Gamification as an Approach to Designing Adaptive and Motivating Learning Environments in Higher Education

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Abstract

Motivation to acquire knowledge and develop skills is considered one of the key predictors of successful educational outcome (Malone, 1981,1987; Linehan, Kirman, Lawson & Chan, 2011). In many studies, game-based pedagogy has been used to increase students' motivation in learning (Whitehall & McDonald, 1993; Ricci, Salas, & Cannon-Bowers, 1996; Hense & Mandl, 2012), and it has potential to influence learning and teaching positively (Nousiainen, Vesisenaho & Eskelinen,2015). Proper integration of gamification can advance the efficiency, effectiveness, motivation and engagement of students in e-learning also in higher education (Urh, Vukovic, Jereb & Pintar, 2015). However, it is important to pay attention to game design and objectives as well as remember that not everything that "is called a game, or looks like a game, will have those motivating qualities" (Linehan et al., 2011, p. 1981). More empirical evidence from specific e-learning contexts is needed to confirm some of the theoretical underpinnings and assumptions.

We conducted a pilot study in higher education, measuring self-study activities with an e-learning tool with 200 students in two subjects (Chemistry and Chemical Engineering). The results indicated that students do not follow a clear or constant path throughout their learning process: they concentrate their biggest efforts at the very end of their learning phase, always correlating with the proximity of the final exams. While this worked for some students, we found that all students who practiced with the tool regularly throughout the whole learning process always got good results in their final exam, indicating that this strategy is beneficial for almost any kind of student. A more detailed analysis revealed that a great amount of time invested in studying is only important if the activities are done with interest and focusing on the task. This is important in order to prepare activities or strategies for increasing students' motivation: activities that increase attention or activities with a higher possibility of interaction will be more adequate than those that only require a passive attitude.

Earlier research suggests that there is a need for understanding students' preferences and triggering their motivation. We assume that appropriate game elements have potential to not only increase students' engagement, but also improve their learning outcomes. As a preliminary solution, we suggest to provide the students with two gamified options, in line with previous research on player type models and preferences (e.g., Bartle, 1996; Lassaro, 2004; Yee, 2006, Stewart, 2011). The first one will include a limited number of specific game elements selected by educational designers, offering the students a possibility to practise their knowledge and skills. The second option will provide students with an opportunity to modify their own learning path by selecting additional game elements by themselves. The selected game elements will be built on the components of the theory of player motivation (Yee, 2006,2015,2016): achievement (advancement, mechanics,

competition), social (socializing, relationship, teamwork), and immersion (discovery, role playing, customization, escapism). The overall number of game elements will be selected accordingly and address each component. We will apply this approach in our next pilot cycle.