I Was Playing When I Learned: A Narrative Game for French Aspectual Distinctions

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Abstract. While intelligent tutoring systems have been successful at promoting learning, students may fail to benefit if they are not motivated or engaged. We added game elements to an intelligent tutoring system for teaching the distinctions between French past tense forms, creating a narrative game in which players edit articles in a virtual journalism office. In a study with 38 students, we compared the game version to a non-game version of the system and assessed motivational responses. Students using the narrative game version found the activity significantly more engaging.

Keywords. Educational games, Computer-aided language learning, motivation

Introduction

Intelligent tutoring systems are extremely effective instructional interventions (Koedinger, Anderson, Hadley, & Mark, 1997). However, students may exhibit a lack of motivation while working with these systems, displaying negative behaviors like gaming and hint abuse (Baker, Corbett, Koedinger, & Wagner, 2004). Educational games may have the potential to motivate students to better attend to the material and spend more time on-task (Lepper & Malone, 1987). However, there has so far been little empirical evidence that this is the case (Hays, 2005). Additionally, games have been theorized to distract from the learning content. Therefore, we propose incorporating game elements into an intelligent tutoring environment to test whether they enhance students’ engagement with the learning content. Habgood and colleagues theorize that creating endogenous fantasies in which the narrative context and instructional material are intrinsically linked should promote learning and motivation (Habgood, Ainsworth, & Benford, 2005). Thus, our design decisions were guided by an effort to link intelligent tutoring properties (e.g. feedback) with relevant narrative and game elements, rather than introducing the elements as add-ons to the system. In a first study we evaluated the effects of introducing game elements into an intelligent tutoring environment on learning and student engagement. We hypothesized that game elements will increase student motivation with respect to the learning environment. Accordingly, students will attend more to the domain content and show increased learning in the educational game version of a tutor. In this paper, we describe the tutor and its transformation into an educational game, and evaluate these hypotheses.

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1. Learning Environments

Two computer-based language-learning environments were developed to explore the effectiveness of game elements in promoting student engagement and learning from educational tasks. In these learning environments, students received a short set of instructional material about the usage of *passé composé* and *imparfait*, read French paragraphs, and determined which of these two forms should be used for several highlighted verbs in these paragraphs. A pilot think-aloud study suggested that a binary selection of verb form made it too easy for students to guess the correct answer. Consequently, two distractor answer choices with incorrect subject-verb agreement conjugations were added to each selection.

After completing all of the selections for a given paragraph, students submitted their answers and received feedback in the following multi-level structure: (i) first, students were told how many verbs they correctly conjugated and were given a list of grammar rules related to their errors, (ii) upon the first incorrect re-submission, participants then saw a version of their paragraph with errors circled in red and feature-focusing questions (e.g. “Does this verb describe a completed action or one that is still in progress?”) that appeared when a student moused over the circle, and (iii) a bottom-level hint in which the errors were circled in red and the feature-focusing question was followed by a verb rule (e.g. “The *passé composé* is typically used to describe completed actions”). Students continued submitting their answers and receiving feedback until all verb selections were correct. In total, students completed 5 paragraphs with a total of 35 verb selections. While engaging in verb selection, students had access to a help button that returned them to the instructional materials.

![Game Environment: Paragraph featuring drop-down verb selection menus and feedback circles.](image)

Using this intelligent tutoring system as a base, we created a narrative game environment in which participants assume the role of a journalist working to edit articles at a newspaper. Because properly choosing verb forms is necessary to edit the articles and advance within the game framework, the content material and game context are intrinsically related. Additional game features included are time pressure (as the game must be completed between a time-scaled 9 am – 5 pm office day), levels (expressed as job titles and promotions within the journalism office), and points.
(conveyed as earnings in the narrative context). In this version, the feedback structure was tied to the narrative metaphor as the corrections were suggested through an imaginary email interface in which the player’s boss edits his or her article submissions. In the game, the help button was labeled as “Reference Lookup” as a journalist may consult references to help his or her writing. Both learning environments were created using Adobe Flash and include several Cognitive Tutor Authoring Tools (CTAT) components to facilitate data collection (Aleven et al, 2006).

![Figure 2. Game environment: Office layout including selection of articles using legends and user task bar featuring personalization, job title, salary, and time information.](image)

2. Method

Thirty-eight undergraduate students enrolled in second, third, or fourth semester French participated in this study. All were proficient English speakers, although 8 participants reported that English was not their native language. Participants had all previously seen the past tense in class, but instructors identified it as a major area for improvement. They received bonus course credit for participating.

The study had a between-subjects design with two levels of learning environment (game and non-game). Dependent measures for learning were comprised of verb form selection questions isomorphic to the intervention as well as open-ended grammar questions. Motivational dependent measures included items on ease of use, enjoyment, engagement, difficulty of content, perceived learning, perceived usefulness in preparing for grammar tasks, and desire to receive a copy of the software, assessed on 5-point Likert scales. Participants completed the pretest and were then randomly assigned to either the game or non-game learning environment for 30 minutes, or until they had finished all exercises. Finally, participants completed a posttest and demographic and motivational measures. Each session lasted about 50 minutes.
3. Results

As analysis of the grammar cloze questions indicated no significant difference in learning between conditions, this section describes results from the motivational measures. We collapsed the motivation measures into 3 constructs: engagement in the system, perceived difficulty of the content material, and perception of learning. Table 1 contains the means and standard deviations for these measures. Students did indeed show more engagement in the system in the game condition than in the non-game condition ($t=-2.09$, $p=0.044$). Reported difficulty of content material trended toward more challenging in the game condition ($t=1.72$, $p=0.095$). Perception of learning (collapsed from perceived amounts of learning and preparation for the posttest) was not significantly different ($t=-1.00$, $p=0.324$).

Table 1. Means and standard deviations of 3 motivation measures scored on a 1-5 Likert scale. (* $p < 0.05$)

<table>
<thead>
<tr>
<th>Motivational Measure</th>
<th>Game Condition</th>
<th>Nongame Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement in the system*</td>
<td>3.26 (SD = 0.76)</td>
<td>2.70 (SD = 0.90)</td>
</tr>
<tr>
<td>(5 = very engaging, enjoyable, easy to use)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived difficulty of content material</td>
<td>2.37 (SD = 0.83)</td>
<td>2.89 (SD = 1.05)</td>
</tr>
<tr>
<td>(5 = very easy content material)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perception of learning</td>
<td>3.65 (SD = 0.67)</td>
<td>3.42 (SD = 0.79)</td>
</tr>
<tr>
<td>(5 = a lot of preparation and learning)</td>
<td></td>
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</tbody>
</table>

4. Discussion

We hypothesized that using a narrative game environment to learn French verb forms would promote learning and increase motivation. While we did not obtain the desired learning results, a series of transfer questions requiring participants to translate and generate past tense sentences will be analyzed next in an effort to further understand possible learning effects. The significantly higher level of engagement with the software exhibited by the game condition is encouraging and confirms common intuitions about the motivational benefits of educational games (Lepper & Malone, 1987). This benefit did not appear to come at the expense of efficiency or quality of learning. We suggest that this motivation to interact with game environments as characterized by high levels of engagement, enjoyment, and perceived challenge could encourage students to continue gameplay and ultimately experience greater learning gains. Qualitative measures of motivation were also assessed and data log files of each participant’s interactions with the learning environment were recorded. Analyzing the results of these data will likely clarify the implications suggested by the quantitative results described above. This investigation provides a good first step toward evaluating the effects of combining intelligent tutoring and educational games.

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References


