Chapter XIX

Pre-Service Computer Teachers as 3D Educational Game Designers

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ABSTRACT

This chapter explores prospective computer teachers' perceptions of and experiences in goal-based scenario (GBS) centered 3D educational game development process. Twenty-six pre-service computer teachers who enrolled in a Design, Development and Evaluation of Educational Software undergraduate course formed the sample of this case study, and they, in groups, developed GBS-centered 3D educational games. The data were collected through GBS evaluation checklists, interviews, and formative evaluations. The findings indicated that the pre-service teachers preferred GBS-centered educational games to traditional educational games. They declared that the most important feature of educational games was their contribution to motivation, attention, and retention. Although the majority of the groups developed their educational games in line with GBS, they had difficulty creating a realistic scenario and mission. Unlike what the literature indicates, one of the group's formative evaluation results showed that while the second graders prefer realism, the sixth graders prefer more fantasy in the scenario.

INTRODUCTION

Digital game-based learning has been used extensively in a wide variety of businesses like consulting firms, manufacturing companies, and military institutions. Even though there are successful examples, there is still doubt in the effectiveness of digital game-based learning. There are two main arguments about digital game-based learning that are not yet accepted fully in the adult learning community. The first argument is that the learners have changed deeply and grew up digital. The second one is that individuals are experienced in the new form of play, computer and video games, and theses experiences shape their preferences and abilities for their learning (Prensky, 2001).

One of the most important issues in designing digital game-based learning is to facilitate reflection and critical thinking while learning, and still create enjoyable games (Prensky, 2001). In designing educational games, a careful application of the story and the character is essential. According to Falstein (2005), game-play and story shape each other, and integrating storyline into game can help a player control his or her character in the game. In games, it is essential to allow the player to make progress in the storyline *by doing activities,* rather than by simply watching the cut scenes. A goal-based scenario (GBS) in this respect is a promising approach in designing educational games to facilitate reflection and critical thinking, and to integrate storyline into games. A GBS with a cover story, mission, the roles given to the learners, and goals in the scenario can provide an appropriate theoretical framework in designing effective educational games.

In a GBS, the students try to find solutions to problems in the domain of students' goals, and learning occurs while students are achieving those goals in a certain context (Schank, Fano, Bett, & Jona, 1994; Schank, Berman, & Macpherson, 1999). Rather than representing the topic to the student, GBSs are developed based on the skills that a student can learn. The value of a GBS approach is clear at this point since a GBS emphasizes creating a model in which learning goals aim for the learner to learn "how to" rather than "know that" (Schank et al., 1999). Defining skills as "knowing how to do something" is the essence of the GBS. The underlying principles of a GBS are founded on Case-Based Reasoning (CBR) theory. It is the theory of memory and learning which aims to explain how people remember and use their memories in order to solve new problems (Schank et al., 1994, 1999). It focuses on solving new problems by using or adapting the solutions of the old problems (Riesbeck & Schank, 1989). Most of the time, individuals can transfer past experiences into the new one; this transfer is critical in the use of CBR efficiently.

The effective learning environment creates conditions that produce strong intrinsic motivation to learn (Schank et al., 1994). A GBS itself comprises a rich context and provides interesting and complex activities that increase students' intrinsic motivation (Schank et al., 1999). GBSs can be applicable to all levels for both formal and informal learning situations. They provide learners with active involvement in the learning environment, which represents the facts and skills in the context of real-world use.

Several researchers examined the users' opinions of GBS-centered educational learning environments through field studies. For example, Bell, Bareiss, and Beckwith (1993) developed a program called "Sickle Cell Counselor." The evaluation results indicated that the users spent a lot of time using the program. This result was important because the program was presented in a museum, and the visitors were not required to use it. They concluded that the program was interesting for the users. In addition, they found that the program's users made fewer irrelevant responses on the post-test than the pamphlet users did. The most important result of the evaluation was that the "Sickle Cell Counselor" group learned the conditions of applicability of the new knowl-

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