Chapter 16
Using Game Development to Teach Programming

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ABSTRACT

One of the educational actions used to leverage the acquisition of practical and theoretical knowledge in the classroom is related to the "learn by practice" methodology in which the student goes from a mere spectator to an agent in his/her learning process. This methodology is being applied in the teaching of courses related to programming, fostering the development of digital games as a didactic practice. This chapter describes the digital games development experience in programming courses on the first year of computer graduation courses in a Brazilian private university. The study reveals the opinion of students and teachers on the application of game development in such courses, as well as the methodology applied to each one of them. The results obtained emphasize that the activity intensifies the learning of concepts inherent to programming, along with fostering motivation and commitment that is paramount in the building of their competencies and skills.

INTRODUCTION

There are several difficulties faced by students during the teaching-learning process of programming. These are often related to the demand for a predominant logical-mathematical thinking in these courses (Silva et al., 2015; Serrano-Cámara et al., 2014). For this reason, teachers, coordinators and managers are always looking for new teaching-learning methodologies that can motivate students to learn programming (Eseryel et al., 2014; Couceiro et al., 2011). In addition, many teachers make changes to the teaching methodology for the pedagogical projects of the courses, in a search for project ideas that can promote multidisciplinarity, or even to provide university extension projects and teacher training, among other possibilities (Couceiro et al., 2011).

According to Silva et al. (2015), students from undergraduate courses and even postgraduate courses cannot yet be considered exactly "adults". For this reason, traditional teaching methodologies can boost the "maturity delay" in these people. This is due to the fact that the student takes a passive role in the teaching-learning process, and it is up to the teacher to decide what, when and how students should learn each subject and acquire certain skills.

According to the Entities Maintaining Higher Education Institutions in the State of São Paulo (Semesp), Brazil, courses in the Information Technology area are the ones that have the highest dropout rate of students, in line with what happens elsewhere in the world. The dropout rates are around 66.66% in Information Systems courses and 75% in Computer Science courses. One of the reasons students give up courses is their inability to learn logic and programming. This is very worrying, as it directly reflects the lack of expert labor in the world. It is projected that the shortage of skilled labor will reach 750,000 professionals by 2020, according to Softex (2015).

On the other hand, the use of methodologies that promote the development of digital games in Computing courses seems to be a good opportunity to stimulate students to learn (Silva et al., 2015; Serrano-Cámara et al., 2014). Digital games have been referenced as a valuable tool and a possibility for the construction of knowledge, transforming the act of playing into action to learn and teach, and building important objectives to achieve learning effectively. Using games in courses can bring benefits such as: using fun to motivate; facilitating learning and stimulating the retention capacity of what is taught; working the mental and intellectual functions of the player; encouraging learning through discovery; promoting socialization; awakening expert behavior, and more (Hayes & Games, 2008).

In the Computer Science Department of the Mackenzie Presbyterian University, a methodology of game-based learning was adopted to develop games to teach programming. The methodology was applied in different courses in three undergraduate degrees in Technology Information, namely Programming Laboratory and Programming Language using Python, and Web Technology using JavaScript. All these experiences were shared by the teachers of these courses. The methodology and results of these experiments will be reported in this chapter. The motivation for developing this chapter was to understand how games can contribute to improve the teaching-learning process and what the students feel about it, carried out through satisfaction questionnaires. Issues related to the students' profile, motivation, commitment and proactivity were addressed, as well as the opinions of the teachers involved in these courses regarding their students. To obtain additional information about the sample of students, a map of correlations was made. Thus, it was possible to obtain information about the profile of the students and correlations between their profile, motivation, proactivity and commitment. In all, 139 students participated in the study across the three courses and seven teachers. Data were collected at the end of the first semester of 2017, when the first cycle of the school year is finished.

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