

Chapter 26

Identifying Student Types in a Gamified Learning Experience

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ABSTRACT

Gamification of education is a recent trend, and early experiments showed promising results. Students seem not only to perform better, but also to participate more and to feel more engaged with gamified learning. However, little is known regarding how different students are affected by gamification and how their learning experience may vary. In this paper the authors present a study in which they analyzed student data from a gamified college course and looked for distinct behavioral patterns. The authors clustered students according to their performance throughout the semester, and carried out a thorough analysis of each cluster, regarding many aspects of their learning experience. They clearly found three types of students, each with very distinctive strategies and approaches towards gamified learning: the Achievers, the Disheartened and the Underachievers. A careful analysis allowed them to extensively describe each student type and derive meaningful guidelines, to help carefully tailoring custom gamified experiences for them.

INTRODUCTION

Videogames are being widely explored to teach and convey knowledge (de Aguilera & Mendiz, 2003; Squire, 2003), given the notable educational benefits and pedagogical possibilities they enable (Bennett et al., 2008; O'Neil et al., 2005; Prensky, 2001). Research shows that video games have a great potential to improve one's learning experience and outcomes, with different studies reporting significant improvements in

subject understanding, diligence and motivation on students at different academic levels (Coller & Shernoff, 2009; Kebritchi et al., 2008; Lee et al., 2004; Mcclean et al., 2001; Moreno, 2012; Squire et al., 2004). As found by Gee (2003), good games are natural learning machines that, unlike traditional educational materials, deliver information on demand and within context. They are designed to be challenging enough so that players will not grow either bored or frustrated, thus allowing them to experience flow (Chen, 2007; Csikszentmihalyi, 1991).

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Gamification is defined as using game elements in non-game processes (Deterding et al., 2011a; Deterding et al., 2011b), to make them more fun and engaging (Reeves & Read, 2009; Shneiderman, 2004). It has been used in many different domains, like marketing programs (Zichermann & Cunningham, 2011; Zichermann & Linder, 2010), fitness and health awareness (Brauner et al., 2013), productivity improvement (Sheth et al., 2011) and promotion of eco-friendly driving (Inbar et al., 2011). Gamification can also be used to help people acquire new skills. For example, Microsoft Ribbon Hero (www.ribbonhero.com) is an add-on that uses points, badges and levels to encourage people to explore Microsoft Office tools. Jigsaw (Dong et al., 2012) uses a jigsaw puzzle to challenge players to match a target image, in order to teach them Photoshop. Users reported Jigsaw allowed them to explore the application and discover new techniques. GamiCAD (Li et al., 2012) is a tutorial system for AutoCAD, allowing users to perform line and trimming operations to help NASA build an Apollo spacecraft. Results show that users completed tasks faster and found the experience to be both more engaging and enjoyable, as compared to the non-gamified system.

Gamifying education is also on the rise, even though empirical data to document major benefits are still scarce. In his book, Lee Sheldon (2011) describes how a conventional course can be cast as an exciting game, without using technology, where students start with an F grade and go all the way up to an A+, by completing quests and challenges, and gaining experience points. Domínguez et al. (2013) proposed a new approach to an e-learning ICT course, where students can take optional exercises, either via a PDF file or via a gamified system. In the latter, students were awarded with badges and medals by completing the exercises. Results show that students that opted for the gamified approach had better exam grades and reported higher engagement in the course. Well-known online learning services, like Khan Academy (www.khanacademy.org) and Codecademy

(www.codecademy.com), allow students to learn by reading and watching videos online, and then performing exercises. Student progress is usually tracked using visual elements, including energy points and badges. The didactical possibilities that gamification unveils are manifold, and their use in MOOCs to stimulate a participative culture have also been explored (Grünwald et al., 2013).

In a previous work we described a long-term study where a college course, Multimedia Content Production (MCP), was gamified (Barata et al., 2013). The experiment was held on two consecutive academic years, a non-gamified and a gamified one, to evaluate how gamification affected the students' learning experience. By carefully comparing empirical data garnered during both years, we observed significant improvements in terms of student participation, lecture attendance and amount of lecture slides downloads. Furthermore, students reported that they perceived the course as being more motivating and interesting than other "regular" courses. In this paper we describe a new study, where we analyzed the students' progression over time and identified three distinct student types, each of which seemingly experienced the gamified course differently. We will present a thorough analysis of each type, regarding many aspects of their learning experience, which reveal different strategies and levels of performance, diligence and engagement to the course. We will further discuss the lessons learned from this experiment and derive relevant design implications to future gamified learning experiences.

THE GAMIFIED MCP COURSE

MCP is an annual semester-long MSc gamified course in Information Systems and Computer Engineering at Instituto Superior Técnico, the engineering school of the University of Lisbon. The course runs simultaneously on two campuses, Alameda and Taguspark, in a completely synchronized fashion, using a shared Moodle

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