

# ADVENTURE GAMES AND LANGUAGE LEARNING

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## ABSTRACT

Educational video games, or teaching games, can help in language learning by increasing student motivation or by allowing contextualized learning. However, game development is a costly and complex activity with many open issues. In this paper we present a method that allows for rapid game prototyping, thus reducing the risks implied in development. The method is based on the reuse of common structures particular to the field of language learning (e.g. multiple-choice questions) and takes advantage of the combination of different e-learning platforms. We present a case study of the application of this method for the creation of a language learning adventure game.

**Keywords:** Computer Assisted Language Learning, Game-Based Learning, eAdventure, LAMS, Visual language

## 1. INTRODUCTION

How to use computers as language learning tools (a.k.a. Computer-Assisted Language Learning, CALL) has been widely discussed in the literature (Levy, 1997; Muyskens, 1997). The specific uses made of the computer vary, ranging from being used to prepare texts for class or to show multimedia contents in the classroom (Fotos, 1996), to being used in networks as collaborative environments (M. Warschauer & Kern, 2000). Meanwhile, the potential for serious games as complement to traditional educational methods has been established (Blunt, 2009), as studied by the Game Based Learning (GBL) field. Therefore, language education or language teaching games appear as a result of the combination of both approaches (M. Warschauer & Healey, 1998).

GBL studies have shown that different game genres can achieve different educational results. In this respect, adventure games and simulations have been identified as a good medium to achieve educational objectives in language learning (Ang & Zaphiris, 2006; Baltra, 1990; Crookall & Oxford, 1990). Adventure games are characterized by their highly narrative nature (Crookall, 2007), allowing the creation of flow (Chen, 2007) through the use of

intrinsic motivation (Gee, 2003). Narrative or story-based games can both help engage students (De Freitas & Jarvis, 2007; Malone, 1981) and to provide a suitable framework for educational content that fosters learning by doing (Aldrich, 2005). These games usually possess an increasing difficulty, allowing the player to slowly understand the game logic and internal assumptions. Games can foster reading, listening, writing and speaking skills (Lee, 1979). Furthermore, adventure games can be used for role-play (Kirriemur & McFarlane, 2004) where the students can experience situations of the real life in a specific language (a.k.a. contextual learning).

This paper shows a method that allows for educators to develop game prototypes that can be used for validation and then as a framework for the finished product. This way educators can evaluate the game's educational potential and effectiveness before investing all the effort and resources needed for a full game developing, thus reducing risk. This approach takes advantage of pre-existing learning tools to achieve its goal. On the one hand, the <e-Adventure> platform, including its latest tools, allows for easy game development and integration with Learning Management Systems (LMS). On the other hand, Learning Activity Management System (LAMS) allows for the creation of learning activity sequences, as well as game deployment and integration and user information collection, in order to test games in real educational settings.

The paper is structured as follows. In Section 2 we analyze the issues that can hinder the development of educational games. In Section 3 we present a method for rapid language game development using the <e-Adventure> platform and LAMS. This paper shows how this can be used in language learning in Section 4 by means of a use case. Finally, in Section 5 we present some conclusions and future lines of work.

## **2. CHALLENGES OF LANGUAGE LEARNING GAME DEVELOPMENT**

Professional game development is beyond the possibilities of most educational settings due to budget and technical restrictions. This issue can be highly reduced to affordable levels by means of game development tools (Torrente, Moreno-Ger, Fernández-Manjón, & Sierra, 2008). However, even using these tools still presents relevant costs, especially in the time the educator must spend creating the game and the creation of graphic resources. Because of these costs, game development can become a risky activity when performed under tight budget constraints.

Besides, general-purpose game development tools usually lack some elements required by educational games such as assessment and adaptation mechanism (Moreno-Ger, Burgos, Sierra, & Fernández-Manjón, 2008). Even

though this problem can be partially addressed by the use of educational specific game development tools, the syntax used can be beyond the skill level of an educator trying to assess the educational potential of the game. This implies a high risk of losing the game's educational value and the desired objectives by limiting the roll of educational experts during the development process (Torrente, Moreno-Ger, Fernández-Manjón, et al., 2008).

Moreover, both general-purpose and education-specific game development tools do not provide out-of-the-box tools to address recurring structures and elements in language games. Such shared elements, for example multiple-choice questions, can provide additional benefits for a creation tool tailored for a specific field. However, if these elements are not provided by default and must be explicitly constructed each time the complexity of the system is increase, thus reducing maintainability and increasing development risks.

In addition, multimedia resource creation is an open issue, which can hardly be addressed by game development platforms. This task implies significant economic costs and is time consuming. However, many systems require such resources to be created along with the game, creating a bottleneck and increasing development costs before the game can be validated.

Finally, traditional video games are more difficult to use in learning environments for several reasons (e.g. delivery problems, the need of top tier computers or installation requirements). This problem, however, can be reduced by integrating games in LMS (Moreno-Ger, Burgos, & Torrente, 2009). Furthermore, there is no clear way to integrate video games in LMS and connect the data extracted from this kind of contents with the rest of learning tools in a session (Á. Del Blanco, Torrente, Moreno-Ger, & Fernández-Manjón, 2010).

### **3. RAPID GAME DEVELOPMENT**

Different costs can be identified in the game development process: asset generation, programming, adding educational features and connecting games with the rest of contents in a lesson. In this section we introduce a rapid prototyping mechanism that helps to decrease the risks involved in adventure game development. This is achieved through the use of simple assets and pre-defined elements that allow for the fast definition of games for language learning.

#### **The eAdventure educational platform**

The eAdventure educational game platform was developed by the e-UCM learning group of Complutense University at Madrid. This game development platform was created specifically for educational games and includes an easy-to-use editor as well as specific educational features such as adaptation and

assessment tasks (Moreno-Ger, et al., 2008) and integration with LMS (Moreno-Ger, et al., 2009). This platform is in permanent evolution, and a new system for graphic story-flow definition named WEEV (Writing Environment for Educational Videogames) was introduced to simplify game authoring.

### Developing the story-flow

WEEV provides a graphic environment where the user can create a visual representation of the story-flow of the game. This story-flow can include educational components (e.g. evaluation) as well as game elements (e.g. conversations). Besides, WEEV includes tools created specifically to suit the needs of different fields. In particular, a multiple-choice component was included to suit language-teaching needs.

The stories that can be developed in this matter can provide a context to the questions (e.g. a travel story to teach travel-related expressions) or just provide additional motivation (e.g. a detective story where the different language-related concepts are included). These stories, in contrast with the ones created on paper, can be directly play-tested by educators and by student groups (**Figure 1**).

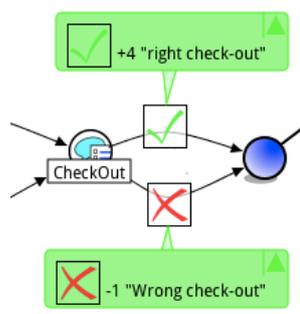


Figure 1. A simple component allows the direct definition of a multiple-choice question; in this case the story progresses even when the student gives the wrong answer and provides the feedback at the end.

### Validating the game

As the stories developed with the WEEV tool can be directly converted into playable <e-Adventure> games, they can be directly validated by the educator and potential users. To achieve that in a fast way the resources used are made in paper and later scanned. Besides, taking into account the visual language used in WEEV and its simplicity, educators can perform a first validation of the WEEV story-board before generating the game. These ideas allow for the reduction of the risk involved in the development of games, as the most

expensive parts of the process are off-put until after the general story/evaluation mechanism is validated.

After the initial teacher's revision, the validation with students can be preformed in a classroom setting or, taking advantage of features readily available on the <e-Adventure> platform, though the internet using a LMS. Besides, the introduction of prototype games in LMS is also important to test how the game is connected with other activities in the lesson checking the relationship between all the learning tools.

### **Integrating with Learning Management Systems**

The games developed using <e-Adventure> game authoring platform can be exported as Learning Objects (LO) following different e-learning standards and specifications that allow for the introduction of the same game in many different LMS such as *Moodle*, *Sakai*, *Blackboard*, etc. Some of these e-learning specifications, such as SCORM (ADL, 2006), can be used to connect the game with the LMS in order to send evaluation information and gather other data about the user profile. Such information can be used to modify the game-flow accordingly (Torrente, Moreno-Ger, & Fernández-Manjón, 2008).

In <e-Adventure> the games also can be exported for specific LMS integration and communication. Using a combination of LAMS (Learning Asset Management System) (Dalziel, 2003) and <e-Adventure> (A. Del Blanco et al., (In press)), games can be easily integrated into the learning design of a course. This easiness allows the validation of games within a LMS, providing flexible tools to replace the game once the complete version is developed or remove the game if it fails its validation.

### **From the prototype to a final game**

Games created with <e-Adventure> allow for the easy edition of graphic resources and other associated properties (e.g. positions). Using this characteristic, images and sounds used in the prototype can be gradually replaced by ones with the quality required by the final game. The final version of the game can also be extended with other media such as videos and slides, as well as animations. In the same way, new situations and questions can be gradually added to the game until the desired length and complexity is reached.

Once the final version of the game is generated, the <e-Adventure>-LAMS integration tool allows for the game to be easily replaced in the LAMS learning sequence. Thus, the latest version of the game will be provided to the students enrolled in the pertinent courses.

## **4. USE CASE**

To showcase the process followed in the development of a game prototype, we present a small, yet representative, use case. This use case shows the creation of a game to teach basic expressions and language concepts. The first part of the process consisted of identifying the subject matter and target audience, a problem common to the development of any educational content (De Freitas & Jarvis, 2007). For this case, we chose to create a game that teaches recurring English expressions used in travel (e.g. hotel check-in, flight check-in, etc.) to high school students. The age range is particularly interesting, as it establishes the kinds of stories that are suitable. In this case, the age range allows a serious story and graphic appearance.

The following step in the development is to identify a set of challenges. One usual type of task in language teaching (mostly to increase the vocabulary) are multiple-choice questions (Alderson & Banerjee, 2002). For our game, we identified between 20 and 30 questions that were relevant to the subject matter (e.g. What time do I have to *check-out* by?). The wording and relation among questions was not relevant for this step, so different sources (when available) can be used or questions made up.

Once relevant questions were established, 2 or 3 situations where these questions could arise were identified. For instance, the check-in and check-out at the hotel implied the use of many common expressions, while needing few graphic assets (the lobby and receptionist could be reused). A simple story was developed for these situations, including the reason for the stay and conversations of which the questions were part. This was represented directly using the <e-Adventure> WEEV tool as shown in **Figure 2**.

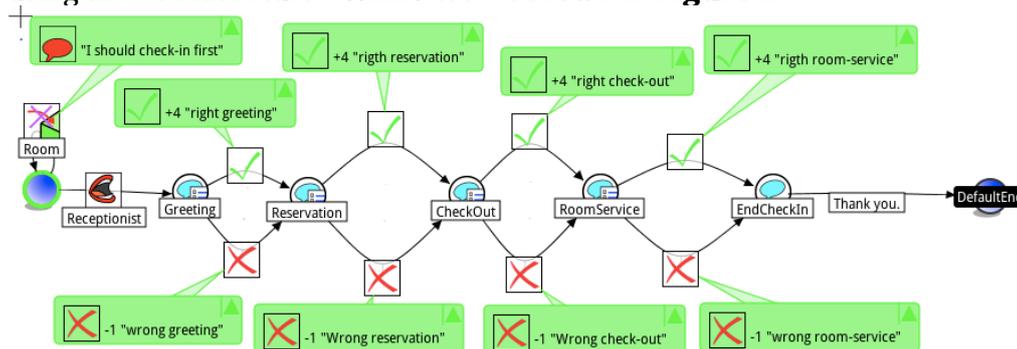


Figure 2 This figure shows a simple story, where talking with the “Receptionist” starts a conversation with a series of questions to the player (“Greeting”, “Reservation”, etc.). The game continues even when the wrong answer is given, thus the feedback is delayed until the end.

To test the game, however, simple assets needed to be developed. These were created using simple line drawing of stick figures that were then scanned. One of the advantages of using the <e-Adventure> platform in this regard is

the fact that graphic resources can be easily modified and improved in a later stage. Once these assets were created the game could be play tested (**Figure 3**) and validated by domain experts and students. This validation and tests can be easily performed within the destined LAMS sequence, as the games created in this manner can be included directly.



Figure 3 The use of simple line-drawing with stick figures allows for rapid game prototyping and validation of the games. These graphic assets can be gradually replaced with production quality figures.

Future steps in the development include the creation of new game situations (achievable thanks to the hierarchical representation used in WEEV) and the improvement of the graphic assets of the game.

## 5. CONCLUSIONS AND FUTURE WORK

The rapid prototyping model proposed in this paper allows for the creation of language-teaching games with limited cost and resources, in a reduced time frame and by users with reduced technical knowledge. This approach allows the validation and play-testing of games before important time commitments and investments are made.

The game developed as a use case is currently in the validating phase and is expected to follow the rest of the model, including the increasing improvement of the graphic assets, should experts in the field validate it.

Future work in this field includes the identification of more recurring structures in language teaching as well as applying the same principles to other areas of knowledge. At the same time, a library of pre-created assets is being developed to help the creation of rapid prototypes for educational games.

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