

## Chapter 1.14

# Using Games to Teach Design Patterns and Computer Graphics

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### ABSTRACT

This chapter discusses some possibilities of using computer games to effectively reach didactic goals in undergraduate teaching. Nowadays, undergraduate students belong to the Net generation and usually play different kinds of games on consoles, computers, and the Internet. Some elements such as creativity and abstraction could be included in computer science and information technology curriculums through the use of games as educational methodological resources, due the motivational

factor they inherently have. This learner-centered approach not only contributes to personalizing the knowledge-building process but also permits the consideration of learning styles to adapt different ludic environments and/or real-world situations according to topics of the course. To demonstrate the possibilities of this educational scenario, two case studies were conducted. One focuses on Design Patterns contents in a computer science course, and the other spotlights computer graphics topics in an information technology course. The results gained in these processes demonstrate the students' involvement in the proposed activities

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and the capacity to apply the lessons learned in diverse situations.

## INTRODUCTION

The acquisition of skills related to creativity and abstraction, indispensable to any computer science and information technology curriculum, constitutes unquestionably a didactical challenge. From the educational point of view, the use of games in this process is a motivational element that could help to make the knowledge-building process more personalized. It is also possible to take into account students' learning styles, thus establishing an adaptive and flexible environment where any skill, subject, or even concept can be effectively learned (Prensky, 2007; Gee, 2003; Bransford, Brown, & Cocking, 2000).

Another aspect that must be considered is that actual undergraduate students belong to the so-called "Net generation" (Tapscott, 1998). According to Tapscott, "N-Geners" could be characterized by having autonomy sense, intellectual openness, technology inclusion (or the facility to use technological elements even though never having any previous contact with them), freedom of expression, curiosity, immediacy, and mainly trust. This scenario perfectly fits into a game universe-based andragogic proposal, because nowadays it is necessary to institute mechanisms that take advantage of technological culture over where they are steeped and transform it into learning resources. The same author also points out the need for an interactive learning posture where focus is learner centered and related to interaction with hypermedia-based systems in order to promote a lifelong learning from a customized—and mainly fun—point of view.

In this situation, professors could be, in a metaphorical way, considered analogous to game masters that guide and encourage players (the students) into a game (the educational process

itself) to play the game, face the challenges, and go through the next level (in other words, succeed in academic life). By exceeding curriculum demands, students could be able to enjoy a lifelong, meaningful learning experience (Ausubel, 1962).

In the role of gamer characters or game development, learners have the opportunity to compare, analyze, and experience situations similar to the real ones. When a student plays in this controlled environment or constructs them, it is possible to present fully inspiring situations where actions only occur in the virtual world, which contributes, among other factors, to reduce cognitive load.

Another consideration in this proposal is based on Shaffer's (2007) works, which focus real problem solving by role-playing a professional character that uses new digital technologies to assume his or her own learning process and institutes attitudinal changing by implementing epistemic games.

Nonetheless, teachers and students barely consider games as something detached from entertainment. The sole tentative of introducing "serious," non-entertaining games into a curriculum often causes the inverse effect, since these sorts of games tend to be tedious as they do not prime for the entertainment-related aspects that are responsible for retaining students' attention.

It must be remembered, although obvious, that the act of learning does not have to be a boring, unexciting situation that students are exposed for a significant part of their lives (Johnson, 2005). Instead, it must be a stimulating and—why not?—funny, entertaining activity to be performed by students. Thus, recovering the ludic side of learning is primordial to motivate students to learn the issues curricula tell them they have to.

Specifically in computer science and information technology areas, students often are already gamers; thus, they are completely aware of game strategies, terminology, and play. The introduction of game-related situations in their curricula has been a well-accepted operation, since games belong

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