Chapter V

Content Integration in Games–Based Learning Systems

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ABSTRACT

A key challenge to move forward the state of the art in games-based learning systems is to facilitate instructional content creation by the domain experts. Several decades of research on computer aided instruction have demonstrated that the expert has to be deeply involved in the content creation process, and that is why so much effort has been devoted to building authoring tools of all kinds. However, using videogame technology to support computer aided instruction poses some new challenges on expert-friendly authoring tools, related to technical and cost issues. In this chapter the authors present the state of the art in content creation for games-based learning systems, identifying the main challenges to make this technology cost-effective from the content creation point of view.

INTRODUCTION

Content in videogames takes two different forms: multimedia and gameplay. 3D models of scenarios, objects and characters, 2D textures to dress the models, animations, music and sound effects collectively define the multimedia content of a videogame. Gameplay defines “what the player does”. Gameplay designers build the dynamics of the game world by providing a detailed descrip-
tation of what the player can do and what the game has to do in response. As the size and quality of videogames increase to respond to growing player expectations, game development projects are also growing to involve several hundreds of people working for an average time of three years, where content creation consumes a good bit of the budget.

It is easy to argue that games-based learning provides new opportunities for building engaging and motivating learning environments, although up to now not many empirical studies have been made to demonstrate it. However, if we were to assume that games-based learning outperforms other computer aided learning technologies in certain domains, it is hard to argue that based on those benefits we are going to get a budget increased by several orders of magnitude. In order to be of practical use, videogame technology applied to learning has to become cost-effective compared to state of the art computer aided learning technologies.

Regarding multimedia content creation, the solutions, which the videogame industry is already pursuing, are procedural content creation and end-user content creation. For example, for the game Spore Maxis has developed procedural animation methods that allow the developer to build new characters and automatically apply predefined animations on them (Cappel, Green, Curless, Duchamp & Popović, 2002). End-user content creation is becoming more popular in industry, both as a way to promote gamer attachment to the game and to profit from a mass of content creation volunteers.

Instructional content creation for games-based learning is a form of gameplay content creation. The instructional designer must provide a detailed description of what the student can do and what the system has to do in response. With current technology the instructional designer should work in pair with a gameplay designer or become one himself. In this chapter we present the state of the art in content creation for games-based learning systems, identifying the main challenges to make this technology cost-effective from the content creation point of view.

**CONTENT CREATION IN VIDEOGAMES**

Video game content may be divided roughly in two different groups: assets and behaviours. The term assets usually denotes those elements that go into a game, such as the artwork (textures and 3D models), sound effects, music, and, generally speaking, every object that is presented to the user. On the other hand, the way in which the objects behave constitutes the second kind of content and is sometimes referred to as dynamic content. Both kinds of content are usually handmade, therefore their cost constitutes an important part of the game budget. To compound matters, the situation is getting harder, because of the ever growing hardware capabilities that allow videogames to present more and more objects with higher resolutions, and therefore requires more and more people involved in the creation of all this content.

The creation of assets involves artists using tools such as 3D Studio™, Maya™ and Photoshop™ to generate 3D models and textures. Depending on the game, the amount of this content varies from just a few models to several Gigabytes of stored files (Gillen 2005). In order to alleviate the cost, some effort has been made to create algorithms that build part of them procedurally. Procedural content generation was used by early games as the only way to fit vast amounts of data onto the small mediums available at that time. Nowadays the goal is not just to save disk space but also man power and therefore budget. Examples of assets procedurally generated are textures, terrains or trees; recent developments like Spore are also exploring dynamically generated animations, and Diablo III, Hellgate: London or Borderlands have random level generation.