that they did not need to solve any of the clues. Instead, they could wait for the help of Knight Timeme arriving at the gate needed to gain entry to the next level [Table 1, question 5].

A summary of the responses to the open-ended questions appear in Table 1.

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
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<tbody>
<tr>
<td>1) What do you remember about the game?</td>
<td>Armor, swords knights, monks, jousts.</td>
</tr>
<tr>
<td>2) What was the goal of the game?</td>
<td>To learn and have fun, To see if children can learn from playing games.</td>
</tr>
<tr>
<td>3) What did you learn?</td>
<td>Pieces of armor, middle ages, people had weird names in the middle ages</td>
</tr>
<tr>
<td>4) Was it very hard to switch between the game and the booklet?</td>
<td>Eight of the ten students used the booklet. Three out of ten found it somewhat difficult to use the booklet</td>
</tr>
<tr>
<td>5) What did you like about the game?</td>
<td>It was real. Like being mobile. It was a game. It felt real. It gave us the answers.</td>
</tr>
<tr>
<td>6) What did you like least about the game?</td>
<td>Too much talking. Listening to people. It was stressful. 10 minutes felt like 1 minute.</td>
</tr>
<tr>
<td>7) What would you change in the game?</td>
<td>Click on object to activate clue. Add more time.</td>
</tr>
<tr>
<td>8) Why should we play computer games in class?</td>
<td>It is fun. It is cool. Fun way to learn. Fun. To help us learn. It helps us a lot.</td>
</tr>
<tr>
<td>9) Did you think you are more interested in the Middle Ages after playing the game?</td>
<td>Likert scale 4.8 (7 extremely interested, 1 not interested)</td>
</tr>
</tbody>
</table>

A review of the use of the booklet and questionnaire after playing the game revealed that although most of the students enjoyed playing the game, some found it difficult because they had to listen carefully to the clues (2/10),
while a few others found it difficult to move from the game to the booklet or never really used it at all (3/10) (Table 1). Two students out of 10 found it difficult if not stressful trying to complete the game within the 45 minute period. Almost all of them agreed (10/10) that playing games in the classroom is a fun way to learn. From the brief focus group held at the end of the session students suggested that their could be a reward for getting to the end of the game, like a joust (boys) or just the opportunity to walk around the city and go shopping (girls).

In the context of this paper it is difficult to present the analysis of the log files used to record each student’s journey through the game. One, finding revealed in this experiment, is that students tend to exhibit a random walk through each enclosed space (level). In the design of *Knight Elimar’s Last Joust*, each level focused on a single topic or subject [Figure 2].

![Path: Levels 1-4](image)

**Figure 2:** Path by a student through the game, levels 1-4 (left). Level 1 of the game (upper right). Final level (lower right).

**Conclusions**

This pilot study was useful in defining directions for future research and development of this game. Focus groups, path analysis are useful tools in improving the quality of serious games. Though it is difficult to evaluate the long-term benefits of game play in the classroom from a single class experience, these preliminary findings suggest that games can be used to motivate students, reinforce recall and provide an opportunity to apply language skills acquired in class. Though all the students in this pilot study were experienced game players, a few found it difficult using verbal clues to solve word problems. One factor which needs to be explored further is the ideal time for the duration of an audio clue. Audio clues must contain the information needed so solve each part of the word puzzle or crossword, while not being too long for students to remember. With clues lasting anywhere from 30-45 seconds, the exercise may have been too taxing, resulting in a “stressful” exercise for a few of the students.
Future Research
Testing with a larger group of students may reveal differences in game play strategy between boys and girls. Future refinements planned for the next generation of this game include: ability to escape from at any point after hearing the clue for a second time and the ability to joust with your arch enemy at the end of the game after you have successfully found all of the armor.

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References


