

An Authoring Tool for Educational Adventure Games: Concept, Game Models and Authoring Processes

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ABSTRACT

The genre of educational adventure games is a common and successful choice in game-based learning. The games combine captivating narratives that motivate players to continue playing with game mechanics that are conducive to learning: the gameplay is slow-paced, allowing players to learn at their own pace, and focused on puzzles that can be infused with educational content. While educational adventure games are well suited for learning in most settings, their creation is often challenging for non-technical experts. Furthermore, existing game editors do not account specifically for adaptive adventure games, which can maximize the learning effectiveness of the games by catering to the players' needs. To address these two challenges, we present a game model for this genre and use this model to build an authoring tool that lowers the threshold for adventure game creation and supports adaptive educational games. The implementation of this concept was evaluated in several studies.

Keywords: Adaptive Game, Adventure Game, Authoring Tool, Digital Educational Game, Game Model

INTRODUCTION

Educational Adventure Games are the combination of educational software tools and games from the genre of adventure games. This genre, which is among seven game genres categorized by Gros (2007), is exemplified by classic games

such as LucasArt's "Monkey Island" series or current games such as "Heavy Rain". It is characterized by the strong focus on a suspenseful or comedic narrative, puzzles to be solved by the players (often by combining items found in the game or by conversing with virtual characters) and the relative lack of action-intensive or time-limited sequences. This combination offers several positive properties for learning:

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educational content can be transported by means of the strong narrative as well as embedded in the game world and puzzles and players can take their time in assimilating the presented knowledge due to the absence of time limits. From a production perspective, choosing the adventure genre is beneficial: adventure games commonly are not expected to push the limits concerning graphics or effects (which incurs high asset production costs in other game genres), and the interaction in adventure games is often so similar from game to game (with vastly differing content at the same time) that tools for their creation exist.

These are reasons why the genre has received the attention of educators for building educational games both during their first era of commercial success – see (Cavallari, Hedburg, & Harper, 1992) – as well as in recent times (Malo & Müsebeck, 2010). An example for a game company producing games for the educational market is the German developer studio BrainGame, exemplified by the *Geograficus* (<http://www.geograficus-game.de/>) and *Physicus* (<http://www.physicus-return.de/>) games (in general, Germany can be seen as one of the strongest markets for adventure games worldwide).

While the reasons for choosing the adventure game genre for game-based learning approaches as described above are valid, at the same time creating educational adventure games incurs higher production costs compared to non-educational/purely entertainment-focused games. This is due to the need to include more team members with specialized backgrounds to production teams. Apart from the game designers, artists and programmers required to implement a regular game, domain experts for the domain of the educational game as well as pedagogues for instructional design have to be included. Furthermore, the whole team needs to communicate on issues arising due to this. For example, the game design has to be adapted in order to accommodate the educational content to be taught in the game. Similarly, artists have to be aware of issues concerning the content, such as in a historical game where uniforms

or villages can't be designed based on fantasy but have to be historically accurate. Processes of coordination such as these increase the production costs and times, often aggravated by different nomenclature in the different specialist groups and different tools used.

The approach we propose for this problem is the introduction of a unified authoring tool, integrating the roles, processes and production stages of game development as described above. This authoring tool allows designers, programmers and domain experts to collaborate during game production. Furthermore, this approach opens the doors to re-authoring of games. Hereby, we use the nomenclature as established by Rensing et al. (2005), indicating a process where existing content is re-combined to be used in a new scenario. Examples of the commercial viability of re-releasing games are found on the console market, with platforms such as the "Wii Virtual Console" being used by publishers to re-publish vintage computer games on modern platforms.

An additional area where authoring tools can assist during the creation of educational adventure games is in the development of adaptive educational games, exemplified by the *80Days* educational game for geography (Kickmeier-Rust & Albert, 2012). Such games are able to adapt during runtime to player characteristics such as the level of previous knowledge of the game's subject matter. While this approach has the potential to increase the learning effects of the game, it complicates development, especially for designers, narrative authors and content producers, who have to provide alternative paths through the game for different adaptations.

The remainder of this paper describes our approach to authoring and re-authoring of educational games, with a focus on the educational game "*Geograficus*" by Braingame Publishing, which was re-authored with the authoring tool StoryTec. We provide an overview of the state of the art of educational adventure games and authoring tools for this genre, with a focus on adaptive educational games. The (re-)authoring process using the StoryTec authoring tool is

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