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Sara Catalán Gil

Engaging users through gamification. The role of emotions, motivation, and flow

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Tesis Doctoral

ENGAGING USERS THROUGH GAMIFICATION. THE ROLE OF EMOTIONS, MOTIVATION, AND FLOW

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DOCTORAL DISSERTATION

ENGAGING USERS THROUGH GAMIFICATION. THE ROLE OF EMOTIONS, MOTIVATION, AND FLOW.

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A mis padres, Enrique y Mª Dolores,
por su apoyo incondicional

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“Games are the most elevated form of investigation”

Albert Einstein

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INTRODUCTION

Over the last few years, gamification has gained momentum as an innovative and promising tool that can be applied within a variety of contexts to motivate people to act in a certain way (Ritcher et al., 2015; Sailer et al., 2017). Despite there is no universally accepted definition of gamification, the central idea behind it is to harness the motivational power of games by applying game design elements (e.g., points, rules, challenge, badges, competition, voluntary play, uncertain outcomes, etc.) into non-game contexts (Deterding et al., 2011; Seaborn & Fels, 2015). If players are deeply attracted by games because games are engaging and motivating, then, by inducing game-like motivation in non-game contexts, it might be possible that people get the same levels of motivation and engagement. As Deterding et al. (2011) argued, "*game elements should be able to make other, non-game products and services more enjoyable and engaging*" (p. 10). This is exactly what gamification attempts to accomplish.

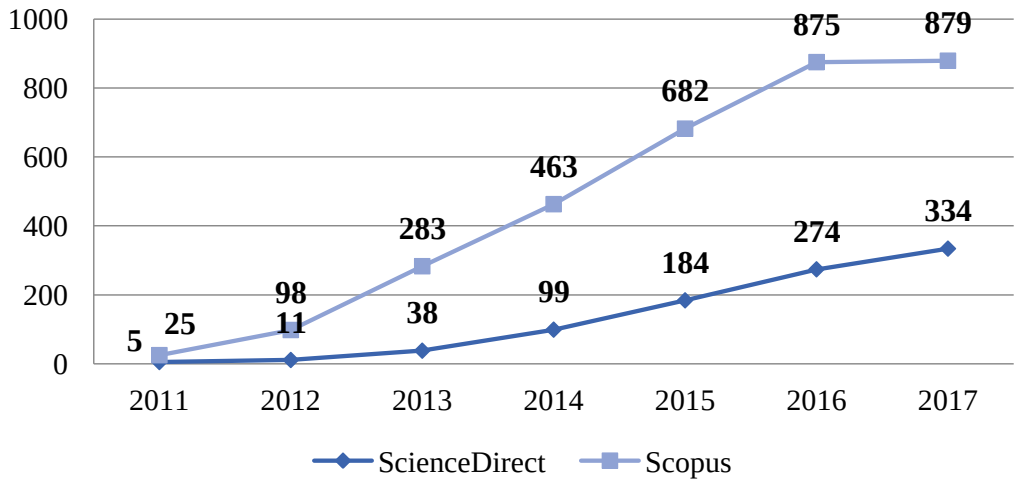
Besides increasing motivation and engagement, gamification offers other important benefits, such as raising brand awareness, enhancing individuals' experiences, and improving customer loyalty (Xu et al., 2017). Similarly, gamification is an effective approach for enhancing the retail experience (Insley & Nunan, 2014), and increasing user activity (Hamari, 2013) and participation (Morschheuser et al., 2016). Likewise, gamification has been related to learning (Hamari et al., 2016; Kolb & Kolb, 2010). In a recent update of Connolly et al.'s (2012) systematic literature review on the use and effects of serious games, Boyle et al. (2016) confirm that playing games is linked to perceptual, cognitive, behavioural, affective and motivational outcomes, such as knowledge acquisition or content understanding. Finally, gamification is also associated with positive outcomes in the work domain, such as leadership development (Kark, 2011) and employee management (Xu et al., 2017).

Several reasons are suggested for the increased attention to gamification (Robson et al., 2015). First, due to the rapid growth of the computer game industry, both designers and scholars have tried to identify which factors influence the success and engagement of computers games. Digital games have become popular because of their entertainment value. People are posited to be more engaged and more

productive when playing games (Buckley & Doyle, 2016; Kim, 2012). Thus, the gains made by the gaming medium have motivated its adoption for pursuits beyond entertainment (Seaborn & Fels, 2015). The main differentiation between games and gamification resides, however, in the purpose of play. Gamification is more about motivating people to take actions, whereas games are more about fun and entertainment (Deterding et al., 2011). Second, the advent of social media and mobile and web-based technologies has changed how individuals and companies interact. Nowadays, organisations are able to generate great amounts of data about individuals, which are useful for producing gamified experiences at scale (Robson et al., 2015). Finally, companies are looking for newer and more effective ways to influence the behaviours of both customers and employees (Robson et al., 2015). In this context, gamification offers an opportunity to connect with them and impact their behaviour.

The importance of this phenomenon is reflected in both the business world and academia. Gamification has gained the interest of practitioners and more and more companies are implementing it. Consequently, the gamification market is expected to grow from $1.65 billion in 2015 to over $11 billion in 2020 (Statista, 2018), and $22.9 billion in 2022 (P&S Market Research, 2017). Gamification has also become a popular topic among academics (Huotari & Hamari, 2017). The interest in gamification is reflected in the increasingly number of appearances of the word “gamification” in titles, keywords, and abstracts of papers indexed in ScienceDirect and Scopus (Figure 1).

Figure 1: Evolution of the publications on gamification



Source: ScienceDirect and Scopus

A literature review on gamification conducted by Hamari et al. (2014) concluded that gamification has great advantages, but its effect is dependent on the context in which it is applied. Werbach and Hunter (2012) proposed to categorise gamification into internal, external, and behaviour change, depending on the non-game context in which it is implemented. Internal gamification takes place in the bosom of a company and is directed to employees, whereas external gamification is directed to companies' customers (Werbach & Hunter, 2012). Overall, the potential of gamification for business is of great importance (Xu et al., 2017). Generally, more motivated and engaged customers are expected to purchase more, whereas more motivated and engaged workers are expected to perform better (Werbach & Hunter, 2012). Finally, behaviour-change gamification is aimed at producing desirable outcomes among a population, such as encouraging people to eat healthier, work out more, engage in learning, or improving their personal finances management (Werbach & Hunter, 2012).

Gamification has also generated increased attention from a variety of domains, including work, healthcare, social networks and online communities (Buckley & Doyle, 2016; Hamari & Koivisto, 2015; Jones et al., 2014; Oprescu et al., 2014; Seaborn & Fels, 2015; Xu et al., 2017). Among all of them, two stand out. These are education (Domínguez et al., 2013; de Marcos et al., 2014) and marketing

(Bittner & Schipper, 2014; Hamari, 2013, 2017; Terlutter & Capella, 2013; Xu et al., 2017).

Education has been pointed out as one of the most promising areas to apply gamification (Lee & Hammer, 2011; McGonigal, 2011). Educators want students to be intrinsically motivated to learn (Deci & Ryan, 2000). However, students' engagement and motivation are declining nowadays (Buckley et al., 2017). In response, educators are implementing gamification to retain students' attention. Given the potential to motivate, and increase enjoyment and engagement, gamification can help motivating individuals to learn in new ways and engage with materials (Hanus & Fox, 2015). In addition, games allow players to restart when making mistakes. This freedom to fail allows students to experiment without fear, increasing their engagement (Hanus & Fox, 2015; Lee & Hammer, 2011). Moreover, as most students have grown up in an age of interactive media and video games, classroom gamification may be appealing and motivating to them (Glover, 2013).

Education has largely employed games in the classroom (Kapp, 2012), but only recently have instructors begun exploring the idea of making the class itself a game (Hanus & Fox, 2015). An example of a gamified activity within the classroom that has recently gained the attention of academics and educators are clicker competitions. Clickers are small devices that transmit and record student responses to questions presented in the classroom. By using clickers, instructors are provided with a tool to transform the class into a friendly competition that motivates students to answer to the questions and pay attention in class while enjoying it. Business simulation games are another example of gamification in learning. Serious games, such as business simulation games, are special cases of gamification (Werbach & Hunter, 2012) that use game design in non-game contexts by assembling game elements into full-blown games. Business simulation games are important motivational and learning tools that enable instructors to provide a bridge between theory and practice via active engagement (Loon et al., 2015). Their potential has been largely analysed and numerous benefits in relation to their use have been

found, such as enhancing the learning of work-related knowledge and skills (e.g., Sitzmann, 2011; Vogel et al., 2006).

The second area in which gamification is predicted to have great impact is marketing (Hofacker et al., 2016; Xu et al., 2015). In fact, Seaborn and Fels (2015) consider that the concept of gamification has its "*roots in marketing endeavours*" (p. 16), such as loyalty cards or stamp books, in which customers collect points to exchange for gifts or discounts. Accordingly, key gamification mechanics are related to relevant marketing concepts, such as customer engagement, brand loyalty, and brand awareness (Lucassen & Jansen, 2014). Specifically, advertising is a promising area to apply gamification (Yang et al., 2017). Traditional media is saturated with advertising messages, so advertisers look for new advertising formats (Küster & Castillo, 2012). Therefore, by adding motivation incentives that increase the enjoyment of consumers, gamification can make advertising more interesting (Bittner & Schipper, 2014). In the last few years, gaming apps, known as "*advergames*", have been created with the specific purpose of promoting a brand or product (Winkler & Buckner, 2006). By embedding brand-specific information into features central to the game play, advergames make the game itself the brand message (Kinard & Hartman, 2013). Marketers have acknowledged the potential benefits of advergames for marketing (Lee & Cho, 2017), such as creating entertaining experiences to engage young adults (Cicchirillo & Mabry, 2016) and capturing consumers' attention, building brand awareness, or persuading the consumer to form a positive attitude toward the brand or product promoted (Terlutter & Capella, 2013).

There is no doubt that gamification has potential to influence behaviour (Buckley & Doyle, 2016). As seen before, gamification is a form of motivational design and an instrument to get people interested in behaving in a particular way (Werbach & Hunter, 2012). Therefore, understanding players' motivation is crucial to building a successfully gamified activity, as motivation drives the outcome of gamification (Zichermann & Cunningham, 2011). In this context, several theories provide foundations for the effects of gamification, such as flow theory, control-value theory of achievement emotions, and self-determination theory.

One of the most popular constructs used to describe players' motivation is the concept of flow (Procci et al., 2012), which refers to a state of total involvement in an activity that is perceived as intrinsically enjoyable (Csikszentmihalyi, 1975). Flow theory has its roots in Csikszentmihalyi's attempt to understand enjoyment experienced by people performing activities that provided no apparent external reward, but were extremely fulfilling and rewarding. Those activities were characterised to be intrinsically motivating, and the optimal experience derived from performing them was labeled "*flow*" (Csikszentmihalyi, 1975). Games are unquestionable flow activities and play is "*the flow experience par excellence*" (Csikszentmihalyi, 1975; p. 36-37).

Besides inducing players in a state of flow, games are also known to cause powerful emotional responses, such as enjoyment, curiosity, or frustration (Küster & Castillo, 2012; McGonigal, 2011). People play games for the experience they create (Lazzaro, 2009) and different mental affective states, reactions, and emotions are evoked among individuals when they participate in a gamified activity (Robson et al., 2015). In particular, creating player enjoyment is an important goal within gamification (Robson et al., 2015). This is especially relevant in academic contexts, where boredom and apathy have been identified as the main causes of disengagement (Shernof et al., 2014) and, therefore, gamification has huge potential to motivate individuals. In this regard, the control-value theory of achievement emotions (Pekrun et al., 2002; Pekrun, 2006) provides an integrative framework for understanding emotions in education. In this particular field, emotions have been often neglected because people believed that they were opposite to rational thinking (Dirkx, 2008). However, gamifying learning experiences is directed toward achieving learning outcomes. Thus, understanding emotions that arise in gamified contexts is of main importance.

Finally, the motivational theory par excellence, the self-determination theory (Deci, 1975), has largely studied the perceived forces that move a person to act (Ryan & Deci, 2000), even in gaming contexts (Ryan et al., 2006). Self-determination theory proposes that motivation resides along a continuum of self-determination, ranging from intrinsic motivation through extrinsic motivation to

amotivation (Ryan & Deci, 2000). Intrinsic motivation refers to people engaging in an activity because they find it interesting, enjoyable, or fun (Deci & Ryan, 2015), such as the case of flow activities. By contrast, extrinsically motivated behaviours are those performed with the intention of attaining some separable outcome (Deci et al., 1996). Gamification impacts both intrinsic and extrinsic motivation of players. On the one hand, game elements are intrinsically motivating (McGonigal, 2011). Thus, individuals tend to engage in gamified activities as they find them interesting and playful (Kim & Ahn, 2017). On the other hand, gamified activities also provide external rewards such as points, badges, or status in exchange for engagement in particular activities (Hanus & Fox, 2015; Seaborn & Fels, 2015).

Despite the widespread interest in gamification, prior research has several limitations. First, as explained above, flow theory, control-value theory of achievement emotions, and self-determination theory provide useful and interesting frameworks through which to analyse gamification. However, despite the suitability and potential of these theories, previous studies have pointed out a lack of theoretical foundation to explain the motivational effects of gamification (Hamari et al., 2014; Sailer et al., 2017; Seaborn & Fels, 2015). Additionally, there is a scant conceptual understanding of gamification (Hamari et al., 2015). Therefore, to address these shortcomings, scholars have pointed out the need for research on the underlying psychological mechanisms that may account for the effects of gamification (Deterding, 2015). In particular, recent literature reviews (e.g., Chien et al., 2016; Hunsu et al., 2016) have highlighted the lack of theoretical discussions that explain how gamified activities, such as those based on the use of clickers, may help learning. Similarly, few studies have provided theoretical frameworks based on motivational theories, such as flow theory, to explain how business simulation games impact learning and achievement (for an exception, see Kiili et al., 2014). Likewise, in advertising settings, there is also a shortage of studies examining the persuasive power of advergames under the lenses of motivational theories.

Second, empirical evidence on the effectiveness of gamification is still scarce (Hamari et al., 2015; Seaborn & Fels, 2015). Gamification is a research field with multidisciplinary attention (Xu et al., 2017), but the discussion around this topic is

divergent (Hamari, 2017). For instance, in education settings, despite the growing number of studies that empirically explore the effects of gamified activities, such as clicker competitions, on learning outcomes (e.g., Blasco-Arcas et al., 2013; Castillo-Manzano et al., 2016; Ludvigsen et al., 2015; McDonough & Foote, 2015; Stowell, 2015; Sun, 2014), findings are largely mixed and inconclusive (Hunsu et al., 2016). In addition, the effectiveness of different gamification elements has not been sufficiently tested (Hanus & Fox, 2015). As noted by Hou and Li (2014), there is a lack of research that empirically investigates game design elements (e.g., goals, feedback, challenges) and the gaming experience in learning contexts. Moreover, in the marketing context, academia has also largely ignored the intersection of marketing and gamification (Lucassen & Jansen, 2014). Few academic papers have discussed the use of gamification for marketing (Xu et al., 2017), specially for the purpose of advertising (Terlutter & Capella, 2013). In particular, mobile gaming platforms are an especially underresearched area in the advergaming field (Terlutter & Capella, 2013), so there have been calls for more investigation examining the effectiveness of advergames within mobile phone apps (Kinard & Hartman, 2013).

Taking into account the attractiveness of gamification and the gaps identified in current gamification literature, this doctoral dissertation draws on different theoretical frameworks—namely flow theory, control-value theory of achievement emotions, and self-determination theory—to understand how gamification impacts behaviour, as well as to provide empirical support for this impact.

This overall aim can be divided into the following research objectives:

1. To examine the effectiveness of gamified activities—in particular, a clicker competition—, based on flow theory and control-value theory of achievement emotions. More specifically, this doctoral dissertation investigates which variables affect players' flow experience while using clickers, and how flow impacts on learning. In addition, it explores the factors that influence players' emotions and evaluates the effect of these emotions on their motivation and learning.

2. To explore the effects of business simulation games based on flow theory and self-determination theory. In particular, this doctoral dissertation investigates the drivers of players' flow experience when using business simulation games and the relationship between flow and students' skills acquisition and learning. It also examines which factors promote the intrinsic motivation of players and explores the impact of intrinsic motivation on players' engagement, skills acquisition and learning.

3. To evaluate the effectiveness of advergames to promote a brand based on players' flow experience while playing the advergame. More specifically, this doctoral dissertation analyses variables affecting players' flow while playing the advergame and its influence on brand-related outcomes.

To achieve these research objectives, the doctoral dissertation is structured as follows.

Chapter I provides a background to understand the concept of gamification. In particular, different conceptualisations of gamification are reviewed. The main components of a gamified activity and a classification of gamification based on the contexts in which it can be implemented are also presented. Finally, theoretical frameworks through which to understand the motivational and engaging nature of gamification and its impact on individuals are provided. In particular, the flow theory, the control-value theory of achievement emotions, and the self-determination theory are explained. These theories are the basis for the following chapters, which correspond to the five empirical studies developed in this thesis.

Chapter II and Chapter III correspond to the first two empirical studies. These studies analyse the effects of implementing a gamified activity (namely a clicker competition) within a Marketing course. In particular, Chapter II investigates the influence of three flow preconditions—balance of skill and challenge, feedback, and goal clarity—on students' flow, operationalised as heightened concentration, sense of control, and autotelic experience, while using clickers. The study also explores the impact of concentration, sense of control, and autotelic experience on students' perceived learning and satisfaction. Chapter III draws on the control-value

theory of achievement emotions to explain how the use of clickers can enhance students' motivation, learning, and satisfaction. More specifically, this study investigates the antecedents (i.e., feedback, control, self-efficacy, and value) and consequences (i.e., intrinsic motivation, extrinsic motivation, perceived learning, and satisfaction) of students' emotions while playing clickers.

Chapter IV and Chapter V analyse the effects of playing a business simulation game. Chapter IV explores the role of flow experienced while playing business simulation games. Specifically, this research investigates the relationship between challenge, skills, feedback, goal clarity and students' flow experience. It also explores the relationship between flow and generic skills development, perceived learning, and satisfaction. Chapter V investigates which factors promote the intrinsic motivation of players. More precisely, based on self-determination theory, this study analyses the satisfaction of the needs for competence, autonomy, and relatedness, and its influence on players' intrinsic motivation, which in turn facilitates engagement. This study also explores the impact of intrinsic motivation and engagement on the development of generic skills and perceived learning.

Chapter VI corresponds to the last empirical study carried out in this doctoral dissertation. It deals with mobile advergames (mobile gaming apps designed to promote a brand or a product). Based on flow theory, this study seeks to explain why the use of mobile advergames can enhance players' brand perceptions and purchase intentions, as well as the factors that affect players' flow experience.

Finally, this doctoral dissertation outlines the main conclusions, implications and limitations, which suggest directions for further research.

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CHAPTER I

GAMIFICATION – A BACKGROUND

The purpose of this chapter is to provide a background to understand the concept of gamification. We begin by reviewing definitions of gamification. Then, we analyse its main components and the contexts in which it can be implemented. Finally, we provide theoretical frameworks through which to understand the motivational and engaging nature of gamification and its impact on individuals.

1.1. DEFINING GAMIFICATION

1.1.1. Definition

Gamification has arisen as a new trend within a variety of domains (Seaborn & Fels, 2015) and has become a prominent vein of research during the last few years (Hamari & Parvinen, 2018). However, the term gamification could be misleading (Robson et al., 2015). In fact, despite the increasing number of gamified applications, there is no agreed upon standard definition of gamification (Sailer et al., 2017; Seaborn & Fels, 2015).

The term gamification has been the focus of increased attention since the beginning of the 2010s, when Deterding et al. (2011) defined gamification in their seminal paper as "*the use of game design elements in non-game contexts*" (p. 9). This definition has two implications. First of all, according to these authors, gamification relates to games, not to play. This distinction between games and play has its origin in Caillois' concept of *paidia* and *ludus* as opposite poles of playing activities (Callois, 2001). *Paidia* (playing) refers to freeform, improvisational recombination of behaviours and meaning, whereas *ludus* (gaming) refers to structured forms of playing, guided by rules and goals. Games are characterised by explicit rule systems, structure, voluntary play, uncertain outcomes, conflict, representation, resolution, etc. (Juul, 2003; Salen & Zimmerman, 2004; Seaborn & Fels, 2015). Accordingly, gamification is related to the rule based, goal-oriented nature of games (Deterding et al., 2011). Secondly, gamification is the use of game design elements in non-game contexts. Thus, according to Deterding et al. (2011), it should be distinguished from fully-developed games serving a specific, non-entertainment purpose. However, as the authors themselves

indicate, it is difficult to establish the limit between a game and an artefact with game elements, and this distinction is personal and subjective (Deterding et al., 2011).

Similar definitions have been provided later. For instance, Werbach and Hunter (2012; p. 26) defined gamification as "*the use of game elements and game-design techniques in non-game contexts*". More recently, Seaborn and Fels (2015; p. 17) posited that gamification is related to "*the intentional use of game elements for a gameful experience of non-game tasks and contexts*", whereas Sailer et al. (2017; p. 372) proposed that gamification is "*the process of making activities in non-game contexts more game-like by using game design elements*".

Other researchers and consultants have described gamification practically and in terms of users' benefits. For example, Zichermann and Cunningham (2011; p. 14) defined gamification as "*the process of game thinking and game mechanics to engage users and solve problems*". Similarly, Gartner (2012; p. 1) suggested that gamification is "*the use of game mechanics and game design techniques in nongame contexts to design behaviours, develop skills or to engage people in innovation*", whereas Robson et al. (2015; p. 2) argued that gamification is "*the application of lessons from the gaming domain to change behaviours in non-game situations*".

Drawing on service marketing theory, Huotari and Hamari (2011) initially defined gamification from a service marketing perspective as "*a form of service packaging where a core service is enhanced by a rules-based service system that provides feedback and interaction mechanisms to the user with an aim to facilitate and support the users' overall value creation*" (Huotari & Hamari, 2011; p. 13). Then, focusing on the goal of gamification, these authors provided an alternative definition of gamification as "*a process of enhancing a service with affordances for gameful experiences in order to support user's overall value creation*" (Huotari & Hamari, 2017; p. 25).

In a broader sense, the term "gamification" (and its derivatives "gamified", "gamify", or "gamifiable") has also been used to refer to the development or use of a game in a non-game context, as well as the transformation of an existing system into a game (Seaborn & Fels, 2015). For instance, in the context of education, as Seaborn and

Fels (2015) note, the term gamification has been commonly used to refer to digital game-based learning (DGBL) and serious games, that is, games used for a different purpose rather than entertainment, such as learning and behaviour change (Bogost, 2007; Kapp, 2012). In this line, Kapp (2012) defined gamification as the use of "*game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems*" (p. 10) and proposed that serious games are a subset of gamification. Similarly, Werbach and Hunter (2012) stated that serious games are *"special cases of gamification*" (p. 33); more precisely, serious games are examples of using game design in non-game contexts by introducing game elements into full-blown games. Finally, Ritcher et al. (2015) noted that gamification and serious games can be distinct terms, but they are also used interchangeably as they are very similar. In fact, both try to harness the motivational power of games to achieve something beyond entertainment.

In this doctoral dissertation we adopt a wide view of the concept of gamification which includes any game-based design developed in a non-game context that has been created for a purpose different that mere entertainment.

1.1.2. Game elements

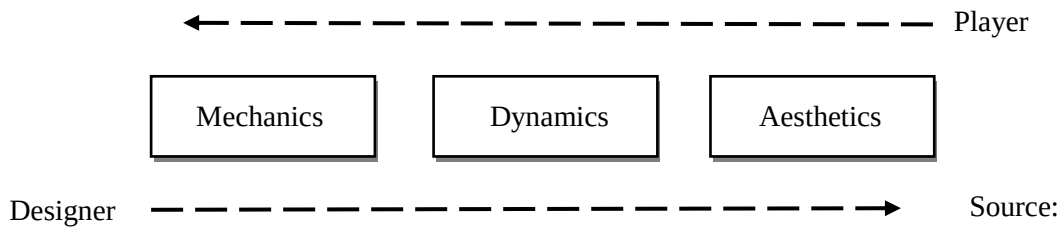
As can be seen in most of the definitions of gamification reviewed in the previous section, one of the main characteristics of gamification is that it uses game elements. Game elements can be defined as "*the pieces that a game designer assembles in creating an engaging experience*" (Werbach & Hunter, 2012; p. 131).

In the context of games and gamification, different authors have proposed various game design elements (e.g., Kapp, 2012; Werbach & Hunter, 2012; Zichermann & Cunningham, 2011). For instance, Reeves and Read (2009) proposed "Ten Ingredients of Great Games", which included self-representations with avatars, three-dimensional environments, narrative context, feedback, reputations, ranks and levels, marketplaces and economies, competition under rules that are explicit and enforced, teams, parallel communication system that can be easily reconfigured, and time pressure. Other authors confirmed achievements, avatars, badges, leaderboards, levels, points, team working, and virtual goods as common game elements (Robertson, 2010;

Xu et al., 2014). Deterding et al. (2011) proposed five different levels of game design elements: game interface design patterns, such as badges, leaderboards, and levels; game design patterns and mechanics, such as time constraints, limited resources, and turns; game design principles and heuristics, such as clear goals; game models, such as challenge, curiosity, fantasy; and game design methods, such as playtesting and playcentric design. Sailer et al. (2017) identified points, badges, leaderboards, performance graphs, meaningful stories, avatars, and teammates as important game elements. Overall, despite parallel between classifications and lists of game elements, they are largely different, which reveals that the decision on which blocks should be identified as characteristic game design elements is somewhat arbitrary and subjective (Sailer et al., 2017).

One of the most common frameworks to analyse game elements is referred to as the MDA framework (Mechanics-Dynamics-Aesthetics) (Hunicke et al., 2004). Hunicke et al. (2004) proposed the MDA framework to bridge the gap between game design and game research. *Mechanics* describe the functioning components of a game, including achievements, collections, badges, etc.; *dynamics* refer to the player's interaction with those mechanics, such as progression to the next level, teamwork or competitions with other players, freedom of making choices, etc.; and *aesthetics* describe the emotional responses evoked in the player when interacting with the game, such as feelings (fantasy, sensation), emotions, and fun. As shown in figure 1.1, from players' point of view, players experience game play from aesthetics, which is influenced by game dynamics, which is guided by game mechanics. On the contrary, from the game designer's point of view, through a set of game mechanics, game designers create the game dynamics, which in turn generate game experiences (aesthetics) for players.

Figure 1.1: MDA framework



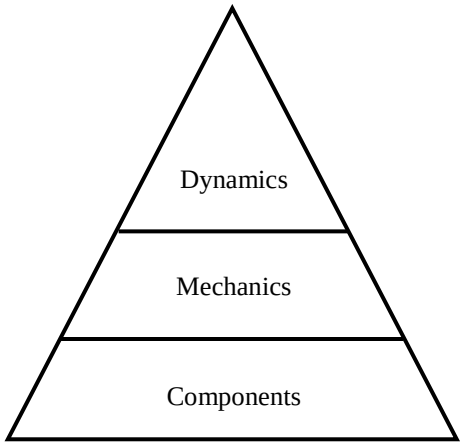
Source: Hunicke et al. (2004)

The original MDA framework was conceived for video games development. In their seminal work, Zichermann and Cunningham (2011) applied the MDA framework to gamification design. They identified points, levels, leaderboards, badges, onboarding, challenges, and social engagement loops as the main mechanics. Similarly, based on the MDA framework, Robson et al. (2015) proposed the MDE framework (Mechanics-Dynamics-Emotions) to analyse gamification for business. Due to the fact that 'aesthetics' in game design described emotional responses that were largely computer game-specific, Robson et al. (2015) stated that it is better to use the term 'emotions' as it better links to the engagement outcomes that business can attain.

Werbach and Hunter (2012) examined different implementations of gamification, finding that the vast majority of them had three elements in common: points, badges, and leaderboards. The so called "PBL triad" was established as a starting point for building gamification. However, it was not sufficient. Therefore, Werbach and Hunter (2012) proposed a hierarchical taxonomy of game elements which included game components, game mechanics and game dynamics, in decreasing level of abstraction (figure 1.2). *Dynamics* are the most abstract game elements and correspond to the conceptual structures underlying a game. Examples of game dynamics are progression, social interactions, constraints, narrative, and emotions. *Mechanics* are the basic processes that drive the action forward and generate player engagement. Each mechanic is a way of achieving one or more dynamics. Examples of mechanics are challenges, chance, competition, cooperation, feedback, resource acquisition, rewards, transactions, turns, win states. Finally, *components* are more-specific forms that mechanics and dynamics can take. Examples of game components are achievements,

avatars, badges, collections, gifting, leaderboards, levels, points, quests, teams, or virtual goods, among others.

Figure 1.2: The game element hierarchy



Source: Werbach & Hunter (2012)

1.1.3. Gamified contexts and applications

Besides the use of game elements, the other characteristic that most of the definitions of gamification have in common is that gamification operates in non-game contexts. This does not specify the possible areas in which gamification can be applied, which leaves the definition open for potential usage scenarios (Sailer et al., 2017). According to Werbach and Hunter (2012), three non-game contexts are particularly relevant for the application of gamification: internal, external, and behaviour change.

Internal gamification refers to those gamified actions performed in the bosom of a company to achieve positive business results through its own employees, such as improving productivity, fostering innovation, or enhancing camaraderie (Werbach & Hunter, 2012). As part of a defined community (i.e., the company), players interact with each other on a regular basis. In this scenario, the motivational dynamics of internal gamification coexist with the company's existing reward structures (Werbach & Hunter, 2012).

A successful case of internal gamification is the Language Quality Game designed by Microsoft. Before launching Windows 7, Microsoft had to test its software to detect possible errors. Taking into account all the languages in which Microsoft Windows was going to be brought into market, revising all the software seemed a monumental task. In fact, automated systems were not sufficient for the task, and the only way to ensure the quality of Windows 7 was that every feature, dialog box, or usage case were reviewed by people. Even for a company such as Microsoft, it was not easy to find enough people prepared to test products like Windows 7. What is more, it was difficult to find people to test it correctly in all the existing languages. The solution to that problem was the Language Quality Game, which created a competitive dynamic to encourage employees around the world to review Windows 7 in their spare time. Every office was awarded points for each error found, and ranked on a public leaderboard. As a result of this competition, around 4,500 participants reviewed over half a million Windows 7 dialog boxes and reported 6,700 errors (Werbach & Hunter, 2012). Microsoft achieved not only that employees revised Windows 7 above and beyond their work responsibilities, but that they also described the process as enjoyable and even addicting.

External gamification is directed to companies' customers and is generally driven by marketing objectives. In this context, gamification is used as a tool to improve the relationship between business and customers, producing increased engagement, loyalty, and ultimately higher revenues (Werbach & Hunter, 2012).

An example of external gamification is the case of BBVA Game. BBVA has been a pioneer in gamifying the financial sector in Spain. They realised that their customers were underusing the online banking services because they were not aware of all the possibilities and transactions that the online platform offered (e.g., money transfers, taxes payment, etc.). To encourage customers to make online transactions, they created the BBVA Game to guide them among different challenges. Some of these challenges were simply making an online operation in the web, whereas others were watching videos with explanations on how to use the online banking services and to respond tests to ensure they had learnt the functioning. Players who participated in the game were accumulating points on each task performed. At the end, they could

exchange the points for gifts or raffles. BBVA not only achieved that more customers started to use the online banking services (more than 100,000 users in the first nine months), but they were also more informed about all the possibilities the platform gave them (Omnium Games, 2013).

Finally, *behaviour-change gamification* strives for creating beneficial habits among a population that produce desirable societal outcomes, such as encouraging people to eat healthier, work out more, and reduce energy consumption; designing gamified learning experiences to make students learn while enjoying it; or creating programs to help people with their personal finances (Werbach & Hunter, 2012). People know they should eat better, exercise more, use less energy, attend during classes, and so forth. However, they might not be sufficiently motivated to do so.

An example of success in behaviour-change gamification is the case of The Fun Theory (www.thefuntheory.com), an initiative promoted by the Swedish Government to change people's behaviour for the better. This initiative was composed by different gamified activities. The first one was called 'The World's Deepest Bin'. Although people know they have to throw rubbish in the bin instead of onto the floor, many people still fail to do so. The World's Deepest Bin consisted of installing a bin in a park, looking like the rest of the bins, but with the difference that when park visitors dropped a piece of trash in it, they heard the sound of an object falling for a very, very long distance. Videos recording the bin showed people ranging around the park grounds, looking for trash to drop into the can. The second gamified activity was named the 'Piano Staircase'. Although people know that using the stairs is good exercise, most people prefer the comfort on an escalator. The Piano Staircase consisted of turning a Stockholm's subway staircase into a huge electronic piano, with each step of the stair corresponding to a key of the piano that made audible sounds. As a result, 66% more people took the stairs, feeling like Tom Hanks in 'Big'. The Fun Theory also created the 'Speed Camera Lottery'. Although people know they have to obey the speed limit, many people do not do it. Volkswagen in collaboration with The Swedish National Society for Road Safety, installed a speed camera and designed a lottery award for drivers who did not speed, with a prize-pool from those who did. As a result, the average speed in the city centre was reduced considerably. Finally, The Fun Theory

designed the ‘Bottle Bank Arcade Machine’ to encourage people to recycle glass by transforming the bottle bank into an Arcade machine that gave people points depending on the amount of glass thrown. While the conventional bottle bank was used twice for a certain period, the gamified bottle bank was used by nearly one hundred people for the same period of time.

In addition to these general contexts—internal, external and behaviour change—gamification has been analysed within a variety of fields, including work (Cardadaor et al., 2017; Oprescu et al., 2014), sports (Lister et al., 2014), tourism (Sigala, 2015; Xu et al., 2017), healthcare (Hamari & Koivisto, 2015; Jones et al., 2014), online communities (Bista et al., 2014), and crowsourcing (Eickhoff et al., 2012), among others. In particular, two specific domains have been posited as promising areas to apply gamification. These are education (Domínguez et al., 2013; de Marcos et al., 2014) and marketing (Bittner & Schipper, 2014; Hamari, 2013, 2017; Terlutter & Capella, 2013).

The first area in which gamification has huge potential is education (Lee & Hammer, 2011; McGonigal, 2011). Although the wish of educators is that students are intrinsically motivated to learn (Deci & Ryan, 2000), the reality nowadays is that both students’ disengagement and motivation have declined (Buckley et al., 2017). In fact, students’ disengagement and lack of attention during lecture classes have been identified as major problems among students (Hamari et al., 2016; Lantz & Stawiski, 2014). An encouraging strategy to solve these problems comes from videogames and gamification (Connolly et al., 2012). While students are unlikely to find motivation in lecture classes, they experience it almost constantly in game-based contexts (McGonigal, 2011). Thus, given the potential to motivate and increase enjoyment and engagement, gamification can help motivating individuals to learn in new ways and engage with materials (Hanus & Fox, 2015).

Gamified activities based on the use of clickers are a common practice nowadays. Clickers, also referred to as Audience Response System, Student Response System, Classroom Communication System, Clicker Assessment and Feedback, or Audience Response Technology (Han & Finkelstein, 2013), integrate a “game

approach" (Martyn, 2007) into traditional lecture classes by incorporating different game elements such as goals, rules, competitions, timing, points, or feedback (Kapp, 2012). Clickers are small, portable devices that transmit and record student responses to questions presented in the classroom. When the instructor asks a question, students can click buttons on their clickers to answer it. A receiver connected to a computer collects and summarises students' responses. The results are automatically presented to the class in visual format, usually via a histogram. Due to the real-time feedback provided by this technology, students can assess their level of understanding of the material being taught (Sun, 2014), while instructors are provided with an opportunity to manage classroom discussion about the concepts being covered (Kay & LeSage, 2009). Although responses are anonymous to peers, the teacher can associate the clicker unit ID with specific students. Thus, clickers can also be used for evaluation or recording students' attendance.

Previous studies have revealed that the use of clickers is associated with different positive outcomes (Kay & LeSage, 2009). Using clicker-based technologies facilitates students' active collaborative learning, and encourages interaction and engagement (Blasco-Arcas et al., 2013; Simpson & Oliver, 2007). Clickers also positively influence students' experiences in the classroom (Han & Finkelstein, 2013; Simpson & Oliver, 2007), enhance classroom attendance and attention (Keough, 2012), facilitate anonymity and participation (Carnaghan et al., 2011), and increase students' motivation and satisfaction (Marshall et al., 2012). In comparison to other techniques, the use of clickers has also been found to increase students' enjoyment (Stowel & Nelson, 2007; see Kay & LeSage, 2009, and Rana et al., 2016 for a more detailed analysis of the benefits of using clickers). Despite their numerous benefits, there are also some challenges regarding the use of clickers in class. Clickers can be stressful for students due to technological issues, such as when remote devices do not function properly, and the greater cognitive energy required from students (Kay & LeSage, 2009). In addition, some teachers are reluctant to integrate clickers into the learning process because of their high cost in terms of time and effort (e.g., writing good questions and responding to students' feedback; Kay & LeSage, 2009) and interruption in the flow of the class (Koenig, 2010; Strasser, 2010). Finally, the use of clickers can

be costly for most educational institutions, which is also a barrier to their adoption (Blasco-Arcas et al., 2013; Rana et al., 2016).

Business simulation games are another example of gamification in learning. In the context of management training, business simulation games are one of the most effective tools for motivating and engaging players actively in the learning experience (Vos & Brennan, 2010). Business simulation games are virtual representations of real business situations. Therefore, they allow students to address educational contents in a more interactive and enjoyable way (Pando-García et al., 2016). By simulating market trends, they allow players to manage a company within a risk-free environment (Pando-García et al., 2016). As they provide an overall view of corporate strategic functions, they can be used as training tools. Specifically, business simulation games require players to make decisions and anticipate competitors' strategies while developing and implementing their own strategies (Doyle & Brown, 2000).

Business simulation games present an effective alternative to traditional teaching methods (Ben-Zvi, 2010) and are a suitable pedagogical tool for participants of different skills and backgrounds (Caulfield et al., 2012). By providing a context in which players are "learning by doing" (Caulfield et al., 2012), they enhance players' learning experiences (Matute & Melero, 2016). Players are of the opinion that playing these simulation games is a useful, interesting, and rewarding learning experience (Lainema & Nurmi, 2006). Likewise, players consider that the nature of the learning includes many experiential components, such as understanding how business decisions are made in the real world (Vos & Brennan, 2010) and constructing a holistic view of the functioning of a manufacturing company (Lainema & Nurmi, 2006). When playing, they experience great cognitive gains, especially in terms of critical thinking, problem-solving, and decision-making (Loon et al., 2015). Playing business simulation games also improves performance (Pasin & Giroux, 2011) and has a positive impact on players in terms of heightening their interest in the field of management (Loon et al., 2015).

In general, students perceive that business simulation games help them to develop a range of skills that are highly valued in the business world, as well as in modern education systems (Borrajo et al., 2010; Doyle & Brown, 2000). Some of these

skills are generic competences, such as decision making, working with uncertainty, and processing and analysing information (Fitó-Bertrán et al., 2014; Pasin & Giroux, 2011). Students also report enhanced communication skills (Loon et al., 2015), as well as team-working, problem solving, and adaptation to new situations (Borrajo et al., 2010). In addition, students consider that business simulation games are useful for developing specific managerial competencies, such as developing strategies, helping to meet the goals of a company, managing a company, and understanding the fundamentals of business administration and the relationship between the business units and organisational areas (Borrajo et al., 2010; Fitó-Bertrán et al., 2014). Despite wide consensus over what advantages business simulation games can provide, their use and introduction in companies and business schools are fraught with difficulties. Doyle and Brown (2000) report that simulations can create anxiety and frustration in players, which can have a negative effect on their learning. This may be due to the highly competitive nature of the game or the inherent pressure of decision-making in a limited time (Matute & Melero, 2016). This frustration can be compounded by team conflict and freeloading of some participants (Adobor & Daneshfar, 2006). Other concerns include that business simulation games' software may be costly for most institutions and that instructors must be well prepared to answer questions and deal with participants' frustration (Pasin & Giroux, 2011). Additionally, if players do not perceive the simulation to be realistic, they may not take it seriously or may lose motivation (Adobor & Daneshfar, 2006).

Besides education, gamification has also been predicted to have significant potential in marketing (Hofacker et al., 2016; Xu et al., 2015). Marketers have realised that, like games engage people, gamification could also engage customers (Insley & Nunan, 2014). In finding synergies between marketing and gamification goals, Lucassen and Jansen (2014) found that engagement, brand loyalty, and brand awareness, which are three important marketing concepts, are also relevant in the gamification context. In fact, engagement has sometimes been referred to as the ultimate goal of gamification (Hamari & Jarvinen, 2011). Within marketing, advertising is a promising area to apply gamification (Yang et al., 2017). By adding motivation incentives that increase the enjoyment of consumers, gamification can make advertising

more interesting (Bittner & Schipper, 2014). In particular, a gamified form of advertisement is advergames.

The term “advergame” is the combination of the words “advertisement” and “video game” (Grossman, 2005) and refers to the delivery of advertising messages through electronic games (Hernández et al., 2004). More precisely, advergames are online games specifically designed to promote a brand or a product (Winkler & Buckner, 2006). They usually have a simple design and can be easily played during short breaks in the day, such as waiting times or breaks within working hours (Terlutter & Capella, 2013). As most of mobile games, advergames usually take the form of casual games (Redondo, 2012) in which players are motivated for quick fun and repeated play. Advergames can be differentiated from product-placement within commercial games, known as in-game advertising (Winkler & Buckner, 2006). As advergames are specially created to promote a brand or product, the brand or product is the central feature of the game (Winkler & Buckner, 2006). Thus, communicating the advertising message is of primary importance (Steffen et al., 2013). On the contrary, in in-game advertising, marketers buy product placement space within an existing commercial videogame (Gross, 2010), such as traditional product placement in TV series or films (Cauberghe & De Pelsmacker, 2010). Therefore, products or brands are typically placed in the background of the game (Winkler & Buckner, 2006), and the focus is the game itself and not the commercial message (Steffen et al., 2013). This distinction between in-game advertising and advergames has also been referred to in previous studies as the distinction between the “traditional approach to product placement in video games”, which refers to the passive appearance of the product within the video game, and the “branded entertainment approach to product placement in video games”, which corresponds to the entire video game working as a product placement (Bigné et al., 2011).

In contrast to traditional advertising, advergames are interactive and immersive and their use is related to positive marketing outcomes. Researchers often refer to advergaming in terms of blurring the boundaries between entertainment and commercial messages (Vanwesenbeeck et al., 2016). Indeed, the complete integration of a brand or product into the entertainment experience facilitates the transfer of positive affect from

the game to the brand (Redondo, 2012; Wise et al., 2008). The rationale behind the potential of advergames is, therefore, that the positive feelings gained when playing them could be transferred to the brand (Okazaki & Yagüe, 2012). In addition, previous studies consider that advergaming is more effective than traditional advertising because it captures consumers' attention best (Edwards, 2003). Thus, players are very receptive to the advertising message or at least to the product or company that is displayed within the game (Winkler & Buckner, 2006). Advergames are also related to building brand awareness and offering product information (Hernández et al., 2004), as well as persuading the consumer to form a positive attitude toward the brand promoted (Ping et al., 2010). Likewise, advergames can increase the perceived value of the embedded brand (Okazaki & Yagüe, 2012). Finally, Bigné et al. (2011) found that the branded entertainment approach to product placement in video games achieves greater brand awareness and positive brand perceptions, communicates information about brand attributes to the player, increases brand knowledge, and is useful to introduce the brand to consumers that have no prior knowledge of the brand.

In sum, gamified activities based on the use of clickers, business simulation games, and advergames are successful applications of gamification in the areas of education and marketing. Therefore, this doctoral dissertation focuses on the analysis of these gamified activities.

1.2. THEORETICAL FRAMEWORKS TO ANALYSE GAMIFICATION

Recent studies have suggested that there is a lack of theoretical foundation to explain the motivational effects of gamification as well as empirical evidence on its effectiveness (Hamari et al., 2014; Sailer et al., 2017; Seaborn & Fels, 2015). This section provides theoretical foundation for the use of gamification. In particular, three theories are explored: (1) flow theory, (2) control-value theory of achievement emotions, and (3) self-determination theory. These theories will be the basis for the following chapters, in which empirical studies on specific applications of gamification will be analysed.

1.2.1. Flow theory

As Zichermann and Cunningham (2011) argue: "*at the heart of the success of games is an idea called flow*" (p. 16). Flow theory has its origin in Csikszentmihalyi's desire to understand enjoyment. Csikszentmihalyi (1975) explored why some people—such as rock climbers or gamers—were willing to invest great amounts of time and effort in doing activities that provide no external reward or scarce material incentives. He found that this group of people felt rewarded by executing actions per se, experiencing high enjoyment and fulfilment from the activity in itself. Those activities were characterised to be autotelic (from Greek *auto* = self, *telos* = goal) or intrinsically motivating, and the optimal experience derived from performing them was labeled "flow" (Csikszentmihalyi, 1975). The flow construct was then described as a "*crucial component of enjoyment*" (Csikszentmihalyi, 1975; p. 11), and the flow experience was defined as "*the holistic sensation that people feel when they act with total involvement*" (Csikszentmihalyi, 1975; p. 36).

Csikszentmihalyi (1975, 1990) found that the general characteristics of the optimal experience and its proximal conditions were remarkably similar across different settings. Csikszentmihalyi (1975) described the first sign of flow as the merging of action and awareness. People in flow become so involved in what they are doing that the activity becomes spontaneous and almost automatic (Csikszentmihalyi, 1990). They stop being aware of themselves as separate from the action they are performing. Yet for flow to be maintained, people cannot reflect on the act of awareness itself. On the contrary, flow is interrupted when people perceive the activity from "outside". It is difficult to maintain flow for any length of time without momentary interruptions, such as when people ask themselves questions such as "Am I doing well?" or "Should I be doing this?". These questions do not come to mind when one is in flow. This merging of action and awareness is possible by a centering of attention on a limited stimulus field, which corresponds to the second characteristic of flow experiences (Csikszentmihalyi, 1975). In flow, people are in a state of intense and focused concentration on what they are doing, thus leaving no room in the mind for irrelevant information (Csikszentmihalyi, 1990). This drives us to the next characteristic of flow experiences: the loss of self-consciousness (Csikszentmihalyi, 1975). When an activity involves

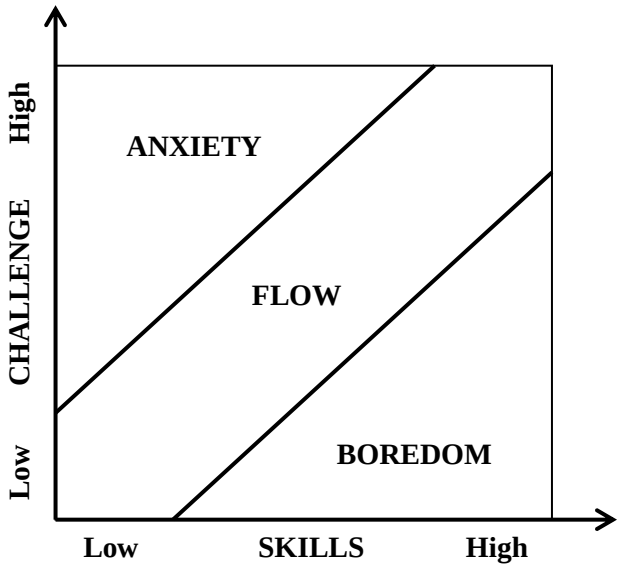
people completely with its demands for action, there is not enough attention left over to allow them to consider any irrelevant stimuli. Therefore, their own self disappears from awareness (Csikszentmihalyi, 1990). Another characteristic of people in flow is that they are in control of their actions and of the environment (Csikszentmihalyi, 1975). In other words, they have no active awareness of control but they are simply not worried by the possibility of lack of control. Flow activities are constructed to allow the practitioner to develop sufficient skills to reduce the margin of error to as close to zero as possible (Csikszentmihalyi, 1990). Additionally, there is a distortion of the temporal experience, and often hours seem to feel like seconds (Csikszentmihalyi, 1990). Finally, the individual enters a state of autotelic experience indicated by the fact that the activity is perceived as intrinsically rewarding (Csikszentmihalyi, 1975).

Regarding the conditions for flow to occur, Csikszentmihalyi (1975) stated that the activity must be feasible. Flow seems to occur only when the challenge of the activity is well matched to the individual's skills. Therefore, in flow activities, the tasks must be within one's ability to perform. The second condition to experience flow during an activity is clear establishment of goals. An individual needs to know what he or she wants to achieve in order to become immersed in an activity (Csikszentmihalyi & Csikszentmihalyi, 1988). Finally, immediate, unambiguous feedback as to how well one is performing is also needed (Csikszentmihalyi,1975). That is, the activity must provide immediate information in real time for the person to know how much he or she has achieved and how the activity is proceeding (Chen et al., 1999).

Chen et al. (1999) classified the nine flow dimensions defined by Csikszentmihalyi (1975, 1990) into three stages: antecedents, experiences, and effects. The first stage describes the prerequisites for provoking the optimal experience (i.e., balance of skill and challenge) and the qualifying factors of the activity for reaching the flow state (i.e., clear goals and immediate feedback). The second stage refers to the characteristics that are perceived during the flow state (i.e., merging of action and awareness, concentration, and sense of control). Finally, the last stage corresponds to the effects after entering the flow state (i.e., loss of self-consciousness, time distortion, and autotelic experience).

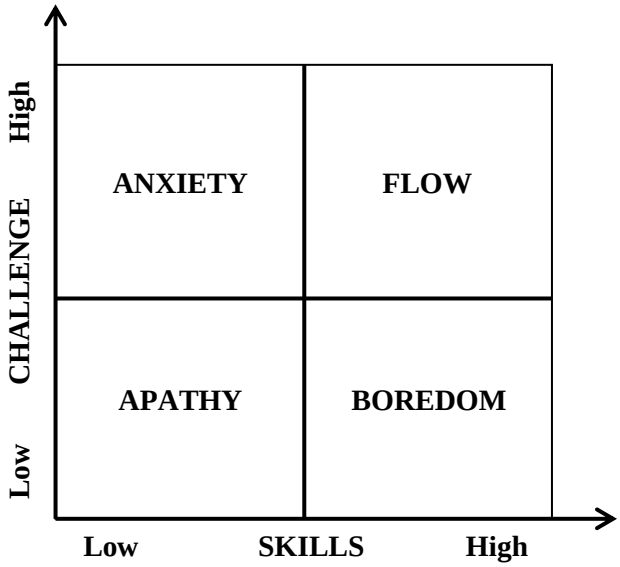
Although flow was defined as a multidimensional construct comprising these nine dimensions (i.e., balance of skill and challenge, clear goals, immediate feedback, merging of action and awareness, concentration, loss of self-consciousness, sense of control, time distortion, and autotelic experience), most flow measuring instruments include the challenge-skill dimension, which has been claimed to be the most important flow antecedent (Csikszentmihalyi, 1990). Based on this, the original model of flow specified that flow occurred when there was an equal match between challenge and skills (i.e., both equally high and equally low) (Csikszentmihalyi, 1975). Suboptimal solutions were either a too challenging situation, which lead to anxiety, or a less challenging situation, which lead to boredom (figure 1.3). Later empirical formulations specified that, for flow to occur, both challenges and skills had to be high and in balance, leading to the 4-channel model of flow (Csikszentmihalyi & Csikszentmihalyi, 1988) (figure 1.4). Otherwise, people showed apathy towards the activity. Besides the 3-channel (Csikszentmihalyi, 1975), and 4-channel (Csikszentmihalyi, 1988) models, other conceptualisations such as the 8-channel (Massimini & Carli, 1988), 9-channel (Clarke and Haworth, 1994), and 16-channel (Massimini & Carli, 1988) have been developed with significant disagreement on how many "channels" should be used to exemplify the patterns of high and low challenges and skills.

Figure 1.3: The 3-channel model of flow



Source: Csikszentmihalyi (1975)

Figure 1.4: The 4-Channel model of flow



Source: Csikszentmihalyi and Csikszentmihalyi (1988)

Based on the work of Csikszentmihalyi, Hoffman and Novak (1996) proposed a model of flow for the online environment. In particular, based on previous models that had examined a limited subset of the components of flow (e.g., Ghani et al., 1991; Ghani & Deshpande, 1994; Trevino & Webster, 1992; Webster et al., 1993), as well as on the flow channel segmentations models (e.g., 3-channel and 4-channel model of flow), Hoffman and Novak (1996) conceptualised flow as a cognitive state determined by high levels of skill and control, high levels of challenge and arousal, focused attention, and that is enhanced by interactivity and telepresence. Following the conceptual model of flow by Hoffman and Novak (1996), Novak et al. (2000) tested it empirically, finding direct paths to flow from skill, challenge, telepresence, and interactivity. Moreover, despite they could not support the direct relationship between focused attention and flow, they found an indirect one through telepresence. Besides proposing different flow antecedents, the novelty of this framework lies in the flow measurement. Novak et al. (2000) directly measured flow using a narrative description of flow followed by a three-item scale.

Despite the intuitive understanding of the concept of flow seems to be uniform among different researchers, there is a clear lack of consistency in operational definitions of flow used by them. This was noted by Choi et al. (2007), who stated that

"*the construct of flow is, however, too broad and ill-defined due to the numerous ways it has been operationalized, tested, and applied*". Given the lack of consensus on a unique operationalisation, Bakker (2005) reviewed the most prominent definitions of flow and proposed that most descriptions have three elements in common: absorption, enjoyment, and intrinsic motivation. These three elements correspond to the core components of the flow state proposed by Csikszentmihalyi (1975). Absorption refers to a state of total concentration and immersion in an activity. Time flies and individuals forget everything else around them. Enjoyment refers to the individuals' assessment of the quality of a certain activity. Finally, intrinsic motivation refers to the desire to perform a certain activity in order to experience the pleasure and satisfaction in undertaking the activity.

Concurrently, Hoffman & Novak (2009) reviewed different conceptualisations of flow and concluded that the approaches to measuring flow can be characterised as unidimensional or multidimensional. On the one hand, some researchers such as Novak et al. (2000) measure flow with a narrative description of flow followed by a direct report three-item instrument. This approach has been employed by a number of researchers (e.g., Choi et al., 2007; Hsu & Lu, 2003). In contrast to direct unidimensional measures of flow, other researchers employ derived unidimensional measures of flow that aggregate different components related to flow into an overall measure, such as the case of the 4-channel model of flow, in which flow is determined by the congruence of skill and challenge. Additional derived measures of flow are those that employ summed scales of flow, where the items in the summed scales correspond to constructs that are related to flow. This is the case of Choi et al. (2000), who used a six-item flow scale comprised by two questions for intrinsic interest, two for curiosity, one for control, and one for focus attention. On the other hand, some researchers measure each of the constructs individually, and employ structural models to predict the effect of each individual dimension or to define a higher-order factor than can be interpreted as flow (Hoffman & Novak, 2009). Examples of this approach are Agarwal and Karahannas (2000), who included temporal dissociation, focused immersion, heightened enjoyment, control, and curiosity; Koufaris (2002), who conceptualised flow as control, enjoyment, concentration, perceived usefulness, and perceived ease of use; or Huang (2003, 2006), who included control, attention, curiosity, and interest.

Flow theory has been applied in varied contexts including work, sports, games, learning, and online navigation. Regardless of the conceptualisation of flow used, research has shown that flow has positive effects for individuals in all these fields. In the academic context, learning has been found to be a consequence of the individual's state of flow (Esteban-Millat et al., 2014; Shernoff & Csikszentmihalyi, 2009; Shin, 2006). Previous studies have found that flow positively predicts students' learning (Barzilai & Blau, 2014; Bressler & Bodzin, 2013; Hamari et al., 2016), achievement (Joo et al., 2015), performance (Wang & Hsu, 2014), self-efficacy (Choi et al., 2017), affect (Esteban-Millat et al., 2014), and skills development (Klein et al., 2010). Likewise, ample evidence has shown flow to be a strong predictor of students' satisfaction (Joo et al., 2011, 2013; Klein et al., 2010; Lee & Choi, 2013; Rossin et al., 2009; Shin, 2006; Wang & Hsu, 2014), which can also impact retention (Lee & Choi, 2013). Flow experience has also been found to have an impact on students' attitudes, which promote behavioural intention (Rodríguez-Ardura & Meseguer-Artola, 2015). Similarly, flow can lead to positive marketing consequences, including attitude formation, purchase intentions, and behaviours (Chen et al., 1999; Ham et al., 2016; Hoffman and Novak, 1996, 2009; Waiguny et al., 2012).

1.2.2. Control-value theory of achievement emotions

Games have been posited to cause powerful emotional responses (McGonigal, 2011). In particular, gamification emotions refer to "*the mental affective states and reactions evoked among individual players when they participate in a gamified experience*" (Robson et al., 2015; p. 6). These emotions should be fun-oriented and appealing. In fact, taking into account that players will not continue to play if they do not enjoy themselves within the gamified experience, creating player enjoyment should be an important goal within gamification (Robson et al., 2015). Despite the great relevance that emotions have in the design of gamified experiences, the truth is that in specific contexts, such as education settings, where gamification has huge potential, emotions have been often neglected because people believed that emotions were opposite to rational thinking (Dirkx, 2008).

The control-value theory of achievement emotions (Pekrun et al., 2002; Pekrun, 2006) provides an integrative framework for understanding the emotions experienced in academic and achievement settings and for analysing their antecedents and effects. The control-value theory of achievement emotions combines principles from different theories, such as attributional theories, expectancy value approaches to emotions, perceived control theories, transactional theories of stress appraisals and related emotions, and models of the performance effects of emotions on learning and performance (see Pekrun et al., 2011 for a review). According to this theory, achievement emotions are defined as "*emotions tied directly to achievement activities or achievement outcomes*" (Pekrun, 2006; p. 317). Achievement activities can include tests, assignments, exams, and home tasks, whereas achievement outcomes can include scores and grades. These achievement activities and outcomes evoke within students a variety of achievement emotions. Previous studies on achievement emotions focused only on emotions relating to achievement outcomes, including hope and anxiety linked to possible success and failure, or pride or shame experienced after feedback on achievement, among others (Pekrun, 2006; Pekrun et al., 2011). By contrast, the control-value theory implies that emotions pertaining to achievement-related activities are also considered achievement emotions (Pekrun, 2006; Pekrun et al., 2007). Thus, activity emotions such as students' enjoyment of learning, boredom experienced during classroom instruction, or anger about task demands are also considered.

As can be seen in table 1.1, a possible classification of achievement emotions can be made according to the object focus, resulting in *activity emotions* relating to achievement activities, and *outcomes emotions* relating to the outcomes of these activities (Pekrun, 2006). The latter include *prospective emotions* (e.g., anticipatory emotions such as anxiety for failure, hope for success) as well as *retrospective emotions* (e.g., pride or shame experienced after feedback of achievement) (Pekrun, 2006). Additionally, achievement emotions can be grouped according to their valence and activation (Pekrun, 1992; Pekrun et al., 2002). Valence refers to experiencing an emotion as positive or negative, whereas activation refers to whether an emotion has an engaging or disengaging effect on motivation. Using these two dimensions, Pekrun et al. (2002) categorised emotions into four groups: *positive activating emotions* (e.g., enjoyment, hope, and pride), *positive deactivating emotions* (e.g., relief and

contentment), *negative activating emotions* (e.g., anger, anxiety, and shame), and *negative deactivating emotions* (e.g., boredom and hopelessness). Beyond this taxonomy, the theoretical framework allows for the contextualisation of emotional experiences into different types of achievement settings (i.e., *class-related*, *test-related*, and *learning-related emotions*), and different temporal specifications (trait emotions and state-emotions). *State achievement emotions* refer to momentary occurrences within a given situation at a specified point in time (e.g., anxiety before an exam), whereas *trait achievement emotions* refer to habitual, recurring emotions typically experienced by an individual (Pekrun et al., 2002, 2005; Pekrun & Stephens, 2010).

Table 1.1: Classification of achievement emotions

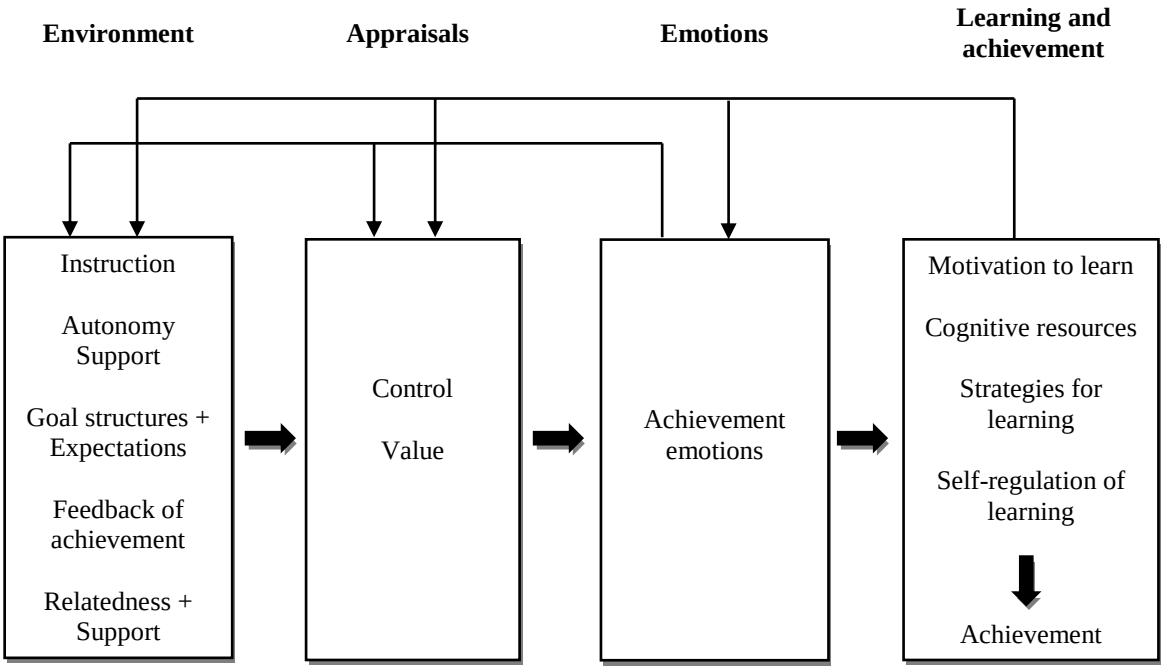
Object focus	**Value**	**Control**	**Emotions**
Outcome/prospective	Positive (success)	High	Anticipatory joy
		Medium	Hope
		Low	Hopelessness
	Negative (failure)	High	Anticipatory relief
		Medium	Anxiety
		Low	Hopelessness
Outcome/retrospective	Positive (sucess)	Irrelevant	Joy
		Self	Pride
		Other	Gratitude
	Negative (failure)	Irrelevant	Sadness
		Self	Shame
		Other	Anger
Activity	Positive	High	Enjoyment
	Negative	High	Anger
	Positive/Negative	Low	Frustration
	None	High/Low	Boredom

Source: Pekrun (2006)

The control-value theory of achievement emotions recognises that physiological processes, genetic dispositions, and cognitive appraisals are the main sources of emotions. However, both physiological processes and genetic dispositions of students are beyond the control of educators (Pekrun et al., 2002). Therefore, cognitive appraisals are of particular importance for achievement emotions. In particular, this theory posits that the degree of control one has over the task (control-related appraisals)

and the value that one places on the task (value-related appraisals) will determine the kinds of achievement emotions that will be generated (Pekrun, 2006). Control-related appraisals refer to the perceived controllability of achievement-related actions and outcomes, whereas value-related appraisals refer to the subjective importance of those activities and outcomes (Pekrun et al., 2011). Perceiving that one is in control of the outcomes (high control) and valuing of the task (high value) lead to the experience of positive emotions and lower levels of negative emotions respectively (Pekrun, 2006). On the other hand, low control and low value-related appraisals lead to negative emotions, or lower positive emotions (see figure 1.5).

Figure 1.5: Control-value theory of achievement emotions



Source: Pekrun (2006)

The control-value theory of achievement emotions posits that there are different environmental factors that influence students' control and value-related appraisals (Pekrun et al., 2002). As can be seen in figure 1.5, these environmental factors relate to students' learning environment and teachers' occupational environment, such as cognitive quality of instruction, task demands, autonomy support and cooperation, goal structures, or feedback on success and failure. Previous studies have also identified

achievement goals as antecedents of academic emotions (Pekrun et al., 2002; Pekrun, 2006), which refer to the reasons or purposes of task engagement (Maehr & Zusho, 2009). It is grounded in a distinction between mastery goals and performance goals.

The theory also addresses the effect of achievement emotions on students' learning and performance (Pekrun et al., 2007, 2009, 2011), which is mediated by a number of cognitive and motivational mechanisms, such as students' motivation to learn, cognitive resources, use of learning strategies, and their self-regulation of learning (Pekrun et al., 2002; Pekrun, 2006). Regarding motivation, positive activating emotions (e.g., enjoyment) generally enhance academic motivation, whereas negative deactivating emotions (e.g., hopelessness, boredom) are detrimental for it (Pekrun et al., 2002). The other two categories of emotions show more complex effects. On the one hand, positive deactivating emotions (e.g., relief, relaxation) can deactivate immediate motivation to continue academic work, facilitating disengagement. However, they can also serve as reinforcers strengthening motivation for the next stage of learning. On the other hand, negative activating emotions (e.g., anger, anxiety, shame) reduce intrinsic motivation related to enjoyment and interest, but increase extrinsic motivation to cope with negative events. With regards to cognitive resources, emotions relating to the setting, other persons, or the self, produce task-irrelevant thinking, reducing cognitive resources available for tasks purposes (Pekrun et al., 2002). On the contrary, emotions relating to the process of learning and task performance direct attention toward the task at hand, allowing for the full use of cognitive resources (Pekrun et al., 2002). In relation to the use of learning strategies, positive academic emotions facilitate the use of flexible, creative learning strategies (e.g., critical evaluation, organisation), whereas negative emotions are associated with the use of more rigid strategies (Pekrun et al., 2002). Moreover, these effects are stronger in activating than in deactivating emotions. Finally, concerning self-regulation of learning, positive emotions facilitate self-regulated learning, whereas negative emotions motivate students to rely on external guidance (Pekrun et al., 2002).

Finally, the control-value theory of achievement emotions also proposes reciprocal linkages between antecedents, emotions, and effects (Pekrun et al., 2002; Pekrun, 2006). As shown in figure 1.5, control and value-related appraisals are posited

to be antecedents of emotions, but emotions can also affect these appraisals. Similarly, emotions affect students' achievement, but feedback of achievement can in turn influence students' emotions. In addition, classroom instruction and social environments can induce different emotions in students, but students' emotions can also influence instruction, environments, and the behaviour of others. For instance, as Pekrun et al. (2002) argue, "*through the process of emotional contagion, a teacher's enthusiasm may stimulate excitement and positive affect in students, but having enthusiastic students in one's class may in turn fuel the teachers' enthusiasm in teaching that class*" (p. 102).

1.2.3. Self-determination theory

Gamification is a form of motivational design and it is fundamentally a means to get people interested in behaving a certain way (Werbach & Hunter, 2012). Players are at the root of gamification and their motivation ultimately drives the outcome (Zichermann & Cunningham, 2011). Thus, understanding players' motivation is crucial to build a successfully gamified activity.

Psychologists have large studied how to get people motivated to do things. One of the most influential theories that analyse human motivation is the self-determination theory (Deci, 1975), which advances the classical division of motivation to identify distinct types of motivation depending on the perceived forces that move a person to act (Ryan & Deci, 2000). Traditionally, motivation theories have treated motivation as a unitary concept focusing on the total amount of motivation. In contrast, self-determination theory focuses on types, rather than amount, of motivation.

According to the self-determination theory, the differentiation of motivation begins with the distinction between intrinsic and extrinsic motivation (Deci et al., 1996). On the one hand, *intrinsically motivated* behaviours refer to those that are performed out of interest and require no separable outcome (Deci, 1975). Intrinsic motivation relates to people engaging in an activity because they find it interesting, enjoyable, or fun, such as the case of children playing (Deci & Ryan, 2015). Not only children, but adults are also intrinsically motivated to perform interesting activities. On the other hand, *extrinsically motivated* behaviours are those performed with the

intention of attaining some separable outcome, such as receiving a reward or avoiding a punishment (Deci et al., 1996).

Early intrinsic motivation research analysed the impact of extrinsic rewards on intrinsic motivation, finding that extrinsic rewards undermined intrinsic motivation (Deci, 1971). This finding, which was controversial, highlighted the negative effects of rewards. Subsequent studies continued analysing this phenomenon. Deci et al. (1999) performed a meta-analysis of more than 100 experiments, confirming that tangible rewards undermined intrinsic motivation if the rewards were contingent on the behaviour, expected while doing it, and relatively salient. They also found that positive feedback enhanced intrinsic motivation. Additional studies found that deadlines, evaluations, or threats of punishment undermined intrinsic motivation, whereas providing people with choice tended to enhance intrinsic motivation (Ryan & Deci, 2000).

Finding that extrinsic motivators decrease intrinsic motivation, it raised the question of whether it was possible for individuals to be autonomous or self-determined while being extrinsically motivated. The self-determination theory addressed that issue finding that extrinsically motivated behaviours can vary in the degree to which they are self-determined versus controlled. The differentiated conception of extrinsic motivation is built around the concepts of internalisation and integration (Deci et al., 1996; Ryan et al., 1985). Internalisation refers to a process through which individuals assimilate and reconstitute external regulations so they can be self-determined while enacting them, whereas integration is the process through which internalised regulations are assimilated with one's self (Deci et al., 1996).

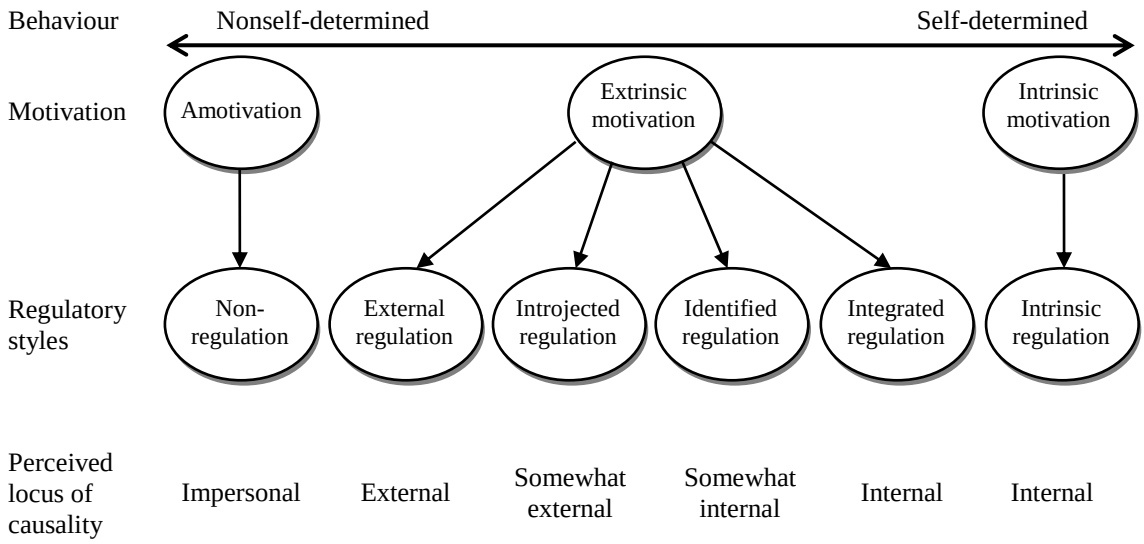
Based on this, extrinsically motivated behaviours are presented as a continuum from being relatively controlled to relatively self-determined, resulting in four types of extrinsic motivation (Ryan et al., 1985) (see figure 1.6). *External regulation* takes place when no internalisation has occurred, and represents the most controlled form of extrinsic motivation. External regulation corresponds to people's behaviour being controlled by others' administration of external contingencies, such as attaining a desired outcome (e.g., tangible reward) or avoiding a threatened punishment (Deci &

Ryan, 2000). Such behaviours are typically seen as been externally imposed. *Introjected regulation* (or introjection) refers to behaviours that are motivated by internal pressures (Deci et al., 1996). Introjected regulation differs from external regulation in that the control of people's behaviour comes from contingent consequences that are administered by the individuals to themselves instead by others (Deci & Ryan, 2000). Examples of introjected regulations are activities that are performed to attain ego enhancement or avoid guilt and shame. Introjected regulations have been partially internalised and are more likely than external regulations to be maintained over time. However, as they have not been assimilated to the self, the resulting behaviour is not self-determined. A more fully internalised form of extrinsic motivation is referred to as *identified regulation* (or identification) and corresponds to the process of people recognising and accepting behaviour's underlying value. Here, people do not behave because they think they should, but because they have identified with the value of the behaviour (Deci et al., 1996). As people accept the regulation as part of their own, they internalise it more, so the behaviour is more autonomous. However, it is still extrinsically motivated because it is still instrumental. Regulations based on identified regulations are expected to be better maintained and to be associated with higher commitment and performance (Deci & Ryan, 2000). Finally, *integrated regulation* (or integration) is the most complete, effective, and self-determined form of extrinsic motivation and refers to integrating regulations with other aspects of the self (Deci & Ryan, 2000). When identification becomes fully integrated, one will behave with a true sense of volition and willingness (Deci et al., 1996). Despite integrated extrinsic regulation bears considerable similarity with intrinsic motivation, these two types of motivation are different in that intrinsically motivated behaviour is performed spontaneously because the person is interested in the behaviour itself, whereas integrated regulation is performed because it is instrumental for an outcome that the person finds important or valuable (Deci et al., 1996).

With the elaboration of extrinsic motivation in terms of the degree of internalisation, autonomous motivation comprises identified and integrated forms of extrinsic motivation, along with intrinsic motivation, whereas controlled motivation comprises external and introjected forms of extrinsic motivation (Deci & Ryan, 2015). Besides the mentioned types of motivation, self-determination theory also posits

amotivation as the lack of both intrinsic and extrinsic motivation which represents a complete lack of self-determination with respect to the target behaviour (Deci & Ryan, 2000).

Figure 1.6: The self-determination continuum



Source: Ryan & Deci (2000)

Much of the research guided by the self-determination theory has examined factors that facilitate motivation. According to cognitive evaluation theory (Deci & Ryan, 1985; Ryan & Deci, 2000), a sub-theory within self-determination theory, factors that enhance a person's satisfaction of his or her basic psychological needs support intrinsic motivation, whereas factors that diminish need satisfaction undermine intrinsic motivation.

Self-determination theory defines needs as "*innate psychological nutriments that are essential for ongoing psychological growth, integrity, and well-being*" (Deci & Ryan, 2000; p. 229). Besides physiological needs (e.g., sleep, drink, eat), humans have three fundamental psychological needs: competence, autonomy, and relatedness, and the satisfaction of these needs is essential for an individual's intrinsic motivation (Ryan & Deci, 2000). *Competence* refers to the experience of behaviour as effective and masterful (White, 1959). It is related to the need for challenge and the ability to produce desired outcomes. Socio-contextual factors that conduce feelings of competence during

action (e.g., optimal challenges and effectance-promoting feedback) can enhance intrinsic motivation for that action (Ryan & Deci, 2000). Besides competence, intrinsic motivation needs individuals to experience a sense of autonomy. *Autonomy* refers to the experience of one's behaviour as choiceful (de Charms, 1968). This relates to the desire to self-organise experiences and act in accordance with one's own sense of self. Finally, it is important to build positive interpersonal relationships for intrinsic motivation (Ryan & Deci, 2000). In this sense, *relatedness* refers to the experience of connection with others (Baumeister & Leary, 1995). If these three needs are satisfied, growth and development result and intrinsic motivation for the task increases. When the three needs are not met, negative emotions may result and intrinsic motivation is undermined (Wang et al., 2008).

The self-determination theory has been applied in various domains, including schools, homes, workplaces, medical settings, and virtual worlds, among others. In general, studies have shown that contexts that support the basic psychological needs foster more autonomous forms of motivation, which yield the most-positive psychological, developmental, and behavioural outcomes (Deci & Ryan, 2015; Ryan & Deci, 2000).

For instance, in academic contexts, previous studies have empirically examined the relationship between satisfaction of the basic needs for autonomy, competence, and relatedness and intrinsic motivation, finding that when the basic needs are satisfied, learners will show higher intrinsic motivation (Chen & Jang, 2010; Vallerand et al., 1997). Other studies have shown that supporting basic needs facilitates deeper and more-internalised learning (Deci et al., 1996; Rigby & Przybylski, 2009). Research has also shown that students who are intrinsically motivated express more creativity (Moneta & Siu, 2002), are more likely to persist on tasks (Vallerand & Bissonnette, 1992), retain more knowledge (Lepper & Cordova, 1992), and exhibit higher academic performance and achievement (Deci & Ryan, 1985; Hanus & Fox, 2015).

In work settings, when managers are more autonomy supportive, their employees perform better at their jobs and show better psychological well-being (Baard et al., 2004). Research in work contexts has also found that satisfaction of the three

needs led to greater autonomous motivation and effort expenditures (de Cooman et al., 2013), enjoyment (Andreassen et al., 2010), well-being (Gillet et al., 2012), and less exhaustion (Van den Broeck et al., 2008).

Regarding gaming contexts, Przybylski et al. (2010) proposed a model of video game engagement, suggesting that video games have the potential to enhance intrinsic motivation as they provide players with experiences that satisfy psychological needs. Games foster competence through feedback and rewards, provide autonomy through the choice to volunteer, and support feelings of relatedness through social connection, competition, and cooperation (Ryan et al., 2006). Research in this domain has found that satisfaction of the needs for autonomy, competence, and relatedness is associated with game enjoyment and intentions for future play (Ryan et al., 2006). Moreover, when players experience more satisfaction of the basic psychological needs they are more intrinsically motivated and more immersed in the games (Rigby & Ryan, 2011). Similarly, Peng et al. (2012) found that game features that support competence and autonomy enhance motivation and engagement. Likewise, the satisfaction of the needs for competence and autonomy when playing video games results in more enjoyment, which influences autonomous motivation and persistence in gameplay (Neys et al., 2014). In their study on the elements of video games that foster aggression, Przybylski et al. (2014) aso found that interactive elements that impede players' psychological need for competence led to higher levels of aggressive feelings, aggressive thoughts and aggressive behaviours while playing. On the contrary, their results indicated that players' perceived competence was positively related to gaming motivation, which was negatively associated with player aggression.

To sum up, flow theory, control-value theory of achievement emotions, and self-determination theory are relevant psychological theories that can help us in explaining the effects of gamification on individuals. As such, in the next chapters, this doctoral dissertation draws on these theoretical frameworks to understand how specific applications of gamification impact behaviour, as well as to provide empirical support for this impact.

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CHAPTER II

THE INFLUENCE OF FLOW ON LEARNING OUTCOMES: AN EMPIRICAL STUDY ON THE USE OF CLICKERS

2.1. INTRODUCTION

Students' disengagement has been recently considered as one of the main problems in the OECD (Organization for Economic Co-operation and Development) learning systems (Hamari et al., 2016). As noted by Lantz and Stawiski (2014), attention during lecture classes is also a common problem among students, whose level of concentration tends to decrease after 20-30 minutes. An encouraging strategy to solve the problems derived from students' disengagement and the absence of concentration comes from videogames and gamification (Connolly et al., 2012; Hamari et al., 2016). While students are unlikely to find motivation in lecture classes, they experience it almost constantly in game-based contexts (McGonigal, 2011). Thus, gamifying learning aspects could make lecture classes more appealing to students.

Clickers—one of the most popular types of polling devices—are small, portable devices that look similar to a television remote control (Blasco-Arcas et al., 2013) and that transmit and record students' responses to questions presented in the classroom. Besides the simplest way of using clickers to ask students to respond to questions individually, clickers can also be used to encourage friendly competition among peer groups. Clickers integrate a "game approach" (Martyn, 2007) into traditional lecture classes by incorporating different game elements such as goals, rules, competitions, timing, reward structures (e.g., points), or feedback (Kapp, 2012). Using the motivational pull of games, clickers can engage learners (Blasco-Arcas et al., 2013), and increase students' motivation and satisfaction, while facilitating participation in class (Carnaghan et al., 2011).

One of the most popular constructs used to describe the subjective game experience is the concept of flow (Procci et al., 2012), which refers to a state of optimal experience and complete absorption in an activity (Csikszentmihalyi, 1975). During the optimal experience concentration is so intense that nothing else seems to matter, time becomes distorted, and self-consciousness disappears (Csikszentmihalyi, 1990). An activity that produces such experiences is autotelic—or intrinsically motivating—which means that people are willing to do it voluntarily, without being concerned about what they will get out of it (Csikszentmihalyi, 1990). This psychological state is desirable for

students, as all learning systems aim for students to engage in the process of learning (Wang & Hsu, 2014). In fact, Csikszentmihaly (2014) posited that the study of flow experiences is particularly relevant in educational institutions.

While prior studies in game-based classroom settings have demonstrated the importance of flow for students (e.g., Hamari et al., 2016; Kiili et al., 2014), they have not investigated this concept neither in the general context of polling devices, nor in the specific context of clicker use. In order to address this gap, the current study explores the role of flow experienced by students while using clickers. Specifically, the objective of this research is twofold. First, we examine the influence of three preconditions of flow—namely, balance of skill and challenge, feedback provided by clickers, and goal clarity—on students' flow experienced while using this technology. In particular, three relevant flow dimensions (i.e., concentration, sense of control, and autotelic experience) are analysed in this study. Second, we investigate the impact of students' concentration, sense of control, and autotelic experience on students' perceived learning and satisfaction with the gamified activity.

This research is intended to add to the extant literature in several ways. First, this study advances knowledge by providing insight regarding the antecedents and outcomes of students' flow experiences in a particular context; that is, the use of clickers. In addition, this study extends previous research by exploring the role of flow in a university setting, which has received limited attention in the literature (Khan & Pearce, 2015). Second, although a growing number of empirical studies have investigated the effects of clickers on learning outcomes, findings are still largely mixed and inconclusive (Hunsu et al., 2016). Therefore, this research offers a conceptual framework through which to explain why the use of clickers may facilitate learning outcomes, and provides new insights into the effectiveness of this technology.

2.2. FLOW THEORY

Flow theory, which was first introduced by Csikszentmihalyi (1975), is rooted in a desire to understand why some activities are autotelic (*auto* = self, *telos* = goal), or

intrinsically motivating (Nakamura & Csikszentmihalyi, 2002). Csikszentmihalyi (1975) investigated the nature and conditions of enjoyment experienced by athletes, artists, and musicians and found that this group of people felt rewarded by executing actions per se, experiencing high enjoyment and fulfilment from the activity in itself. This optimal experience was labelled "flow" (Csikszentmihalyi, 1975).

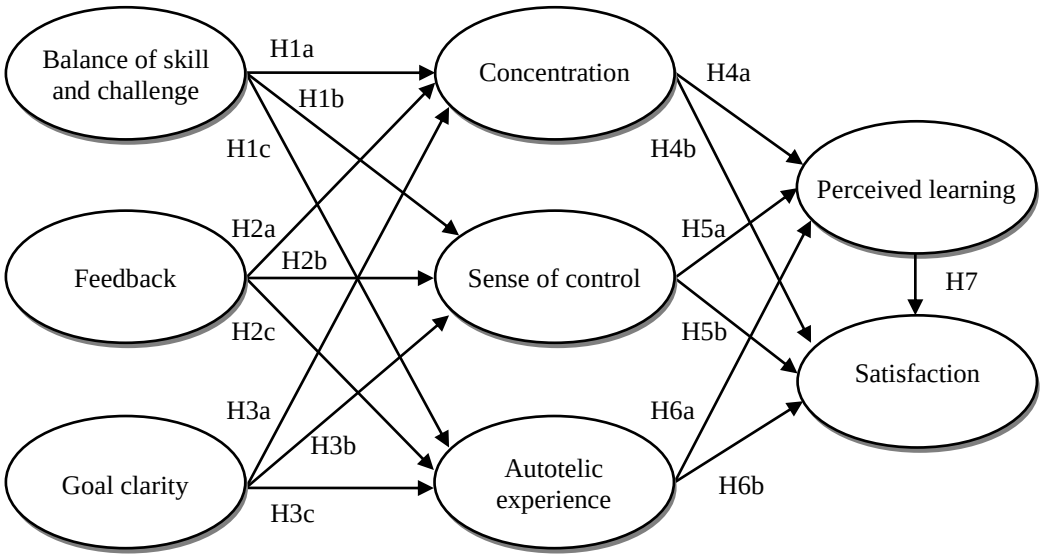
Csikszentmihalyi (1975) summarised the factors related to the flow experience into nine elements. The first group of elements, known as flow preconditions or antecedents, describes the qualifying factors of the activity for reaching the flow state. First, flow seems to occur only when the challenge of the activity is well matched to the individual's skills. That is, the challenge and skills have to be high and in balance so that individuals can expand their skills in pursuit of a challenging goal (Shernoff & Csikszentmihalyi, 2009). The second condition to experience flow during an activity is clear establishment of goals. An individual needs to know what he or she wants to achieve in order to become immersed in an activity (Csikszentmihalyi & Csikszentmihalyi, 1988). Finally, immediate feedback as to how well one is performing is also needed. That is, the activity must provide immediate information in real time for the person to know how much he or she has achieved and how the activity is proceeding (Chen et al., 1999). The second group of elements related to flow corresponds to the dimensions of the flow experience. First, the individual is in a state of intense and focused concentration on what he or she is doing. Second, as a result of this deep concentration, there is a merging of action and awareness (i.e., the activity becomes spontaneous and almost automatic). Third, the individual also experiences loss of self-consciousness and, fourth, a sense of control over his or her actions. Additionally, there is a distortion of the temporal experience, and often hours seem to feel like seconds. Finally, the individual enters a state of autotelic experience indicated by the fact that the activity is perceived as intrinsically rewarding.

2.3. CONCEPTUAL FRAMEWORK AND HYPOTHESES

Figure 2.1 shows the proposed model underlying this research. Drawing on flow theory, the balance of students' skills and the task challenge, feedback provided by

clickers, and clear goals during the clicker activity are proposed to positively influence students' state of flow. This study focuses on the analysis of three dimensions of flow proposed by Csikszentmihalyi (1975)—namely concentration, sense of control, and autotelic experience—, as they have been considered as the three more prominent characteristics of flow experience in the learning process (Guo & Ro, 2008; Klein et al., 2010). The model also proposes that concentration, sense of control, and autotelic experience while using clickers influence students' perceived learning and satisfaction.

Figure 2.1: Proposed model



As explained above, flow theory postulates that balance of skill and challenge, immediate feedback, and goal clarity are the main preconditions of the flow state. Prior research has shown that challenges and skills are salient factors leading to overall flow experience (Hamari & Koivisto, 2014; Jackson & Marsh, 1996; Procci et al., 2012). This result has been confirmed in different contexts, such as online learning (Esteban-Millat et al., 2014; Guo et al., 2016), computer-based instruction environment (Wang & Hsu, 2014), and mobile gaming (Su et al., 2016). Previous studies have also found a positive impact of immediate feedback on students' flow experience, mostly on concentration, sense of control, and enjoyment (Guo & Ro, 2008). Similarly, having a clear goal also has a strong correlation with flow (Guo et al., 2016; Shin, 2006), as

students can stay focused on the learning tasks more easily when goals are clear (Kiili et al., 2014). According to these arguments, we propose:

H_1: Balance of skill and challenge has a positive influence on (a) concentration, (b) sense of control, and (c) autotelic experience.

H_2: Feedback has a positive influence on (a) concentration, (b) sense of control, and (c) autotelic experience.

H_3: Goal clarity has a positive influence on (a) concentration, (b) sense of control, and (c) autotelic experience.

Learning has been found to be a consequence of the individuals' state of flow (e.g., Hoffman & Novak, 1996; Shernoff & Csikszentmihalyi, 2009; Skadberg & Kimmel, 2004; Webster et al., 1993). Previous studies have reported the effects of flow on students' perceived learning and satisfaction in a range of learning environments, such as conventional courses (Guo et al., 2007; Klein et al., 2010) and computer-based instructional environments (Wang & Hsu, 2014). In the context of e-learning, ample evidence has also shown flow to be a strong predictor of students' learning (Esteban-Millat et al., 2014; Shin, 2006) and satisfaction with online courses (Joo et al., 2011; Shin, 2006). In addition, the use of technology-based interactive learning has been found to enhance students' learning achievement and satisfaction (Kettanurak et al., 2001). Finally, in game-based learning, flow and perceived learning were found to be strongly and significantly correlated (Hamari et al., 2016). Based on these arguments, we propose:

H_4: Concentration has a positive influence on (a) perceived learning, and (b) satisfaction.

H_5: Sense of control has a positive influence on (a) perceived learning, and (b) satisfaction.

H_6: Autotelic experience has a positive influence on (a) perceived learning, and (b) satisfaction.

H7: Perceived learning has a positive influence on students' satisfaction.

2.4. METHODOLOGY

2.4.1. Data collection and participants

Data were obtained via a survey that was administered to undergraduate business students enrolled in an introductory marketing course at a major university in Spain. Participants belonged to 4 different classes and met for two 120-minute sessions for 15 weeks during the first semester of the academic year 2015–2016. They were asked to complete the survey at the end of the semester (January 2016). A total of 210 questionnaires were completed. Non-valid questionnaires were discarded, resulting in 204 valid questionnaires. The participants' ages ranged from 18 to 43 (M = 19.30, SD = 2.64), and 55.88% were women.

2.4.2. Materials

Clicker practice activities were developed and incorporated into classes as a competition among small groups of four to five students. The introductory marketing course in which clickers were used included six units. Therefore, the competition consisted of six rounds. In addition, a final round covering all the material on the course was carried out in the final week. Each round consisted of 10 multiple-choice test questions with four possible answers, with only one correct response. Students used clickers to enter their responses to the questions, which aimed to review the students' understanding of the material. In order to cover the material in an identical way, teachers from the four classes were coordinated to standardise their course materials, lectures, and Power Point slides.

At the beginning of each session in which a round was conducted, each group picked up their assigned clicker. PowerPoint slides were used to present the questions in the test. Then, the teacher asked the groups to discuss the question among themselves in limited time (between 60 and 90 seconds) and answer it using their clicker. The clicker software (Hyper-Interactive Teaching Technology; www.h-itt.com) received the signals

from the clickers through a USB receiver connected to the teacher's laptop and recorded all responses, which were displayed as a bar graph with the distribution of answers. Each group was encouraged to explain its answer to the rest of the class, and a debate was conducted to discuss alternative answers. Finally, the teacher showed the correct answer on the screen. After each round, the groups' rankings were uploaded to Moodle with the teams' total points. The activity accounted for 20% of the students' final course grade.

2.4.3. Measures

To measure the constructs included in the model, well-established scales were employed. In all cases, seven-point Likert scale items were used ranging from 1 (strongly disagree) to 7 (strongly agree). The preconditions of flow, as well as the flow dimensions of concentration, sense of control, and autotelic experience were measured following the Flow State Scale (FSS) developed by Jackson and Marsh (1996). Based on the original dimensions of flow proposed by Csikszentmihalyi (1990), Jackson and Marsh (1996) developed and validated a scale to measure the optimal experience. The FSS has been widely used in different contexts, such as sports (Jackson & Eklund, 2002), games (Kiili, 2006), and business education (Guo & Ro, 2008). Regarding learning outcomes, perceived learning was measured following Hamari et al. (2016), who analysed this construct in the context of game-based learning. Finally, satisfaction was measured with items from Kettanurak et al. (2001), who developed their study in the context of interactive learning environments. Table 2.1 provides an overview of all the measures used, whereas the full questionnaire can be found in Appendix 1.

Table 2.1: Constructs, items, and measurement model results

Constructs, sources, and items	FL	CR	AVE
Balance of skill and challenge (Jackson & Marsh, 1996)		0.876	0.702
BSC1. I believed my skills would allow me to meet the challenge in the clicker competition.	0.818		
BSC2. I considered the challenge of the competition and my skills to be at an equally high level.	0.833		
BSC3. I felt I was competent enough to meet the high demands of the clicker competition.	0.863		
Feedback (Jackson & Marsh, 1996)		0.896	0.741
While I am taking part in the clicker competition…			
FEE1. it is really clear to me that I am doing well.	0.816		
FEE2. I am aware of how many questions I am performing well on.	0.876		
FEE3. I know how well I am doing.	0.889		
Goal clarity (Jackson & Marsh, 1996)		0.883	0.715
GOA1. The goals were clearly defined.	0.847		
GOA2. I knew what I had to do.	0.850		
GOA3. I knew what I had to achieve.	0.839		
Concentration (Jackson & Marsh, 1996)		0.924	0.802
CON1. I was completely focused on the competition.	0.911		
CON2. My attention was focused entirely on what I was doing.	0.934		
CON3. It did not require any effort to keep my mind on what was happening.	0.838		
Sense of control (Jackson & Marsh, 1996)		0.882	0.713
SOC1. The greater the effort, the better my performance.	0.838		
SOC2. I consider myself to be responsible for the results of the clicker competition.	0.837		
SOC3. I have a high degree of control over my performance on the clicker competition.	0.858		
Autotelic experience (Jackson & Marsh, 1996)		0.951	0.866
AUT1. I really enjoy the clicker competition.	0.920		
AUT2. I feel good during the clicker competition.	0.950		
AUT3. I found the experience with the clickers extremely rewarding.	0.921		
Perceived learning (Hamari et al., 2016)		0.929	0.813
PL1. The clicker competition was useful for my learning.	0.888		
PL2. The clicker competition helped me understand the material.	0.905		
PL3. The clicker competition helped me learn.	0.911		
Satisfaction (Kettanurak et al., 2001)		0.904	0.759
SAT1. I found the clicker competition valuable.	0.866		
SAT2. I was very satisfied with the clicker competition.	0.872		
SAT3. I had a very positive learning experience during the clicker competition.	0.875		

Note: FL: factor loadings; CR: composite reliability; AVE: average variance extracted

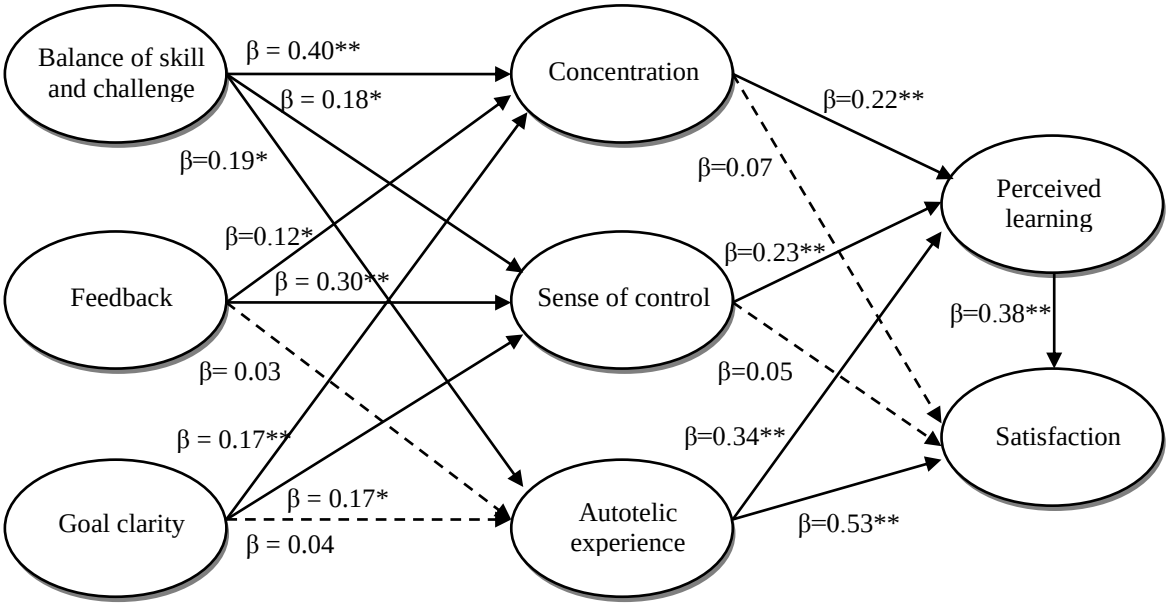
2.5. ANALYSES AND RESULTS

To test the hypotheses, partial least squares (PLS) structural equation modelling with the software SmartPLS 3 was used (Ringle et al., 2015). Compared to other methods, such as the co-variance based structural equation method, this methodology is appropriate when the interest of the study, as in our case, focuses on prediction and on theory development rather than on strong theory confirmation (Reinartz et al., 2009). In addition, PLS uses non-parametric procedures and therefore has less restrictive assumptions about the distribution of the data.

First, the reliability and validity of the constructs were assessed. Measurement model results are shown in Table 2.1. All standardised factor loadings were above 0.7, which suggests that individual item reliability was adequate. In addition, all the constructs were internally consistent, since their composite reliabilities (CR) were greater than 0.7. The constructs also met the convergent validity criteria, as the average variance extracted (AVE) values were above 0.5. Finally, discriminant validity was supported. In all cases, the squared root of the AVE was greater than the correlation estimate for any two constructs.

The proposed model was then tested. To assess the significance of the path coefficients, a bootstrapping procedure with 5,000 subsamples was used. The results revealed that all factorial loadings were significant at 1%. The preconditions of flow accounted for 30.7% of the variance of students' concentration, 25.2% of sense of control, and 5.6% of autotelic experience. Likewise, the model explained 36.9% and 67% of the variance in perceived learning, and satisfaction with the gamified activity, respectively. The Stone–Geisser test criterion (Q^2) exceeded the threshold of 0 for all the dependent variables, thereby supporting the predictive relevance of the model. Figure 2.2 presents the results of the structural model.

Figure 2.2: Structural results



Note: * p < 0.05; ** p < 0.001. The relationships which were not significant are drawn using broken lines.

The results indicate that balance of skill and challenge has a positive impact on concentration (β=0.40; t=5.21), sense of control (β=0.18; t=2.25), and autotelic experience (β=0.19; t=2.21). Thus H1a, H1b, and H1c were supported. Feedback provided by clickers has a positive and significant effect on students' concentration (β=0.12; t=1.68) and sense of control (β=0.30; t=3.97), which supports H2a and H2b, respectively. As proposed in H3a and H3b, goal clarity also has a positive impact on concentration (β=0.17; t=2.65) and sense of control (β=0.17; t=2.03). By contrast, the influence of feedback (β=0.03; t=0.43) and goal clarity (β=0.04; t=0.51) on autotelic experience are not statistically significant, leading H2c and H3c to be rejected.

The results also show that concentration (β=0.22; t=3.24), sense of control (β=0.23; t=2.89), and autotelic experience (β=0.34; t=4.63) have a positive and significant influence on students' perceived learning, supporting H4a, H5a, and H6a. The results indicate that autotelic experience positively influences students' satisfaction (β=0.53; t=4.81), which supports H6b. However, concentration and sense of control do not exert a significant effect on students' satisfaction (β=0.07; t=1.31 and β=-0.03; t=0.55, respectively), leading H4b and H5b to be rejected. Finally, the results reveal a

significant positive relationship between students' perceived learning and satisfaction (β=0.38; t=3.99). Therefore, H7 is also supported.

2.6. DISCUSSION

The aim of this study was to explore the role of flow experienced by students while using one of the most common polling devices, clickers. Specifically, the influence of three flow preconditions—namely balance of skill and challenge, feedback, and goal clarity—on students' flow, operationalised as heightened concentration, sense of control, and autotelic experience, while using this technology has been investigated. The study has also explored the impact of these flow dimensions on students' perceived learning and satisfaction.

Overall, the findings of this study provide strong support for the use of this technology in academic settings as a tool to promote flow experiences and enhance the learning experience. Specifically, interesting findings stem from the analysis of the relationships between the preconditions of flow—i.e., balance of skill and challenge, immediate feedback, and goal clarity—and the selected flow dimensions—i.e., concentration, sense of control, and autotelic experience. Our findings confirm that students who feel that their ability or skill level is adequate for the challenges presented during the clicker activity will experience deeper concentration, higher sense of control, and higher enjoyment or autotelic experience. Prior studies acknowledge the importance of feedback during the process of learning to enhance the learning experience (Hunsu et al., 2016). According to our findings, both immediate feedback and goal clarity are important factors for students' learning because of their direct impact on students' level of concentration and sense of control. In particular, the findings suggest that feedback received during the clicker activity in terms of how well the group is performing will enhance students' likelihood of both concentrating on the task and having a sense of control over the activity. Additionally, if students clearly recognise the purpose of the activity and the objectives to achieve, they will concentrate more closely on pursuing those objectives and will experience a higher sense of control. Interestingly, students' perceptions of autotelic experience are not influenced by immediate feedback or goal

clarity while using clickers. A reason for this may be that, regardless of perceptions regarding immediate feedback and goal clarity, students enjoy the experience of using clickers as it is usually perceived as an engaging activity. In order to encourage an autotelic experience, attention must be paid to the balance between the skills and the challenge, which is considered the main precondition of the flow experience (Csikszentmihalyi, 1990). If both the challenge and students' skills are low, students will experience apathy. On the contrary, if the challenge is too high in comparison with students' skills, students will be anxious when performing the activity.

Our results also show that concentration, sense of control, and autotelic experience have a positive impact on perceived learning. Contrary to predictions, only autotelic experience predicted students' level of satisfaction with the gamified activity. An explanation for this could be that, regardless of perceptions of concentration and sense of control, students were satisfied with the clicker activity because they perceived it as autotelic and enjoyable. Finally, the results suggest that students who consider the clicker activity to be useful for their learning will be more satisfied with use of this technology.

This study offers several theoretical contributions. First, our research advances knowledge by exploring the role of flow in the context of polling devices and, particularly, in the context of clicker use. Second, this study enhances understanding of the concept of flow in a university setting by testing the causal relationships between the different components of flow and examining its effect on students' perceived learning and satisfaction. Third, previous studies on clickers have usually lacked theoretical frameworks for exploring the effects of this technology on learning (Hunsu et al., 2016). Building on the theory of flow, this study addresses this gap and helps to understand the effectiveness of clickers. Finally, this study overcomes some limitations of previous research on clickers, such as a bias toward qualitative work or the absence of validity and reliability analysis of the measurement instruments (Kay & LeSage, 2009).

This study also offers several implications for educational practice. First, instructors should provide students with challenges that balance with their skills. In

other words, the difficulty of questions presented during the clicker activity (i.e., the challenge) must be balanced with explanations given by the teachers in previous classes, which give students the necessary knowledge (i.e., skills) to answer these questions correctly. In addition, it would be interesting to know what the students' level of knowledge and skills are at the beginning of the course, and then design the activity based on students' current level of skills. In this way, it would be easier to help students to achieve a balance between their level of skills and the challenge presented during the clicker activity. Additionally, instructors involved in the design of clicker activities should ensure that the activities offer clear goals for students to pursue, and provide them with clear rules to follow in order to help them become immersed in the activity. Additionally, the activity should provide immediate feedback in real time to enable the students to understand how well they are performing and how the activity is proceeding. Instructors should also consider the underlying dimensions of the flow experience, as these contribute to enhancing learning performance and satisfaction. Thus, clicker activities should be adequately designed with respect to encouraging concentration, a sense of control, and enjoyment.

Limitations of this study should be noted, which also suggest directions for further research. First, this study has used a combination of concentration, sense of control, and autotelic experience to measure flow experienced by students. Although these dimensions are commonly used and correspond to the original definition of flow proposed by Csikszentmihalyi (1975), they are not the only dimensions that describe the flow experience. Second, the use of retrospective measures in this study may be another limitation. While most studies have used questionnaires and retrospective measures of flow (e.g., Pelet et al., 2017), Csikszentmihalyi and LeFevre (1989) recommended using the experience sampling method to measure respondents' flow experience. Third, further research should analyse other variables related to flow, such as contextual factors (e.g., classroom setup, learning task and materials, perceptions of instructors) or learners' characteristics (e.g., individual ability, prior knowledge, interest, personality and learning styles). Finally, the use of Partial Least Squares (PLS) to analyse data may also be another limitation of this study.

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CHAPTER III

DO CLICKERS ENHANCE LEARNING? A CONTROL-VALUE THEORY APPROACH

3.1. INTRODUCTION

The use of clickers in academic settings has gained popularity over the past few years, becoming an important topic of research for both scholars and educators across different disciplines. Clickers are small, portable devices that look similar to a television remote control (Blasco-Arcas et al., 2013) and use radio-frequency or infrared technology to transmit and record student responses to questions presented in the classroom. Due to the real-time feedback provided by clickers, students can assess their level of understanding of the material being taught (Sun, 2014), whereas instructors are provided with an opportunity to manage classroom discussion about concepts being covered (Kay & LeSage, 2009). Different forms of instruction that integrate clickers are commonly found in the literature (Chien et al., 2016). The simplest way of using clickers is to ask students to respond to a question individually. In addition to this most common use, clickers can be used with teams of four or more students, encouraging peer discussion and collaborative learning (McDonough & Foote, 2015). Clickers can also be used as a tool to encourage friendly competition among peer groups. In addition, using the motivational pull of games, clickers can make traditional lecture-style classes more appealing to students, engaging them in the learning process (McGonigal, 2011).

In the past few years, a growing number of empirical studies have explored the effects of clickers on learning outcomes (e.g., Blasco-Arcas et al., 2013; Castillo-Manzano et al., 2016; Ludvigsen et al., 2015; McDonough & Foote, 2015; Stowell, 2015; Sun, 2014). However, findings are still largely mixed and inconclusive (Hunsu et al., 2016). In addition, several recent reviews on research into clickers (Chien et al., 2016; Hunsu et al., 2016) have highlighted an important shortcoming of previous research: the lack of theoretical discussions that explain how clickers may help learning. In this sense, Chien et al. (2016; p. 747) stated that empirical studies "*should be conducted in a more rigorous manner, to provide explanations for academic learning outcomes through explicit incorporation of a theoretical framework.*" In response to this, the current research draws on the control-value theory of achievement emotions developed by Pekrun (2000, 2006) to explain how the use of clickers can improve students' motivation, learning, and satisfaction. Students can experience different emotions, such as enjoyment, pride, or boredom, while using clickers. These

achievement emotions, defined as those that are directly tied to achievement activities or achievement outcomes (Pekrun, 2006; Pekrun et al., 2007), are critical for students' learning, performance, and motivation, among other variables (Schutz & Pekrun, 2007). Therefore, this theory, which offers an integrative approach to analysing the emotions experienced in academic settings, is a useful framework for explaining why the use of clickers can facilitate academic learning outcomes.

More specifically, we investigate both the antecedents and consequences of students' achievement emotions while using clickers. First, we explore the influence of the feedback provided by clickers on students' perceived academic control, self-efficacy, and value. In addition, we examine the effect of students' perceived academic control and self-efficacy over the activity in which clickers are used, as well as the value students assign to this activity, on students' positive and negative achievement emotions. In particular, three relevant achievement emotions in the learning context (i.e., enjoyment, pride, and boredom) are analysed in this study. Finally, we investigate the impact of achievement emotions experienced while using clickers on students' motivation, perceived learning, and satisfaction.

This study contributes to the literature in two ways. First, building on control-value theory, we offer a conceptual framework for understanding why the use of clickers may facilitate learning outcomes. In addition, our empirical findings provide new insights into the effectiveness of clickers. Second, despite the recent increase in the number of studies that have explored achievement emotions, the development and influence of achievement emotions, other than anxiety, on performance remain under-researched and scholars have highlighted the need to investigate their effects further (Pekrun, 2006; Pekrun et al., 2009; Peterson et al., 2015). This study addresses this request.

3.2. CONTROL-VALUE THEORY OF ACHIEVEMENT EMOTIONS

The control-value theory of achievement emotions (Pekrun, 2000; Pekrun et al., 2002; Pekrun et al., 2006) provides an integrative framework for understanding the

emotions experienced in achievement and academic settings and for analysing their antecedents and effects. It builds on propositions from different theories, such as attributional theories, expectancy value approaches to emotions, perceived control theories, transactional theories of stress appraisals and related emotions, and models of the performance effects of emotions (Pekrun et al., 2007).

According to control-value theory, achievement emotions are defined as those that are directly associated with achievement activities or achievement outcomes (Pekrun, 2006; Pekrun et al., 2007). Prior to the control-value theory, studies on achievement emotions focused only on emotions relating to achievement outcomes, including prospective outcome emotions (e.g., hope and anxiety linked to possible success and failure, respectively) and retrospective outcome emotions (e.g., pride or shame experienced after feedback on achievement; Pekrun, 2006; Pekrun et al., 2011). The definition proposed by the control-value theory implies that emotions pertaining to achievement-related activities are also considered achievement emotions (Pekrun, 2006; Pekrun et al., 2007). Examples of activity emotions are students' enjoyment of learning, boredom experienced during classroom instruction, or anger about task demands. The differentiation of activity emotions versus outcome emotions pertains to the object focus of achievement emotions. Additionally, achievement emotions can be grouped according to their valence (positive vs. negative), and the degree of activation implied (activating vs. deactivating; Pekrun et al., 2007). Using these two dimensions, emotions can be categorised into four groups: positive activating emotions (e.g., enjoyment, pride, and hope), positive deactivating emotions (e.g., relief), negative activating emotions (e.g., anxiety, anger, and shame), and negative deactivating emotions (e.g., boredom and hopelessness; Pekrun et al., 2002).

The control-value theory holds that appraisals of control and value are key determinants of achievement emotions (Pekrun, 2006). Briefly, control appraisals relate to the perceived controllability of achievement actions and outcomes, whereas value appraisals refer to the subjective importance of those activities and outcomes (Pekrun et al., 2011). In addition, the control-value theory posits that students' perceptions of control and value are influenced by factors related to students' learning environment and teachers' occupational environment, such as cognitive quality of instruction, task

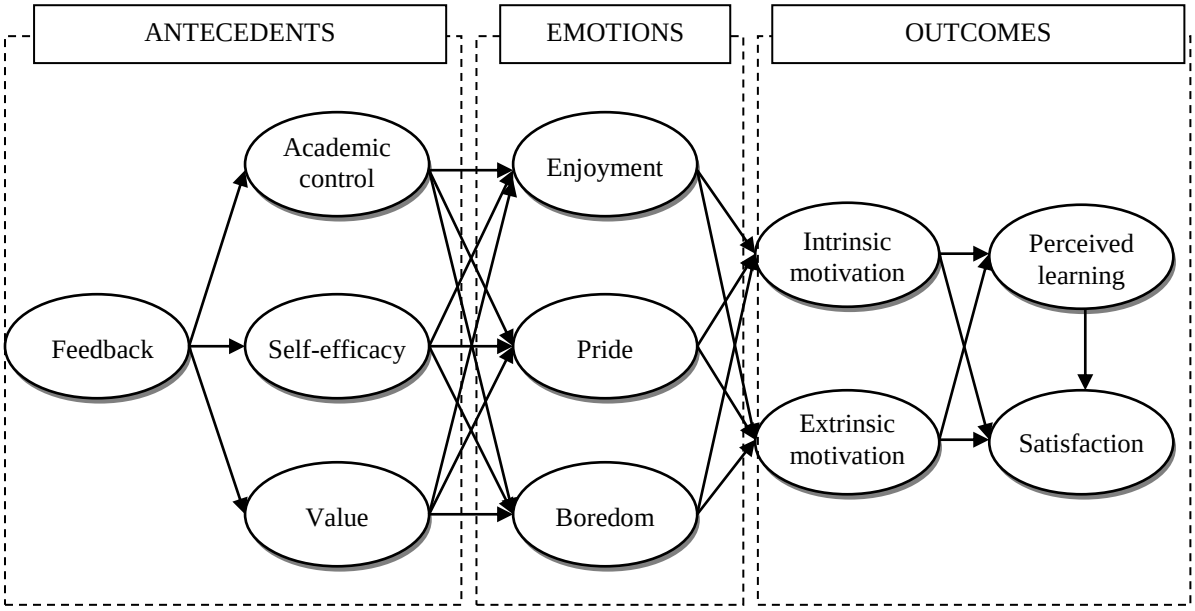
demands, autonomy support and cooperation, goal structures, or feedback on success and failure. Finally, the theory also addresses the effects of achievement emotions on students' learning and performance, which are mediated by a number of cognitive and motivational mechanisms, such as students' motivation to learn, cognitive resources, use of learning strategies, and self-regulation vs. external regulation of learning (Pekrun, 2006; Pekrun et al., 2002).

Considering that students can experience different achievement emotions, such as enjoyment, pride, or boredom, while using clickers, the control-value theory provides a relevant conceptual framework to account for the effectiveness of this technology.

3.3. CONCEPTUAL FRAMEWORK AND HYPOTHESES

Figure 3.1 shows the proposed model underlying this research. Specifically, drawing on the control-value theory, feedback provided by clickers is proposed to positively influence control and value appraisals (i.e., perceived academic control, self-efficacy, and value), which in turn affect students' positive and negative achievement emotions (i.e., enjoyment, pride, and boredom). In addition, the model proposes that achievement emotions experienced while using clickers influence students' intrinsic and extrinsic motivation, which in turn impact students' perceived learning and satisfaction.

Figure 3.1: Proposed model



As noted earlier, the influence of achievement emotions other than anxiety has been under-researched (Pekrun, 2006). Therefore, we focus our attention on the analysis of three different achievement emotions: enjoyment, pride, and boredom. These achievement emotions are often experienced by students in academic settings (Pekrun et al., 2002). In addition, they are important for students' learning, performance, and motivation in clicker competition settings. Clickers can make traditional lecture classes more appealing to students, increase students' enjoyment and pride, and help avoid boredom (Hoekstra, 2008; Stowel & Nelson, 2007). Therefore, the study of these achievement emotions is especially relevant.

As explained above, the control-value theory of achievement emotions postulates that physiological processes, genetic dispositions, and cognitive appraisals are the main sources of emotions. However, neither physiological processes nor the genetic dispositions of students are under the control of educators (Pekrun et al., 2002). For this reason, cognitive appraisals are of specific relevance for achievement emotions. In particular, within this theory two categories of cognitive appraisals are proposed as determinants of achievement emotions: subjective control over achievement activities and their outcomes, and the subjective value of these activities and outcomes (Pekrun,

2006). In other words, achievement emotions are inferred when students feel "in control of, or out of control of, activities and outcomes that are subjectively important" for them (Pekrun et al., 2011; p. 38).

Two types of control appraisals have been identified in the literature (Pekrun et al., 2011): perceived academic control and self-efficacy. Perceived academic control refers to students' beliefs about whether they can intentionally predict and influence outcomes in their academic environment (Stupnisky et al., 2008). On the other hand, self-efficacy is defined as students' beliefs about their ability to complete a task successfully under certain conditions (Bandura, 1997). Finally, value appraisals relate to the subjective importance of activities and outcomes (Pekrun et al., 2011). The value of an activity can be intrinsic (e.g., when students engage in an activity per se, although it does not produce any relevant outcome) or extrinsic (e.g., when students value the utility of activities to produce external, desired outcomes; Pekrun et al., 2007).

In addition, the control-value theory of achievement emotions assumes that there are different environmental factors that influence students' control and value-related appraisals (Pekrun et al., 2002). Among all environmental factors, feedback on achievement is of major importance for our study because it is a distinctive feature of clickers. The use of clickers offers two types of information as feedback: first, display of the voting results; and second, instructors' explanations for the answers to questions (Chien et al., 2016).

According to the control-value theory, feedback on success or failure at learning implies information about the probability of future success or failure, thus having an impact on control and value appraisals (Pekrun, 2006). Therefore, based on these theoretical assumptions, it is proposed that the feedback provided by clickers will have a positive impact on perceived academic control, self-efficacy, and value.

H_1: Feedback has a positive influence on (a) perceived academic control, (b) self-efficacy, and (c) value.

There are manifest connections between individuals' appraisals and achievement emotions (Pekrun et al., 2002, 2007, 2011). In general terms, control-related appraisals

(perceived academic control and self-efficacy) correlate positively with students' positive emotions and negatively with negative emotions. For instance, students' academic control in university settings has been found to have a positive impact on students' enjoyment and hope (González et al., 2011), but a negative impact on students' boredom and anxiety (Stupnisky et al., 2013; Tempelaar et al., 2012; You & Kang, 2014). Additionally, students' self-efficacy has been found to be correlated positively with joy (Pekrun et al., 2004) and negatively with anxiety (Singh et al., 2013). Regarding value-related appraisals, thinking that an activity is valuable is negatively correlated with experiencing boredom during the activity (Noteborn et al., 2012) and positively correlated with positive emotions such as enjoyment and hope (González et al., 2011).

Although further investigation is needed to test assumptions for some emotions addressed by the control-value theory, there is ample evidence from a number of sources to corroborate the predictions for enjoyment, pride, and boredom (Pekrun et al., 2007). First of all, enjoyment is prompted when the activities are experienced as both controllable and valuable (Pekrun et al., 2011). Several studies have found that enjoyment is high when both control and value are high, and low when either control or value or both are low (González et al., 2011; Pekrun et al., 2002, 2007). Conversely to enjoyment, boredom is induced when the activity lacks value (Pekrun et al., 2011). Boredom may serve as a way of escaping from situations that do not provide sufficient stimulation to students, but also from situations that are beyond the students' capabilities (Pekrun et al., 2002). Finally, pride is also assumed to be control dependent (Pekrun, 2006; Pekrun et al., 2007). This emotion is posited to be induced by attributions of success and failure to the self (Pekrun et al., 2007), implying control over the outcomes (Pekrun et al., 2011).

According to this argument, if students are interested in the clicker activity and feel capable of taking part in it, they will experience enjoyment. In contrast, clicker-related boredom will be a signal that students have a strong sense of being able to master the activity, but do not value it. Finally, in the context of collaborative learning, students will feel pride if they consider that their contribution to the group has made the group win, so success can be attributed to students' control over the clicker activity and

over the subject content. Based on these assumptions, we propose the following hypotheses:

H2: Perceived academic control has a positive influence on (a) enjoyment, (b) pride, and (c) boredom.

H3: Self-efficacy has a positive influence on (a) enjoyment and (b) pride, and a negative influence on (c) boredom.

H4: Value has a positive influence on (a) enjoyment and (b) pride, and a negative influence on (c) boredom.

According to the control-value theory, achievement emotions affect students' learning and academic performance (Pekrun et al., 2007, 2009, 2011) by influencing their motivation and effort, their self-regulation, and their use of learning strategies. In our study, we focus on the direct effects of students' achievement emotions on both intrinsic motivation, which refers to the motivation to participate in an activity because it is interesting and enjoyable, and extrinsic motivation, which relates to the achievement of positive outcomes (e.g., good marks) or to the prevention of negative outcomes (e.g., poor marks; Pekrun et al., 2011).

Positive activating emotions such as enjoyment and pride have a positive influence on students' motivation and academic performance (Pekrun et al., 2004, 2009, 2011). They promote both intrinsic and extrinsic motivation, facilitating flexible learning and self-regulation, and helping the learner to focus attention on the task at hand (Pekrun et al., 2002, 2004, 2011). In contrast, negative deactivating emotions, such as boredom, are detrimental to students' motivation, as they direct attention away from the task, making any processing of task-related information shallow and superficial (Pekrun et al., 2002, 2009). Therefore, it is hypothesised that positive emotions (i.e., enjoyment and pride) will enhance both types of motivation, while negative emotions experienced while using clickers (i.e., boredom) will undermine them.

H5: Enjoyment has a positive influence on (a) intrinsic motivation and (b) extrinsic motivation.

H_6: Pride has a positive influence on (a) intrinsic motivation and (b) extrinsic motivation.

H_7: Boredom has a negative influence on (a) intrinsic motivation and (b) extrinsic motivation.

The effect of intrinsic and extrinsic motivation on learning outcomes (i.e., perceived learning performance and students' satisfaction) is explored next. Different operational definitions for learning can be found in previous research. In most studies, learning outcomes have been measured as "achievement" or "performance" based on grades (Giannakos, 2013; González et al., 2011; Mega et al., 2014; Noteborn et al., 2012; Tempelaar et al., 2012). However, the use of grades may not always provide the best measure (Rovai & Barnum, 2003). In this sense, final course grades do not always reflect "pure" learning, but other considerations such as classroom participation and attendance (Caspi & Blau, 2008). Furthermore, grades, particularly for performance tests, may not be a reliable measure of learning, as teachers are unlikely to assign grades consistently (Rovai, 2002). Additionally, grades tend to have restricted ranges, thus limiting their use in correlation studies (Rovai, 2002). Therefore, the use of grades as a measure of learning can be problematic. Alternatively, other perspectives on learning, such as the cognitive perspective, which regards learning as changes in one's mental models or knowledge representations (Shuell, 1986), consider that learning outcomes can also be assessed through students' perceptions of learning outcomes (Alavi et al., 2002). Therefore, this study explores perceived learning to measure the beliefs and feelings that students have regarding the learning experience (Caspi & Blau, 2008), as well as students' satisfaction, which is also an important learning outcome (Klein et al., 2010).

The model proposed by Pekrun (1992) posits that achievement emotions influence motivational variables that, in turn, have an impact on students' achievement. As intrinsic motivation theorists have argued, being motivated, interested, and engaged in the learning process results in better learning and achievement (Cordova & Lepper, 1996; Deci & Ryan, 1985). Empirical evidence has also shown the positive effect of motivation on academic achievement (e.g., Lepper et al., 2005; Mega et al., 2014).

Students with a higher level of motivation experience a higher level of user satisfaction and perceive that their learning outcomes are better (Eom et al., 2006). Therefore, there is ample evidence that improvements in students' perceived learning and satisfaction can be expected if students experience a class where clickers are used as a rewarding experience that motivates them (Guo et al., 2007; Klein et al., 2010; Rossin et al., 2008). Thus, we hypothesise that both intrinsic and extrinsic motivation will have a positive effect on students' perceived learning as a result of using clickers and their satisfaction with the use of this technology:

H_8: Intrinsic motivation has a positive influence on (a) perceived learning and (b) students' satisfaction.

H_9: Extrinsic motivation has a positive influence on (a) perceived learning and (b) students' satisfaction.

Finally, students' satisfaction is also influenced by their perceived learning. Findings in different educational contexts have provided empirical evidence for the impact of students' learning performance on their overall level of satisfaction (Tao et al., 2009). Students who perceive higher levels of collaborative learning also tend to be more satisfied with their courses (So & Brush, 2008). Therefore, we propose that students' perceived learning as a consequence of using clickers in class will have a positive effect on their satisfaction with the clicker activity:

H_{10}: Perceived learning has a positive influence on students' satisfaction.

3.4. METHODOLOGY

3.4.1. Data collection and participants

The data was gathered via a survey that was administered to undergraduate business students at a major university in Spain at the end of the semester, in January 2016. A total of 210 questionnaires were completed. Non-valid questionnaires were discarded, resulting in 207 valid questionnaires.

Participants were enrolled in an introductory marketing course during the first semester of the academic year 2015–2016, and they met for two 120-minute weekly sessions. Their ages ranged from 18 to 43 (M = 19.33, SD = 2.64), and 56% were women.

3.4.2. Procedure

Clicker activities were developed and incorporated in the classes. Specifically, over the course of 15 weeks, students were given seven multiple-choice tests, using clickers to respond. The introductory marketing course included six units. Thus, a total of six tests were administered at the end of each unit, in one of the sessions held in weeks 5, 7, 9, 11, and 14. These multiple-choice tests tried to review and check the students' understanding of the material in each unit. In addition, a final test covering all the material on the course was carried out in week 15. The multiple-choice tests accounted for 20% of the students' final course grade.

Clicker practice activities were undertaken in small groups, comprising four or five students. Therefore, students in each group shared a clicker. At the beginning of each session where a multiple-choice test was administered, groups picked up their assigned clicker. Then, the teacher presented the multiple-choice questions (10 questions per test) using PowerPoint slides and asked the groups to click on the correct answer. Each multiple-choice question had four possible answers, with only one correct response per question. According to the difficulty of the questions, groups were given between 60 and 90 seconds to discuss among themselves and answer the question using their clicker. The clicker software (Hyper-Interactive Teaching Technology) received the signals from the clickers through a USB receiver connected to a laptop and recorded all responses, which were displayed as a bar graph with the distribution of answers. Then, each group was encouraged to explain its answer to the rest of the class, and discuss alternative answers. Finally, the correct answer was shown.

3.4.3. Measurement instrument

Well-established scales were employed to measure the constructs included in the model. In all cases, seven-point Likert scale items were used ranging from 1 (strongly

disagree) to 7 (strongly agree). Table 3.1 provides an overview of all the measures and the questionnaire is available in Appendix 1. The feedback provided by clickers was measured using items from Jackson and Marsh (1996). Measures of perceived academic control were adapted from Perry et al. (2001). Value, self-efficacy, and extrinsic motivation were measured using items from the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich et al., 1991). The achievement emotions, pride and boredom, were measured using items from the Achievement Emotions Questionnaire (AEQ; Pekrun et al., 2005), whereas enjoyment was assessed following Jackson and Marsh (1996). Measures of intrinsic motivation were adapted from the Situational Motivation Scale (SIMS; Guay et al., 2000). Perceived learning was measured using three items from Hamari et al. (2016). Finally, satisfaction was assessed following Kettanurak et al. (2001).

Table 3.1: Constructs, items, and measurement model results

Constructs, sources and items	**FL**	**CR**	**AVE**
Feedback (Jackson & Marsh, 1996)		0.895	0.741
While I am taking part in the clicker competition…			
FEE1. it is really clear to me that I am doing well.	0.794		
FEE2. I am aware of how many questions I am performing well.	0.890		
FEE3. I know how well I am doing.	0.895		
Perceived academic control (Perry et al., 2011)		0.882	0.715
CON1. The greater the effort, the better my performance.	0.811		
CON2. I consider myself responsible for the results of the clicker competition.	0.851		
CON3. I have a high degree of control over my performance on the clicker competition.	0.873		
Self-efficacy (Pintrich et al., 1991)		0.837	0.637
SELF1. I expected to do well.	0.857		
SELF2. I expected to receive an excellent grade.	0.890		
SELF3. I was confident I could learn interesting concepts.	0.619		
Value (Pintrich et al., 1991)		0.941	0.843
VAL1. I think the clicker competition is useful for me to learn the material.	0.914		
VAL2. I think I will be able to use what I have learnt through the clicker competition.	0.915		
VAL3. Understanding the material through the clicker competition is very important to me.	0.924		
Enjoyment (Jackson & Marsh, 1996)		0.950	0.865
ENJ1. I really enjoy the clicker competition.	0.914		
ENJ2. I feel good during the clicker competition.	0.950		
ENJ3. I found the experience with the clickers extremely rewarding.	0.924		

Table 3.1: Constructs, items, and measurement model results (continuance)

Constructs, sources and items	FL	CR	AVE
Pride (Pekrun et al., 2005)		0.885	0.721
PRI1. I feel proud if my group does better than other groups.	0.781		
PRI2. I am proud of the contributions I have made in my group.	0.891		
PRI3. When I contribute to my group winning, I get even more motivated.	0.872		
Boredom (Pekrun et al., 2005)		0.856	0.665
BOR1. I find the clicker competition fairly dull.	0.837		
BOR2. When I play the clicker competition I can't wait for the class to end because I feel bored.	0.828		
BOR3. I think about what else I might be doing rather than playing the boring clicker competition.	0.779		
Intrinsic motivation (Guay et al., 2000)		0.897	0.744
INT1. I find the clicker competition funny.	0.840		
INT2. I find the clicker competition interesting.	0.863		
INT3. I find the clicker competition pleasant.	0.883		
Extrinsic motivation (Pintrich et al., 1991)		0.806	0.583
EXT1. Getting a good grade in the clicker competition is the most satisfying thing for me right now.	0.802		
EXT2. I would like to get better grades than the other groups in the clicker competition.	0.668		
EXT3. I want to do well in the clicker competition because it is important to show my ability to my classmates and teachers.	0.812		
Perceived learning (Hamari et al., 2016)		0.928	0.812
PL1. The clicker competition was useful for my learning.	0.891		
PL2. The clicker competition helped me understand the material.	0.893		
PL3. The clicker competition helped me learn.	0.919		
Satisfaction (Kettanurak et al., 2001)		0.903	0.757
SAT1. I found the clicker competition valuable.	0.866		
SAT2. I was very satisfied with the clicker competition.	0.885		
SAT3. I had a very positive learning experience during the clicker competition.	0.859		

Note: FL: factor loadings; CR: composite reliability; AVE: average variance extracted

3.5. ANALYSES AND RESULTS

The hypotheses were tested using partial least squares (PLS) with the software SmartPLS 2.0. Compared to other methods, such as the covariance-based structural equation method, this methodology is appropriate when the interest of the study, as in our case, focuses on prediction and on theory development rather than on strong theory confirmation (Reinartz et al., 2009). In addition, PLS uses non-parametric procedures and therefore has less restrictive assumptions about the distribution of data. Although

PLS estimates both the measurement and structural models simultaneously, this analysis should be evaluated through two steps: analysis of the measurement model and analysis of the structural model.

3.5.1 Measurement model

First, the reliability and validity of the research constructs were assessed (see Table 3.2). The results showed that all standardised factor loadings were above 0.7 (Carmines & Zeller, 1979), which suggests that individual item reliability was adequate. In addition, all the constructs were internally consistent, since their composite reliabilities (CR) were greater than 0.7 (Nunnally & Bernstein, 1994). The constructs also met the convergent validity criteria, as the average variance extracted (AVE) values were above 0.5 (Fornell & Larcker, 1981). Finally, discriminant validity was also supported. In all cases, the AVE for any two constructs was greater than the squared correlation estimate, as shown in Table 3.2 (Fornell & Larcker, 1981).

Table 3.2: Discriminant validity

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
1. Feedback	0.74										
2. Academic control	0.19	0.71									
3. Self-efficacy	0.18	0.18	0.63								
4. Value	0.07	0.27	0.14	0.84							
5. Enjoyment	0.02	0.11	0.08	0.29	0.86						
6. Pride	0.21	0.26	0.15	0.19	0.14	0.72					
7. Boredom	0.01	0.00	0.04	0.02	0.10	0.01	0.66				
8. Intrinsic motivation	0.03	0.00	0.04	0.04	0.13	0.02	0.19	0.74			
9. Extrinsic motivation	0.12	0.24	0.12	0.13	0.12	0.26	0.02	0.01	0.58		
10. Perceived learning	0.07	0.19	0.15	0.68	0.24	0.11	0.05	0.07	0.11	0.81	
11. Satisfaction	0.05	0.12	0.07	0.45	0.53	0.11	0.06	0.13	0.08	0.43	0.75

Note: Values on the diagonal are the AVE. Off-diagonal elements are the squared correlations among constructs.

3.5.2. Structural model

To assess the significance of the path coefficients, a bootstrapping procedure with 5,000 subsamples was employed. Results of the structural estimation revealed that all the factorial loadings were significant at 1%. The model accounted for 24.7% of the

variance in intrinsic motivation, 28.6% in extrinsic motivation, 15.8% in perceived learning, and 47.7% in satisfaction with the gamified activity. The predictive relevance of the model was also assessed through the Stone–Geisser test. The results showed that the Q^2 value of this test for the dependent variables was positive. Therefore, it can be accepted that the dependent variables can be predicted by the independent variables and that the model presents predictive relevance. Table 3.3 presents the results of the structural model.

Table 3.3: Structural results

	Hypothesis	β	t-value	Supported
H1a	Feedback positively associated with perceived academic control	0.43	6.58***	Yes
H1b	Feedback positively associated with self-efficacy	0.42	8.55***	Yes
H1c	Feedback positively associated with value	0.25	3.83***	Yes
H2a	Perceived academic control positively associated with enjoyment	0.03	0.51	No
H2b	Perceived academic control positively associated with pride	0.33	6.10***	Yes
H2c	Perceived academic control positively associated with boredom	0.11	1.25	No
H3a	Self-efficacy positively associated with enjoyment	0.08	1.20	No
H3b	Self-efficacy positively associated with pride	0.17	1.97**	Yes
H3c	Self-efficacy negatively associated with boredom	-0.18	2.60***	Yes
H4a	Value positively associated with enjoyment	0.48	6.85***	Yes
H4b	Value positively associated with pride	0.19	2.58***	Yes
H4c	Value negatively associated with boredom	-0.14	1.59*	Yes
H5a	Enjoyment positively associated with intrinsic motivation	0.24	2.92***	Yes
H5b	Enjoyment positively associated with extrinsic motivation	0.17	2.14***	Yes
H6a	Pride positively associated with intrinsic motivation	0.00	0.07	No
H6b	Pride positively associated with extrinsic motivation	0.43	7.00***	Yes
H7a	Boredom negatively associated with intrinsic motivation	-0.36	5.53***	Yes
H7b	Boredom negatively associated with extrinsic motivation	-0.02	0.44	No
H8a	Intrinsic motivation positively associated with perceived learning	0.23	3.64***	Yes
H8b	Intrinsic motivation positively associated with satisfaction	0.32	5.47***	Yes
H9a	Extrinsic motivation positively associated with perceived learning	0.30	3.91***	Yes
H9b	Extrinsic motivation positively associated with satisfaction	0.24	2.66***	Yes
H10	Perceived learning positively associated with satisfaction	0.59	6.39***	Yes

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Regarding the effect of achievement emotions, the results show that enjoyment experience while using clickers was positively associated with both intrinsic (β=0.24; t=2.92) and extrinsic motivation (β=0.17; t=2.14), supporting H5a and H5b. The results also indicate that pride was associated with extrinsic motivation (β= 0.43; t=7.00), which gives support to H6a. However, pride did not exert a significant effect on intrinsic motivation (β=0.00; t=0.07), leading H6b to be rejected. Likewise, boredom predicted intrinsic motivation (β=-0.36; t=5.53), supporting H7a. However, H7b was not supported, as the relationship between boredom and extrinsic motivation was not significant (β=-0.02; t=0.44).

As expected, both intrinsic (β= 0.23; t=3.64) and extrinsic motivation (β=0.30; t=3.91) were positively associated with perceived learning, providing support for H8a and H9a. Likewise, as proposed in H8b and H9b, intrinsic (β=0.32; t=5.47) and extrinsic motivation (β=0.24; t=2.66) proved to be significant predictors of satisfaction. Finally, the results reveal a significant positive relationship between perceived learning and satisfaction (β=0.59; t=6.39). Therefore, H10 was also supported.

3.6. DISCUSSION

The popularity of clickers as a way to enhance the learning process has increased during the last few years. Therefore, a large number of studies have analysed their impact on students' learning outcomes. However, recent literature reviews on clickers have highlighted an important shortcoming of previous research. The existing literature has not integrated theoretical discussions about how clickers affect learning. With the aim of addressing this gap, this study draws on the control-value theory of achievement emotions as a theoretical framework to explain how the use of this technology can improve students' motivation, perceived learning, and satisfaction.

Overall, the results of our empirical study provide strong support for the use of clickers in academic settings as a tool to enhance the learning experience. Our findings reveal that feedback on achievement encourages students' perceived academic control and self-efficacy. Feedback provided by clickers also increases the subjective

importance of the activity in which clickers are used. Clickers provide students with instant feedback on their achievement, enabling them to evaluate their level of understanding of the material. If students are aware of their level of performance, they will be more confident and will have a higher degree of control over their future results. In addition, students will believe that the clicker activity is useful for them to learn.

According to the control-value theory, control and value-related appraisals are the main antecedents of achievement emotions. Regarding control appraisals, perceived academic control and self-efficacy positively predicted pride. Therefore, the intensity of this retrospective outcome emotion will be higher when students attribute their success to their abilities or efforts in preparation for the clicker activity. Likewise, self-efficacy correlated negatively with boredom. As such, students' beliefs about their ability to complete the clicker activity successfully will decrease the likelihood of boredom. Interestingly, enjoyment experienced while using clickers was not influenced by the level of perceived academic control or self-efficacy. A reason for this may be that, regardless of perceptions of control (both perceived academic control and self-efficacy), students enjoy the experience of using clickers as it is usually perceived as a funny and appealing activity. Similarly, perceived academic control was not associated with higher levels of boredom. Thus, boredom is induced independently of students' level of perceived academic control. Regarding value appraisals, value was found to have a positive effect on enjoyment and pride, and a negative effect on boredom. This finding confirms that when students perceive the clicker activity to be valuable, they will be more likely to experience positive and activating emotions, such as enjoyment and pride. By contrast, greater value will be associated with lower levels of negative and deactivating emotions, such as boredom.

Our results also show a direct impact of students' achievement emotions on their motivation. On the one hand, enjoyment experienced while using clickers encourages both intrinsic and extrinsic motivation. Likewise, pride positively predicts extrinsic motivation. However, contrary to predictions, pride experienced by students as a consequence of success does not make the clicker activity more intrinsically motivating for them. The fact that the clicker activity accounted for part of the students' final course grade could explain this result. On the other hand, negative emotions, such as

boredom, are detrimental for intrinsic motivation. In contrast, we were unable to derive support for the negative relationship between boredom and extrinsic motivation. As noted earlier, one reason for this could be that, regardless of students' perceptions of boredom while using clickers, they may be extrinsically motivated to participate in the competition due to the grades that they receive.

Finally, both students' intrinsic and extrinsic motivation are found to have a positive effect on perceived learning and satisfaction with the clicker activity. Additionally, students who consider the clicker activity to be useful for their learning are more satisfied with the use of this technology.

The current study offers a number of theoretical contributions. Prior studies on clickers have lacked theoretical frameworks in terms of the ways in which clickers influence learning outcomes (Chien et al., 2016; Hunsu et al., 2016). Therefore, this study extends previous clicker research by providing new insights into the effectiveness of this technology, building on the control-value theory of achievement emotions. While prior studies in classroom settings have demonstrated the importance of emotions for students' learning and achievement (Pekrun et al., 2002, 2009), few papers have investigated this relationship in the context of clicker use (see Stowell & Nelson, 2007 as an exception). An important contribution of this study is, therefore, to empirically analyse the achievement emotions experienced while using clickers, as well as their antecedents and consequences. In addition, our research overcomes limitations of previous clicker studies, such as a bias toward qualitative work, the narrow range of educational settings in which clickers have been explored (e.g., mathematics and science), and the absence of validity and reliability analysis of the measurement instruments (Fies & Marshall, 2006; Kay & LeSage, 2009).

Furthermore, existing research on achievement emotions has primarily investigated students' anxiety, yet only a relatively small number of studies have examined the development and influence of other achievement emotions. Therefore, this research provides insights into the effects of enjoyment, pride, and boredom, and responds to the calls for research to further investigate their effects (Pekrun, 2006; Pekrun et al., 2009; Peterson et al., 2015).

The findings of the present research also have a number of implications for educational practice. The use of clickers evokes different achievement emotions within students. Findings have suggested that positive (negative) emotions experienced by students will result in higher (lower) levels of motivation, perceived learning, and satisfaction. Therefore, instructors that use clickers in their classrooms should pay special attention to the design of the activity in which clickers will be used. Given that students' achievement emotions are influenced by their perceptions of control and value, instructors should highlight the benefits of clicker activities, as well as enhance students' sense of control. Instant feedback on achievement provided by clickers will help to achieve this objective.

There are several limitations to this study, which also suggest directions for further research. First, this study investigated three achievement emotions – enjoyment, pride, and boredom – as they are critical for students' learning and motivation. In order to gain a better understanding of emotions experienced by students while using clickers, further research should analyse other emotions, such as shame, anger, or anxiety, as they can also be experienced in academic settings and can affect students' performance. Second, only students using clickers were investigated. Therefore, further research should include a control group of non-users (e.g., students answering questions via other methods, such as hand raising) to investigate which method best favours students' motivation and learning. Third, in our research clickers were used with teams of four to five students. Thus, future research should compare the use of clickers by a single individual and their use in groups to analyse whether peer group discussions and collaborative learning as a result of using clickers encourage better learning outcomes. In addition, further studies should replicate the model in other disciplines and countries. Finally, the control-value theory of achievement emotions assumes the existence of reciprocal causation between achievement emotions, their effects, and their antecedents. Thus, additional longitudinal research could provide additional insight into probable reciprocal causation.

Despite these limitations, the findings reported in this study contribute to understanding of the influence of clickers on students' motivation, learning, and satisfaction. It is hoped that the conceptual framework drawn from the control-value

theory of achievement emotions and the results of the research offer some new insights into the reasons why the use of clickers may facilitate learning outcomes.

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CHAPTER IV

EXPLORING STUDENTS' FLOW EXPERIENCES IN BUSINESS SIMULATION GAMES

4.1. INTRODUCTION

Business simulation games are important motivational and learning tools that enable instructors to provide a bridge between theory and practice via active engagement (Loon et al., 2015). The use of business simulation games has grown over the years, being a widespread instructional tool (Faria et al., 2009). They have become increasingly popular for business studies in higher education, as well as for training in companies. Nowadays, business simulation games providers offer a range of comprehensive simulations games (e.g., general, industry specific and customised), that enable students and employees to manage a company within a risk-free environment. In addition, more and more organisations are using business simulation games within their recruitment processes. For instance, the well-known EY advisory company (earlier known as Ernst & Young) uses a business simulation game to recruit business students for its grant programme in Spain and USA. While previous literature recognises that simulation games have numerous benefits, such as enhancing the learning of work-related knowledge and skills (e.g., Sitzmann, 2011; Vogel et al., 2006), less is known about what factors contribute to their success (Matute & Melero, 2016).

Game-based learning research has demonstrated the importance of flow for students (e.g., Garris et al., 2002; Hamari et al., 2016). Indeed, it is widely recognised that games are more successful and engaging when they facilitate the flow experience (Kiili, 2005). This concept refers to a state of optimal experience and complete absorption in an activity (Csikszentmihalyi, 1975). During the optimal experience, concentration is so intense that nothing else seems to matter, time becomes distorted, and self-consciousness disappears. An activity that produces such experiences is so pleasant that people are willing to do it voluntarily, without being concerned about what they will get out of it (Csikszentmihalyi, 1990).

Although business simulation games provide opportunities for students to enter the flow state, few studies have investigated how flow theory applies to and accounts for students' learning outcomes in the specific context of business simulation games use. Thus, drawing on flow theory (Csikszentmihalyi, 1990), this research explores how the use of business simulation games is related to students' learning outcomes. The

objective of this study is, therefore, to investigate whether the flow experience when using business simulation games, and its antecedents, lead to positive learning outcomes. Specifically, we examine the relationship between four flow preconditions—challenge, skills, feedback, and goal clarity—and students' flow experience, operationalised as heightened absorption, enjoyment, and intrinsic motivation. We also explore the relationship between flow and students' development of generic skills, perceived learning, and satisfaction.

This study contributes to the extant literature in several ways. First, as noted by Hou and Li (2014), there is a lack of game-based learning research that empirically investigates game design elements (e.g., goals, feedback, challenges) and gaming experience (e.g., flow experience). In addition, there is a lack of empirical studies investigating the effectiveness of game-based teaching methods on learning (Girard et al., 2013). Therefore, this study sheds new light on what features of business simulation games are related to flow experiences, and the relationship between these experiences and students' development of generic skills, perceived learning, and satisfaction. Second, while previous studies have emphasised the importance of experiencing flow in educational contexts for students' learning and achievement, few have analysed this relationship in the context of business simulation games (for an exception, see Kiili et al., 2014). Thus, the current research advances knowledge by analysing the business game playing experience based on the concept of flow. Finally, the results can help both academia and industry understand how business simulation games can be used in the education sector to improve learning.

4.2. CONCEPTUAL FRAMEWORK AND RESEARCH HYPOTHESES

Flow theory provides a natural foundation from which to explain motivation in games and learning (Qian & Clark, 2016). The concept of flow was first introduced by Csikszentmihalyi (1975) to explain why some people—such as athletes, artists, and musicians—feel rewarded by executing actions per se, experiencing high enjoyment and fulfilment from the activity in itself. Csikszentmihalyi's (1975) findings revealed that flow is defined by nine dimensions. The first group of elements, known as flow

preconditions or antecedents, describes the qualifying factors of the activity for reaching the flow state: (1) flow seems to occur only when the challenge of the activity is well matched to the individual's skills; (2) there must be a clear establishment of goals; and (3) immediate feedback as to how well one is performing is also needed. The second group of elements related to flow corresponds to the dimensions of the flow experience, which is characterised by the following: (4) a state of intense and focused concentration on what the individual is doing; (5) the activity becomes spontaneous and almost automatic; (6) the individual also experiences a loss of self-consciousness and (7) has a sense of control over his or her actions; (8) there is a distortion of the temporal experience; and (9) the individual enters a state of autotelic experience indicated by the fact that the activity is perceived as intrinsically rewarding.

Despite these nine dimensions have been the basis for different studies to measure the flow state, as well as its conditions (e.g., Fu et al., 2009; Hamari & Koivisto, 2014; Jackson & Marsh, 1996; Jackson & Eklund, 2002; Kiili, 2005), not all studies use the same variables to measure this complex construct. In general, following Csikszentmihalyi's work, there is consensus that a balance of challenges and skills (Esteban-Millat et al., 2014; Ghani et al., 1991; Hamari et al., 2016; Wang & Hsu, 2014), immediate feedback about the process and clear goals (Guo et al., 2016; Hou & Li, 2014; Kiili et al., 2014; Tsai et al., 2016), are required to experience flow. On the contrary, no consensus exists about the best measures with which to capture this multifaceted construct (Pelet et al., 2017). For instance, Ghani et al. (1991) conceptualised flow as a combination of concentration and enjoyment, whereas Shin (2006) reported that the flow experienced was characterised by enjoyment, telepresence, focused attention, time distortion and engagement. Moon et al. (2014) proposed control, focused attention, curiosity and interest as dimensions of flow. More recently, Hamari et al. (2016) defined flow as a combination of engagement and immersion. Finally, other authors such as Kiili et al. (2014), Hou and Li (2014) and Tsai et al. (2016) considered concentration, time distortion, loss of self-consciousness and autotelic experience as the variables to measure flow.

Given the lack of consensus on a unique operationalisation, Bakker (2005) reviewed the most prominent definitions of flow and proposed that all descriptions have

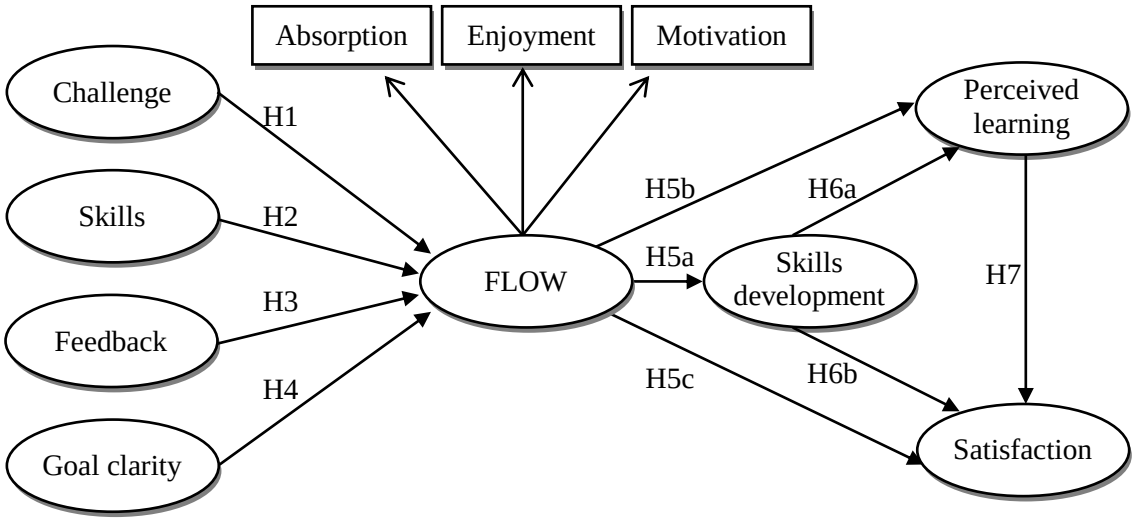
three elements in common: absorption, enjoyment, and intrinsic motivation. These three elements correspond to the core components of the flow state proposed by Csikszentmihalyi (1975). Absorption refers to a state of total concentration and immersion in an activity. Time flies and individuals forget everything else around them. This dimension relates to other concepts used in previous studies such as concentration (e.g., Guo & Ro, 2008; Jackson & Marsh, 1996; Klein et al., 2010), immersion (e.g., Fu et al., 2009; Hamari et al., 2016), and time distortion (e.g., Jackson & Eklund, 2002; Kiili, 2006; Klein et al., 2010). Enjoyment refers to the individuals' assessment of the quality of a certain activity, and has been included as a dimension of flow in previous studies, such as Agarwal and Karahanna (2000), Skadberg and Kimmel (2004), and Shin (2006). Finally, intrinsic motivation refers to the desire to perform a certain activity in order to experience the pleasure and satisfaction in undertaking the activity. This variable has also been referred to in prior studies as autotelic experience (Csikszentmihalyi, 1990; Guo & Ro, 2008; Hamari & Koivisto, 2014; Jackson & Marsh, 1996; Kiili, 2006; Procci et al., 2012; Wang et al., 2009) or intrinsic interest (Webster et al., 1993). The three-dimensional model of flow has been successfully applied to measure the flow state at schools as well as in work settings (Bakker, 2005; 2008). It has also been recently applied to the higher education context to study the effects of a board game on flow in undergraduate business students (Khan & Pearce, 2015).

Based on the previous literature review, the present study focuses on the analysis of the flow preconditions proposed by Csikszentmihalyi (1975) –namely challenge, skills, feedback and goal clarity– as they have been considered as the most important antecedents in flow research. In addition, to analyse students' flow experience when playing a business simulation game, the study uses the three components of flow proposed by Bakker (2005, 2008) –namely absorption, enjoyment and intrinsic motivation–, which correspond to the main dimensions of the flow state proposed by Csikszentmihalyi (1975) and are also common in numerous flow studies.

Figure 4.1 shows the proposed model underlying this research. Drawing on flow theory, the task challenge, students' skills, feedback provided by the business simulation game, and goal clarity during the game are proposed to be positively

associated with students' state of flow, which is composed by three dimensions: absorption, enjoyment and intrinsic motivation (Bakker, 2005). Following Siekpe (2005), flow is operationalised as a reflective second-order factor model. Finally, flow is proposed to be related to students' generic skills development, perceived learning, and satisfaction.

Figure 4.1: Proposed model



Business simulation games can provide the possibility of experiencing flow. For this to occur, the activity must meet certain prerequisites. Flow theory postulates that the task challenge, individuals' skill level, immediate feedback, and goal clarity are the main antecedents of the flow state. First, the possibility of experiencing flow is higher when the educational game can offer students challenges that are in correspondence with their skills (Kiili, 2005). The effect of challenges and skills on flow has been supported by prior studies in different contexts, such as problem-solving activities (Ghani et al., 1991), online learning (Guo et al., 2016; Shin, 2006), social media use (Pelet et al., 2017), computer-based instruction environments (Wang & Hsu, 2014), and mobile gaming (Su et al., 2016). Immediate feedback and goal clarity also induce people into a state of flow during a learning activity. The main purpose of feedback is to inform players about their performance and progression toward the goals (Kilii et al., 2014). Real-time feedback from the simulation game also helps to maintain students'

interest in it (Loon et al., 2015). Previous studies have confirmed these assumptions and found a positive impact of this precondition on students' flow experience (Guo & Ro, 2008). Having clear goals also helps students in achieving the state of flow (Guo et al., 2016; Shin, 2006). Game administrators need to carefully define and explain the objectives of the simulation to users (Adobor & Daneshfar, 2006), because when players' goals are clear they can more easily stay focused on the learning tasks (Kilii et al., 2014). According to these arguments, we propose:

H_1: Challenge is positively related to students' flow.

H_2: Students' skill level is positively related to their flow.

H_3: Feedback provided by the business simulation game is positively related to students' flow.

H_4: Goal clarity is positively related to students' flow.

The theory of flow is inherently related to learning (Shernoff & Csikszentmihalyi, 2009). This study explores the relationship between flow and students' development of generic skills, which is one of the most important learning outcomes within the context of business simulation game use (Borrajo et al., 2010; Fitó-Bertrán et al., 2014). This research also focuses on students' perceived learning, which represents a retrospective evaluation of the learning experience (Caspi & Blau, 2008), and students' satisfaction with the gamified activity, which is also an important learning outcome (Klein et al., 2010).

Learning has been found to be a consequence of the individuals' state of flow (e.g., Ghani et al., 1991; Hoffman & Novak, 1996; Skadberg & Kimmel, 2004; Webster et al., 1993), and evidence has indicated that flow can positively affect students' skills development, satisfaction, and perceived learning of the subject matter (Klein et al., 2010). Previous studies in different contexts, such as online learning (e.g., Esteban-Millat et al., 2014; Shin, 2006), computer-based instructional environments (Wang & Hsu, 2014), and game-based learning (Barzilai & Blau, 2014; Bressler & Bodzin, 2013; Hamari et al., 2016), have found that flow positively predicts students' learning. In

conventional business courses, Guo et al. (2007), and Klein et al. (2010) also demonstrated that flow is related to students' skills development, perceived learning, and satisfaction. Likewise, ample evidence has shown flow to be a strong predictor of students' satisfaction (e.g., Joo et al., 2013; Lee & Choi, 2013; Shin, 2006). Additionally, it has been argued that generic skills acquired while playing business simulation games have a significant positive influence on students' level of satisfaction (Fitó-Bertrán et al., 2015). Finally, previous research has suggested that students who perceive higher levels of learning tend to be more satisfied compared to those who perceive low levels of learning (e.g., Tao et al., 2009). Therefore, we propose:

H_5: Flow is positively related to (a) skills development, (b) perceived learning, and (c) satisfaction.

H_6: Skills development is positively related to (a) perceived learning and (b) satisfaction.

H_7: Perceived learning is positively related to satisfaction.

4.3. METHODOLOGY

4.3.1. Participants and data collection

The participants for this study were final-year business students at a major Spanish university. Participants were enrolled in a marketing course during the first semester of the academic year 2015–2016, and they met for two 120-minute weekly sessions to use a business simulation game. Data collection took place at the end of the semester after students had been exposed to the business simulation game. Participation in the study was voluntary and students were assured that non-participation would not affect their grades in any way. Anonymity and confidentiality of data was guaranteed for those who participated. Data was collected through a self-administered questionnaire. 8 non-valid questionnaires were discarded because they were incomplete, resulting in 167 valid questionnaires.

4.3.2. Materials

This study employed a business simulation game developed by Gestionet S.L., one of the most important Spanish simulation developers with extensive experience in designing simulators for universities and companies (http://www.simuladores-empresariales.com/). Some of its business simulation games have been used in recent academic work (see Pando-García et al., 2016). The business game used in this research is similar to other well-known business games, such as Capstone, The Business Strategy Game, Cesim Global Challenge, or Markstrat (see also Batko, 2016, for a recent review of the main business simulation companies and business simulation games). This novel simulator has a very realistic design and an attractive and user-friendly interface (sample screenshots can be seen online at http://www.simuladores-empresariales.com/simuladores/SimGestion.html). An important advantage of this business game is that it can be customised by instructors to meet the course objectives. It is also browser-based, so there is no need for software installation and works on any device with a web browser (e.g., a laptop, tablet, smartphone). Finally, it is available in two languages: Spanish and English.

The simulation game helped students to immerse themselves in an artificially created technology industry in which companies had the option of researching, manufacturing, and selling air conditioning products. Each company operated in simulated markets similar to those in the European Union, North America, and South America. Students had to make strategic decisions about which products to produce and in which markets those products could be commercialised, as well as to choose the most suitable competitive advantage for each product–market crossover (i.e., costs, technical quality, service, innovation, and image). Each company had one plant to operate and a workforce to manage, so students had to deal with inventory, quality controls, outsourcing, purchasing of new machinery, purchasing of raw materials, and human resources management, among others. Students also had to make decisions on marketing areas, such as pricing, distribution, and investments on media planning. Finally, students had to manage the financial area. All students within a group were involved in all decision-making tasks.

4.3.3. Briefing, action, and debriefing

The business simulation was designed by incorporating briefing, action, and debriefing sessions (Jones, 1980; Parker & Swatman, 1999). First of all, students were given a user manual, which was supplemented with teachers' explanations in class. During the briefing sessions, students learned the purpose and operation of the business simulation game, as well as how to use the software. To familiarise themselves with the simulation game, students were given a two-class period to practice an entire decision-making cycle (e.g., predicting customer demand, determining the production order, calculating prices, etc.).

During the action sessions, students were divided into teams of four to six members, which had access to at least three computers. While less than four members could be associated with perceived excessive workload, more than six members could trigger problems of "free riding". Each team managed a company to compete against five other companies run by other students, forming a competitive environment. A total of seven competitive environments took part in the study. The business simulation game included 10 rounds of decision making, each representing a time period of one semester. The instructor in charge of each environment monitored students to ensure that all of them participated in the discussions, avoiding the presence of free riders.

Debriefing is an essential part of simulation games (Crookall, 2010; Lederman, 1992; Peters & Vissers, 2004). Thus, intermediate and final debriefing were conducted. After each round, students evaluated their strategy and were able to see their progress in several different feedback forms, such as financial statements, market share, positioning studies, etc. The performance results of each team were also automatically displayed to students at the end of each round. The business simulation game gave a total score, up to a maximum of 1,000 points, to each group based on decisions made and results obtained. In addition, the simulator sent alerts to groups that were impacted by extraordinary events. In-game debriefing was also possible through oral, informal debriefing based mostly on discussions following the simulation. As pointed out by Peters and Vissers (2004), it is useful for teachers to analyse the game scene with all students after playing stops, in order to make a joint analysis of what has happened.

Thus, after students had analysed feedback from the simulator, the teachers went group by group to guide students through a reflective process about their learning. During debriefing, the teachers drew associations between the simulations and the real world and encouraged students to see patterns of behaviour. However, as noted by Parker and Swatman (1999), oral, informal debriefing alone is not sufficient for effective learning, as students are more focused on completing their next tasks rather than on reflecting and discussing the previous rounds' results and experiences with teachers. Thus, intermediate debriefing was supplemented by final written debriefing. Immediately after the last round of the game, students were asked to answer questions concerning their opinions and impressions of the gaming experience. In addition, three final debriefing sessions were introduced at the conclusion of the business simulation game. During these sessions, students were required to write reflective essays in which they deeply analysed strategies and decision making during game play. Teachers asked the students to draw some conclusions about factors that might have affected their competitive position in different markets, and the reasons for success and/or failure. During the final session, the students explained what they had done to the rest of the class and answered both teachers and other groups' questions. Thus, all groups beneficiated from their peers' reflections on the gaming experience.

4.3.4. Measurement instrument

Well-established scales were employed to measure the constructs included in the model. In all cases, seven-point Likert scale items were used, ranging from 1 (strongly disagree) to 7 (strongly agree). Table 4.1 provides an overview of the measures used, while the full questionnaire can be found in Appendix 2.

Table 4.1: Constructs, items, and measurement model results

Constructs, sources, and items	FL	CR	AVE
Challenge (Novak et al., 2000)		0.909	0.716
CHA1. Playing the business simulation game (BSG) challenges me.	0.732		
CHA2. Playing the BSG challenges me to perform to the best of my ability.	0.914		
CHA3. Playing the BSG provides a good test of my skills.	0.876		
CHA4. I find that the BSG stretches my capabilities to the limits.	0.852		
Skills (Novak et al., 2000)		0.842	0.573
SKI1. I am extremely skilled at playing the BSG.	0.781		
SKI2. I consider myself knowledgeable about playing the BSG.	0.798		
SKI3. I know somewhat more than most of my colleagues about the BSG.	0.768		
SKI4. I know how to find what I am looking for when playing the BSG.	0.674		
Feedback (Fu et al., 2009)		0.897	0.745
FEE1. While I am playing the BSG, I receive feedback on my progress in the game.	0.894		
FEE2. While I am playing the BSG, I am notified of the results of decision making.	0.804		
FEE3. While I am playing the BSG, I receive information on my score within the BSG.	0.888		
Goal clarity (Jackson & Marsh, 1996)		0.919	0.791
At the beginning of the business simulation game…			
GOA1. the goals were clearly defined.	0.844		
GOA2. I knew what I had to do.	0.906		
GOA3. I knew what I had to achieve.	0.916		
Flow (Bakker, 2008; Khan & Pearce, 2015)		0.946	0.595
Absorption			
When I am playing the business simulation game…			
ABS1. I think about nothing else.	0.681		
ABS2. I get carried away by the game.	0.687		
ABS3. I forget everything else around me.	0.725		
ABS4. I am totally immersed in the game.	0.760		
Enjoyment			
ENJ1. Playing the BSG gives me a good feeling.	0.796		
ENJ2. I get a lot of enjoyment from playing the BSG.	0.787		
ENJ3. I feel happy whilst playing the BSG.	0.838		
ENJ4. I feel cheerful when I play the BSG.	0.855		
Motivation			
MOT1. I would still play the BSG, even if I was not rewarded for it.	0.771		
MOT2. I find that I also want to play the BSG in my free time.	0.791		
MOT3. I play the BSG because I enjoy it.	0.870		
MOT4. I get my motivation from playing the BSG, and not from the reward of winning it.	0.663		

Table 4.1: Constructs, items, and measurement model results (continuance)

Constructs, sources, and items	FL	CR	AVE
Skills development (Borrajo et al., 2010; Fitó-Bertrán et al., 2014; Loon et al., 2015)		0.900	0.644
SD1. Decision making.	0.829		
SD2. Working under pressure.	0.812		
SD3. Adapting to new situations.	0.843		
SD4. Teamwork.	0.750		
SD5. Applying theory into practice.	0.776		
Perceived learning (Tiwari et al., 2014)		0.924	0.754
PL1. The BSG helped me understand the practical integration of business functions.	0.856		
PL2. The BSG helped me develop and analyse competitive advantages for my business.	0.854		
PL3. The BSG gave me a thorough understanding of the target market.	0.878		
PL4. The BSG gave me a thorough understanding of the products' positioning.	0.884		
Satisfaction (Kettanurak et al., 2001)		0.931	0.817
SAT1. Overall, I found the BSG valuable.	0.900		
SAT2. Overall, I was very satisfied with the BSG.	0.887		
SAT3. Overall, I had a very positive learning experience.	0.925		

Note: FL: factor loadings; CR: composite reliability; AVE: average variance extracted

4.4. ANALYSES AND RESULTS

To test the hypotheses, partial least squares (PLS), a variance-based structural equation technique, was employed. Specifically, the software SmartPLS 3 was used (Ringle et al., 2015). Compared to other methods, such as the covariance-based structural equation method (CBSEM), PLS is more suitable when the focus of the study, as in our case, in on prediction and on theory development rather than on strong theory confirmation, and the sample size is lower than 250 (Reinartz et al., 2009). PLS is also advisable when the conceptual model is complex and includes many indicators and latent variables (Chin, 2010; Hair et al., 2011). In addition, this methodology involves non-parametric procedures and therefore has less restrictive assumptions about the distribution of data.

First, the reliability and validity of the constructs were assessed (see Table 4.1). Following Bakker (2005), flow is defined as an experience that is characterised by

absorption, enjoyment, and intrinsic motivation. Coherently with previous conceptualisations (Siekpe, 2005), flow was conceived as a second-order reflective construct with three dimensions (absorption, enjoyment and intrinsic motivation), which in turn were measured by their indicator variables. The results showed that all standardised factor loadings were above 0.6, which suggests that individual item reliability was adequate. In addition, all the constructs were internally consistent, since their composite reliabilities (CR) were greater than 0.7. The constructs also met the convergent validity criteria, as the average variance extracted (AVE) values were above 0.5. Finally, discriminant validity was also supported. The square of the correlation between two constructs was less than the AVE estimates of the two constructs for all pairs of constructs (Farrell, 2010; Fornell & Larcker, 1981).

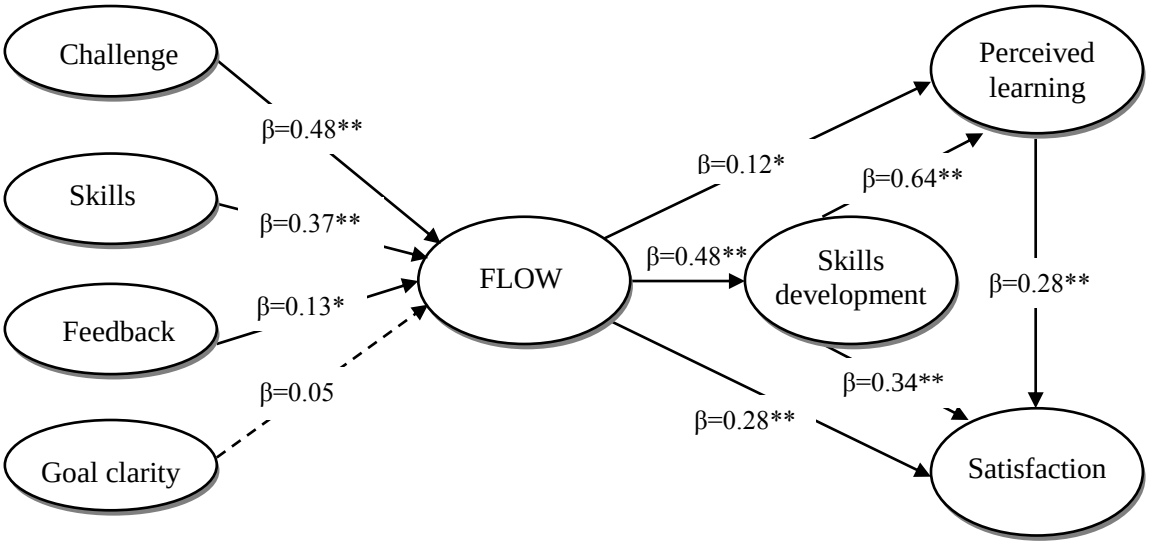
The proposed model was then tested. To assess the significance of the path coefficients, a bootstrapping procedure, which represents a non-parametric approach for estimating the precision of the PLS estimates, with 5,000 subsamples was used. The preconditions of flow (challenge, skills, immediate feedback, and goal clarity) accounted for 55.0% of the variance of students' level of flow. Likewise, the model explained 22.8%, 50.1%, and 56.5% of the variance in skills development, perceived learning, and satisfaction, respectively. The Stone–Geisser test criterion (Q^2) exceeded the threshold of 0 for all dependent variables, thereby supporting the predictive relevance of the model. Figure 4.2 presents the results of the structural model.

The results indicate that the challenge provided by the business simulation game (β=0.48; t=8.05), as well as students' skills to meet the challenge (β=0.37; t=5.51), were positively associated with students' flow experienced during the simulation game. Thus, H1 and H2 are supported. As proposed in H3, feedback provided by the business simulation game was positively associated with students' flow (β=0.13; t=2.27). By contrast, the relationship between goal clarity and the level of flow experienced by students was not statistically significant (β=0.05; t=0.07), leading H4 to be rejected.

The results also show that the level of flow experienced by students during the simulation game was positively and significantly associated with their generic skills development (β=0.48; t=7.34), perceived learning (β=0.12; t=1.65), and satisfaction

with the activity (β=0.28; t=4.35), supporting H5a, H5b, and H5c. Students' perceptions of their skills development were positively related to both their perceptions of learning (β=0.64; t=9.74) and their satisfaction with the simulation game (β=0.34; t=4.03), which supports H6a and H6b. Finally, the results reveal a significant positive relationship between students' perceived learning and satisfaction (β=0.28; t=3.33). Therefore, H7 is also supported.

Figure 4.2: Structural results



Note: *p<0.05; **p<0.01. The relationships that were not significant are shown using broken lines.

4.5. DISCUSSION

Business simulation games enable instructors to provide a bridge between theory and practice (Loon et al., 2015), as well as to deliver valuable skills through a medium that students find highly engaging (Vos & Brennan, 2010). This study confirms that the use of simulation and game-based learning enhances the player experience. Overall, the findings of this study provide strong support for the use of business simulation games in academic settings as a tool to promote flow experiences, which is positively associated with students' skills development, perceived learning and satisfaction. Regarding the influence of flow antecedents on the flow experience, our findings confirm that if students feel that their ability or skill level is adequate for the challenges presented

during the business simulation game, they will experience flow in terms of absorption, higher enjoyment, and higher intrinsic motivation. This finding supports the conclusions of previous studies in different contexts that proposed a balance of skills and challenge as a key requirement for reaching the state of flow (e.g., Ghani et al., 1991; Guo et al., 2016; Kiili, 2005; Pelet et al., 2017; Shin, 2006; Su et al., 2016). Likewise, our findings suggest that feedback received during the business simulation game, in terms of how well the group is performing, is positively related to students' likelihood of engaging in the activity. This is in line with previous studies which reported that immediate feedback during an activity was related with experiencing more flow (e.g., Guo & Ro, 2008; Loon et al., 2015). Contrary to predictions, our findings do not show a significant effect of goal clarity on flow. A reason for this may be that regardless of perceptions regarding goal clarity, students enter a state of flow because they enjoy the experience of playing the business simulation game as it is perceived as a fun and engaging activity.

Our results also show a positive association between students' level of flow experienced while playing business simulation games and the development of generic skills, perceived learning, and satisfaction. This finding demonstrates the importance of experiencing flow within a learning context (Hoffman & Novak, 1996; Skadberg & Kimmel, 2004; Webster et al., 1993). Finally, the results of the study suggest that students who consider the business simulation game to be useful for the development of generic skills will perceive an enhancement in their learning and will be more satisfied with the game. In the same vein, students who consider the business simulation game to be useful for their learning will be more satisfied with the use of this technology.

The current study offers a number of theoretical contributions. First, although a large number of studies (e.g., Doyle & Brown, 2000; Fitó-Bertrán et al., 2014, 2015; Kiili et al., 2014; Pasin & Giroux, 2011; Tao et al., 2012) have analysed the impact of business simulation games on students' learning outcomes, little is known about what specific factors contribute to their success (Matute & Melero, 2016). Likewise, there is a lack of game-based learning research that has empirically investigated both game design elements (e.g., goals, feedback, challenges) and gaming experience (e.g., flow experience) (Hou & Li, 2014). In addition, there is a lack of empirical studies

investigating the effectiveness of game-based teaching methods in learning (Girard et al., 2013). Therefore, drawing on the concept of flow, this study sheds new light on what features of business simulation games promote flow experiences, as well as on the relationship between flow and students' development of generic skills, perceived learning, and satisfaction. Second, while prior studies have emphasised the importance of experiencing flow in educational contexts for students' learning, few have analysed this relationship in the context of business simulation games. Therefore, this study extends previous research by exploring the role of flow in this specific context.

This research offers suggestions for instructors with respect to designing classes that promote flow experiences and engage students by having them play business simulation games. First, instructors should provide students with the correct level of challenge, which is neither too high nor too low, in order to meet students' level of skills. As such, the difficulty of decision-making during the business simulation game must be balanced with explanations given by the instructors in class, as well as the materials provided to students (e.g., users' manual, PowerPoint slides), which must give them the necessary knowledge to make decisions correctly. Because the players' skills are likely to improve after playing the simulation game a few times, the challenges that students are facings, such as competing among other companies to sell more products in a market, will depend not only on the simulation design, but also on how well the other companies are performing. Thus, a constantly evolving challenge can be guaranteed. Business simulation games should also be designed to adequately provide students with immediate feedback in real time to enable them to understand how well they are performing and how the activity is proceeding. For instance, students need to know different market information, such as competitors' prices and sales, profits, product positioning, etc., to reorient their own strategy. In addition, internal information, such as cost per unit, is also required to manage the company more efficiently. Moreover, instructors should consider the underlying dimensions of the flow experience, as these dimensions contribute to developing skills that are valuable in the business world, as well as enhancing learning performance and satisfaction. Thus, business simulation games should be adequately designed with respect to encouraging absorption, enjoyment, and a sense of intrinsic motivation. Finally, instructors should pay attention to debriefing sessions (such as feedback during the game, discussions with teachers, or

writing reflective essays), as these improve the potential of business simulation games to benefit learning.

As with any research, several limitations exist. First, although absorption, enjoyment, and intrinsic motivation correspond to the core components of the flow state proposed by Csikszentmihalyi (1975), they are not the only measurement of flow. Second, this study has used retrospective measures of flow. While most studies have used questionnaires and retrospective measures of flow (e.g., Pelet et al., 2017), Csikszentmihalyi and LeFevre (1989) recommended using the experience sampling method to measure respondents' flow experience. Third, another limitation of this study is the use of self-report measures. As the questionnaire was answered anonymously, we could not link students' responses to objective measures of student performance, such as student grades. Therefore, future research should also include objective measures of students' performance (e.g., student grades) to further explore whether students' flow influences their learning. Fourth, due to the cross-sectional design of the study, causal inferences cannot be made. Finally, while the findings provide new insights into the effectiveness of business simulation games, we acknowledge that the improvement in students' development of generic skills, perceived learning, and satisfaction may not be exclusively related to playing the game itself, but also to the debriefing sessions. Future research could use a robust experimental research design that compares users of business simulation games without debriefing, and users of business simulation games with debriefing.

Despite these limitations, the findings reported in this study contribute to understanding how business simulation games can improve the development of skills, students' perceived learning, and satisfaction. It is hoped that the conceptual framework drawn from flow theory and the results of the research offer some new insights into the reasons why the use of business simulation games may facilitate learning outcomes.

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CHAPTER V

ENCOURAGING INTRINSIC MOTIVATION IN MANAGEMENT TRAINING: THE USE OF BUSINESS SIMULATION GAMES

5.1. INTRODUCTION

The use of games and gamification has received increasing attention in the literature in the last few years (Buckly & Doyle, 2016; Kasurinen & Knutas, 2018). The growing interest in games stems from the idea that they influence behaviour by affecting motivation. Gaming environments have great appeal, and players are highly motivated to engage in them (Ryan et al., 2006). Among the different types of motivation, intrinsic motivation is the most desirable form and has been related to positive outcomes, such as improved psychological well-being or learning outcomes (Ryan & Deci, 2000). When intrinsically motivated, people perform activities for the positive feelings resulting from the activities themselves. They display curiosity, explore novel stimuli, and work to master optimal challenges (Deci, 1975; Deci & Ryan, 2008). Compared to people who are externally controlled regarding an action, those whose motivation is intrinsic have more interest, which in turn manifests as enhanced performance (Deci & Ryan, 1991).

In the context of management training, business simulation games are one of the most effective tools for motivating and engaging players actively in the learning experience (Vos & Brennan, 2010). In addition, the fast development of information technology has allowed business games to innovate, evolve, and spread (Baldissin et al., 2013). Business simulation games allow students to address educational contents in a more interactive and enjoyable way (Pando-García et al., 2016). When playing business simulation games, players are more excited and become actively involved in the decision-making process (Ben-Zvi, 2010). In fact, previous research has provided evidence of the positive benefits of using simulation games (e.g., Sitzmann, 2011; Vogel et al., 2006). However, the results of the meta-analysis by Wouters et al. (2013) showed that serious games, such as simulation games, were no more motivating than conventional instruction. Therefore, understanding which factors support intrinsic motivation in management training with business simulation games is of primary importance.

In this study, we explore players' intrinsic motivation while playing business simulation games on management education under the lens of self-determination theory

(SDT; Deci, 1975). SDT is a widely researched theory of human motivation that is applicable to activities in the major spheres of life, such as education, work, and play (Deci et al., 2017; Thaggard, 2010). According to SDT (Deci, 1975), contexts that support satisfaction of the three innate psychological needs for competence (i.e., experience mastery and effectiveness), autonomy (i.e., the ownership of one's behaviour), and relatedness (i.e., feeling of being connected to others) will allow individuals to maintain intrinsic motivation (Deci et al., 1996). SDT seems particularly suitable for investigating motivation in business simulation games, as the theory has been applied to analyse motivation in different gaming contexts, such as gamified courses (Hanus & Fox, 2015), videogames (Peng et al., 2012; Przybylski et al., 2010; Ryan et al., 2006; Sepehr & Head, 2017), and massively multiplayer online games (MMOGs; Eseryel et al., 2014). However, to the best of our knowledge, no one has empirically applied this theory in the context of business simulation games.

Therefore, drawing on this theory, our fundamental hypothesis is that business simulation games enable intrinsic motivation through the satisfaction of the basic psychological needs. As such, we hypothesise that business simulation games are primarily motivating to the extent that players satisfy their needs for competence, autonomy, and relatedness while playing. We also look at the outcomes derived from the use of business simulation games. Specifically, we hypothesise that intrinsic motivation while playing business simulation games will facilitate engagement. In addition, we explore the impact of intrinsic motivation and engagement on the development of generic skills and perceived learning.

This study contributes to the literature in a number of ways. First, building on SDT, we provide a conceptual framework through which to understand which factors may promote players' intrinsic motivation in business simulation games. Second, this study extends previous knowledge by examining the consequences of intrinsic motivation in terms of engagement, development of generic skills, and perceived learning. In particular, while previous studies have noticed that the use of business simulation games seems to have a positive impact on students in terms of "*increasing engagement in their studies*" (Loon et al., 2015; p. 232), engagement has not been analysed according to its multidimensional nature, which includes cognition, emotion,

and behaviour (Fredricks et al., 2004). The measures used have been very simple and have not reflected the true magnitude of the construct. Thus, this study fills this gap by assessing the three dimensions. Finally, the results can help academia and industry to understand how business simulation games used in management training must be designed to improve motivation, engagement, and learning.

5.2. THEORETICAL FRAMEWORK AND RESEARCH HYPOTHESES

Self-determination theory (Deci, 1975) is an approach to human motivation that advances the classical division of motivation to identify distinct types of motivation depending on the perceived forces that move a person to act (Ryan & Deci, 2000). Intrinsically motivated activities are defined as "*those that individuals find interesting and would do in the absence of operationally separable consequences*" (Deci & Ryan, 2000; p. 233). On the other hand, according to SDT, extrinsically motivated behaviours can vary in the degree to which they are self-determined or autonomous versus controlled, ranging from external regulation to introjection, identification, and integration (Deci & Ryan, 2000). Finally, SDT posits amotivation as the lack of both intrinsic and extrinsic motivation (Deci & Ryan, 2000).

As noted earlier, of all the different types of motivation, intrinsic motivation is the most desirable (Deci & Ryan, 1991). Thus, significant attention has been given to the study of the conditions that enhance versus undermine intrinsic motivation (Deci & Ryan, 2000). According to cognitive evaluation theory (CET; Deci & Ryan, 1985; Ryan & Deci, 2000), a subtheory within SDT, factors that enhance a person's satisfaction of his or her basic psychological needs support intrinsic motivation, whereas factors that diminish need satisfaction undermine intrinsic motivation.

SDT defines needs as "*innate psychological nutriments that are essential for ongoing psychological growth, integrity, and well-being*" (Deci & Ryan, 2000; p. 229). Humans have three fundamental needs: competence, autonomy, and relatedness, and the satisfaction of these needs is essential for an individual's intrinsic motivation (Ryan & Deci, 2000). Competence refers to the experience of behaviour as effective and

masterful (White, 1959). It is related to the need for challenge and the ability to produce desired outcomes. CET argues that socio-contextual factors that conduce feelings of competence during action (e.g., optimal challenges and effectance-promoting feedback) can enhance intrinsic motivation for that action (Ryan & Deci, 2000). Besides competence, CET specifies that intrinsic motivation needs individuals to experience a sense of autonomy. Autonomy refers to the experience of one's behaviour as choiceful (de Charms, 1968). This relates to the desire to self-organise experiences and act in accordance with one's own sense of self. Finally, CET underlines the importance of building positive interpersonal relationships for intrinsic motivation (Ryan & Deci, 2000). In this sense, relatedness refers to the experience of connection with others (Baumeister & Leary, 1995). In academic contexts, relatedness refers to students' feeling of belonging in the classroom, as well as the quality of the relationships between students and teachers (Reeve, 2006). In gaming contexts, relatedness refers to the quality of the relationships among players (Ryan et al., 2006). If these three needs are satisfied, growth and development result and intrinsic motivation for the task increases. When the three needs are not met, negative emotions may result and intrinsic motivation is undermined (Wang et al., 2008).

Previous studies in academic contexts have empirically examined the relationship between satisfaction of the basic needs for autonomy, competence, and relatedness and intrinsic motivation, finding that when the basic needs are satisfied, learners will show higher intrinsic motivation (Chen & Jang, 2010; Vallerand et al., 1997). SDT has also been used to explain the motivations of players. For instance, Ryan et al. (2006) found that games are motivating to the extent that players experience autonomy, competence, and relatedness while playing. Previous studies have also confirmed that experiences of competence, autonomy, and relatedness are major contributors to game enjoyment and intrinsic motivation for videogame players (Przybylski et al., 2010; Tamborini et al., 2010). According to this, we hypothesise that business simulation games will facilitate intrinsic motivation if they satisfy players' psychological needs.

H_1: Need satisfaction has a positive impact on intrinsic motivation.

According to SDT, contexts that facilitate satisfaction of the three basic psychological needs (and therefore foster intrinsic motivation) yield the most-positive psychological, developmental, and behavioural outcomes (Ryan & Deci, 2000). In this study, we focus on the impact of intrinsic motivation on three outcomes: players' engagement; players' development of generic skills, which has been shown to be one of the most important learning outcomes within the context of business simulation games (Borrajo et al., 2010; Fitó-Bertrán et al., 2014); and players' perceived learning in the field of management, which represents a retrospective evaluation of the learning experience (Caspi & Blau, 2008).

The concept of engagement has received considerable attention across a number of academic disciplines (Hollebeek et al., 2014). In particular, there has been increasing interest in this construct in relation to academic contexts (Skinner & Pitzer, 2012) and, more specifically, technology-mediated learning contexts (Henrie et al., 2015). In this sense, engagement refers to "*the quality of effort students make to perform well and achieve desired outcomes*" (Sun & Rueda, 2012; p. 193).

When analysing this construct, it is important to distinguish between the indicators of engagement and the facilitators of engagement (Sinclair et al., 2003). On the one hand, indicators of engagement refer to "*the features that belong inside the construct of engagement proper*" (Skinner et al., 2008; p. 766). Fredricks et al. (2004) describe engagement as a multifaceted construct comprising cognitive, emotional, and behavioural dimensions. According to these authors, cognitive engagement refers to learners' efforts in understanding what is being taught; emotional engagement refers to the feelings that learners have about the learning experience, such as interest, enjoyment, boredom, or frustration; finally, behavioural engagement includes behaviours necessary to academic success, such as participation and attendance. On the other hand, facilitators of engagement refer to "*the causal factors (outside the construct) that are hypothesized to influence engagement*" (Skinner et al., 2008; p. 766), such as motivation.

Previous studies have found that motivational and learning factors such as interest, self-efficacy, and self-regulation positively influence student engagement

(Bates & Khasawneh, 2007; Kanuka, 2005). Sun and Rueda (2012) also found that there was a positive correlational relationship between interest and all types of engagement (cognitive, emotional, and behavioural engagement). Finally, in a gaming context, enjoyment resulting from the satisfaction of the three psychological needs has also been found to increase gaming engagement (Boyle et al., 2012). Thus, we propose the following hypothesis:

H_2: Intrinsic motivation has a positive impact on engagement.

Previous studies in the context of education have shown that supporting intrinsic needs facilitates deeper and more-internalised learning (Deci et al., 1996; Rigby & Przybylski, 2009). Research has also shown that students who are intrinsically motivated express more creativity (Moneta & Siu, 2002), are more likely to persist on tasks (Vallerand & Bissonnette, 1992), retain more knowledge (Lepper & Cordova, 1992), and exhibit higher academic performance and achievement (Deci & Ryan, 1985; Hanus & Fox, 2015). In a gaming context, the intrinsic motivation of players has also been shown to positively affect persistence in gameplay (Neys et al., 2014), whereas in an online gamified learning intervention, Buckly and Doyle (2016) found that those students who were intrinsically motivated reported an improvement of their general knowledge about the tax system.

In addition, engagement has been found to be a robust predictor of students' learning, grades, and retention (Fredricks et al., 2004; Reeve, 2013). Specifically, previous research has analysed the impact of cognitive, emotional, and behavioural engagement on important educational outcomes, such as academic achievement (Fredricks et al., 2004; Hughes et al., 2008), satisfaction (Filak & Sheldon, 2008), and students' persistence in learning (Fredricks et al., 2004).

We therefore propose that intrinsic motivation and engagement while playing business simulation games will positively predict both skill development and perceived learning.

H_{3a}: Intrinsic motivation has a positive impact on skill development.

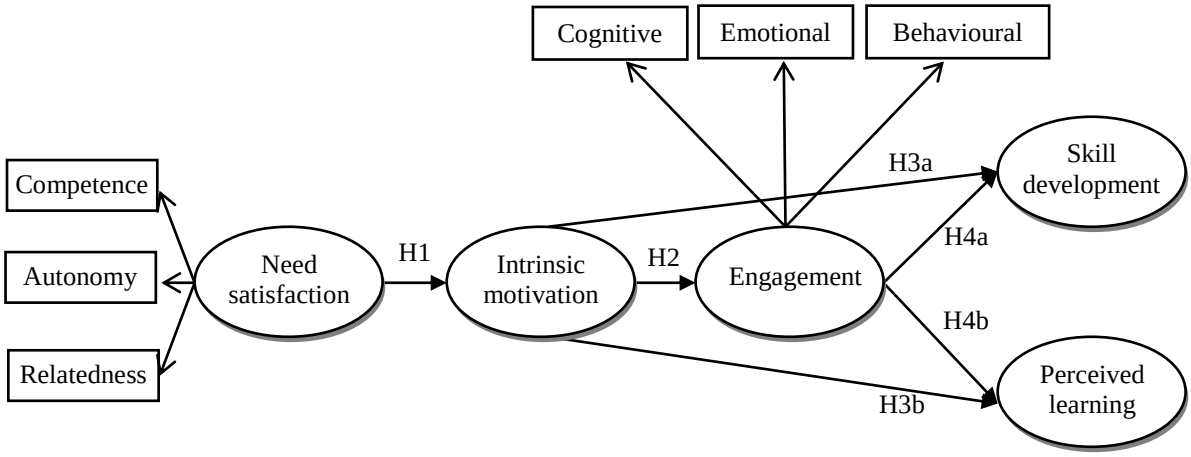
H_{3b}: Intrinsic motivation has a positive impact on perceived learning.

H_{4a}: Engagement has a positive impact on skill development.

H_{4b}: Engagement has a positive impact on perceived learning.

Figure 5.1 presents the proposed model underlying this research.

Figure 5.1: Proposed model



5.3. METHODOLOGY

5.3.1. Data collection and participants

Participants were final-year business students who played a business simulation game at a major Spanish university in a semester-long course. Data was collected during two academic years: 2015-16 and 2016-17, at the end of each semester after the last gaming session. Players were asked to answer a self-administered Likert-style questionnaire. Participation in the study was voluntary, and the anonymity and confidentiality of data were guaranteed for the 360 individuals who participated.

5.3.2. Procedure

This study employed a business simulation game developed by Gestionet S.L., one of the most important Spanish simulation developers with extensive experience in designing simulators for universities and companies (http://www.simuladores-

empresariales.com/). Some of its business simulation games have been used in recent academic work (Pando-García et al., 2016).

During the first sessions, the instructors explained the game and the software to the players. Once the game had been explained, players were divided into teams of 4–6 members. Each team managed a company to compete against other companies run by other players, forming a competitive environment. The business simulation game included ten rounds of decision-making by teams. In each round, players had to immerse themselves in an artificially created technology industry to manufacture and sell different air-conditioning products in three simulated markets similar to the markets in the European Union, North America, and South America. Besides making strategic decisions about which products to commercialise in which markets, players had to manage one productive plant, so they had to deal with inventory, quality controls, outsourcing, and purchasing new machinery, among others. Finally, players had to make decisions on marketing areas (such as pricing, distribution, and investments in media planning) and on managing finances.

5.3.3. Measures

In studies of motivation, it is important to distinguish among needs (i.e., competence, autonomy, and relatedness), regulations (e.g., intrinsic motivation), and responses or consequences (in our case: engagement, skill development, and learning) (Ryan & Deci, 2000). Following Neys et al. (2014), the need and regulation modes were measured by use of the Player Experience of Need Satisfaction (PENS) scale and the Situational Motivational Scale (SIMS), respectively. The PENS scale was developed by Ryan et al. (2006) to measure in-game satisfaction regarding competence, autonomy, and relatedness. In this study, need satisfaction has been adapted from Neys et al. (2014), who applied the PENS instrument in a videogame setting. Intrinsic motivation has been adapted from Guay et al. (2000), who based their work on the SDT approach of Deci and Ryan (2000) to create the SIMS to assess motivation in digital gaming. Regarding the consequences of motivation, emotional and behavioural engagement were measured following Reeve (2013), drawing on Skinner et al. (2008), whereas cognitive engagement was assessed through the Metacognitive Strategies Questionnaire

(Wolters, 2004). The perceived learning measure was adapted from Tiwari et al. (2014). Finally, the selected skills hypothesised to be enhanced by the use of business simulation games –namely, decision-making, working under pressure, teamwork, and applying theory in practice– have been highlighted in previous work as the most relevant skills acquired when playing these games (e.g., Borrajo et al., 2010; Fitó-Bertrán et al., 2014; Loon et al., 2015). In all cases, seven-point Likert scale items were used, ranging from 1 (strongly disagree) to 7 (strongly agree). Table 5.1 provides an overview of all the measures used, whereas the questionnaire can be found in Appendix 2.

Table 5.1: Constructs, items, and measurement model results

Constructs and items	**FL**	**CR**	**AVE**
Need satisfaction		0.903	0.511
Competence			
COM1. I feel competent at the business game	0.782		
COM2. I feel very capable when playing the business game	0.762		
COM3. I feel effective in the business game	0.735		
Autonomy			
AUT1. I experienced a lot of freedom in the business game	0.695		
AUT2. The business game provides me with interesting options and choices	0.762		
AUT3. I could always find something interesting in the business game to do	0.761		
Relatedness			
REL1. I find the relationship with my group mates gratifying	0.691		
REL2. I find the relationship with my group mates important	0.607		
REL3. I feel close to my group mates	0.612		
Intrinsic motivation		0.913	0.779
INT1. I think that the business game is interesting	0.878		
INT2. I think that the business game is pleasant	0.906		
INT3. I think that the business game is fun	0.864		

Table 5.1: Constructs, items, and measurement model results (continuance)

Constructs and items	FL	CR	AVE
Engagement		0.922	0.543
Cognitive engagement			
When I am playing the business game…			
COG1. I try to connect it with what I am learning through my degree	0.649		
COG2. I try to make all the decisions fit together and make sense	0.760		
COG3. I try to relate what I am learning to what I already know	0.733		
Emotional engagement			
When I am playing the business game…			
EMO1. I feel good	0.647		
EMO2. I feel interested	0.818		
EMO3. I have fun	0.691		
EMO4. I feel involved	0.774		
Behavioural engagement			
When I am playing the business game…			
BEH1. I try hard to do well in the game	0.828		
BEH2. I participate in group discussions	0.755		
BEH3. I listen very carefully to the teacher	0.692		
Skill development		0.907	0.660
SD1. Decision-making	0.847		
SD2. Working under pressure	0.814		
SD3. Teamwork	0.828		
SD4. Applying theory in practice	0.800		
SD5. Adapting to new situations	0.771		
Perceived learning		0.928	0.763
PL1. The business game helped me to understand the integration of business functions	0.871		
PL2. The business game helped me to understand how to analyse competitive advantages for a business	0.878		
PL3. The business game gave me a thorough understanding of target markets	0.865		
PL4. The business game gave me a thorough understanding of product positioning	0.881		

Note: FL: standardised factor loading; CR: composite reliability; AVE: average variance extracted.

5.4. ANALYSES AND RESULTS

To test the hypotheses, we employed partial least squares (PLS) structural equation modelling with SmartPLS 3.0 software (Ringle et al., 2015). PLS has less-

restrictive assumptions about the distribution of data and, compared to other methods, such as covariance-based structural equation methods, it is more appropriate when the interest of the study focuses on prediction and on theory development, rather than on strong theory confirmation (Reinartz et al., 2009).

Following previous research (e.g., Chen & Jang, 2010), players' overall satisfaction of basic needs was operationalised as a second-order reflective construct: need satisfaction, with perceived competence, perceived autonomy, and perceived relatedness as its dimensions. Likewise, engagement was modelled as a second-order reflective construct comprising cognitive, emotional, and behavioural dimensions (Fredricks et al., 2004; Hollebeek et al., 2014).

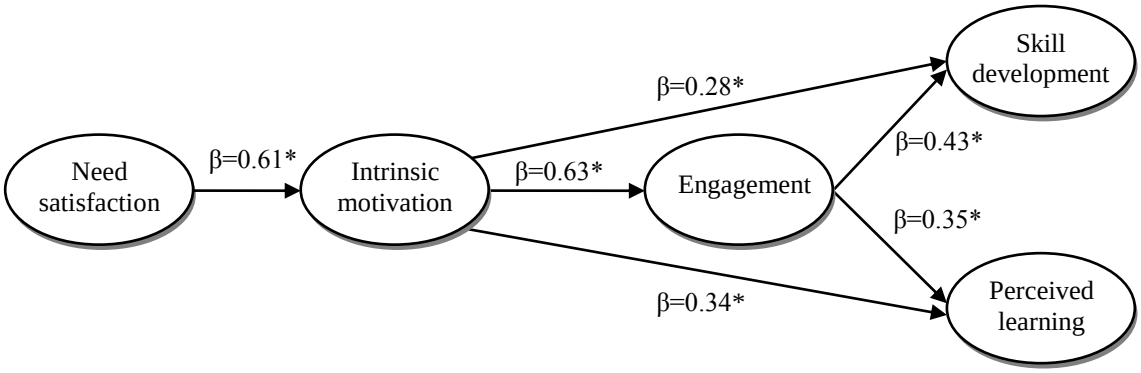
First, the reliability and validity of the constructs were assessed. All standardised factor loadings were above 0.6 (Carmines & Zeller, 1979), which suggests that individual item reliability was adequate. Moreover, all the constructs were internally consistent because their composite reliability (CR) values were greater than 0.7 (Nunnally & Bernstein, 1994). The constructs also met the convergent validity criteria because the average variance extracted (AVE) values were above 0.5 (Fornell & Larcker, 1981). Finally, discriminant validity was also supported. In all cases, the root of the AVE was greater than the correlation estimate for any two constructs (Fornell & Larcker, 1981).

The structural model was then tested. We used the bootstrapping algorithm with 5,000 subsamples to estimate the significance level of weights, loadings, and path coefficients. Need satisfaction accounted for 37.7% of the variance of players' intrinsic motivation. Likewise, the model explained 40.4%, 42.9%, and 40.1% of the variance in engagement, skill development, and perceived learning, respectively. The Stone–Geisser test criterion (Q^2) exceeded the threshold of 0 for all dependent variables, thereby supporting the predictive relevance of the model.

The results indicate that satisfaction of the needs for competence, autonomy, and relatedness while playing business simulation games had a positive and significant influence on players' intrinsic motivation to play ($\beta = 0.61$; $t = 16.88$), supporting H1. As proposed in H2, intrinsic motivation had a positive impact on players' engagement

(β = 0.63; t = 17.65). The results also show that players' intrinsic motivation during the simulation game had a positive and significant influence on their skill development (β = 0.28; t = 5.00) and perceived learning (β = 0.34; t = 5.62), supporting H3a and H3b. Finally, players' engagement positively influenced both their skill development (β = 0.43; t = 7.65) and their perceived learning (β = 0.35; t = 5.91). Therefore, H4a and H4b were also supported. Figure 5.2 presents the results of the structural model.

Figure 5.2: Structural results



Note: *p<0.01

5.5. DISCUSSION

During the last few years, there has been increasing interest in the use of games and gamification to motivate individuals to perform tasks in different contexts (Buckley & Doyle, 2016; Kasurinen & Knutas, 2018). In particular, in management training settings, modern business simulation games are used as an effective tool to motivate, involve, and engage players in the learning experience (Ben-Zvi, 2010; Vos & Brennan, 2010). These games have an impact on both intrinsic and extrinsic motivation. While the way to increase extrinsic motivation is relatively easy (e.g., using leaderboards, badges, or incentives such as grades), increasing intrinsic motivation in business simulation games seems to be a more difficult task to accomplish. As intrinsically motivated behaviours are more desirable than extrinsically motivated behaviours (Deci & Ryan, 1991), analysing which factors can promote intrinsic motivation while playing business simulation games is of primary importance for management training.

According to SDT (Deci, 1975), intrinsic motivation is determined by satisfying three basic needs: competence, autonomy, and relatedness (Ryan & Deci, 2000). Satisfaction of these needs fosters intrinsic motivation, which leads to higher-quality engagement and learning (Ryan & Deci, 2000). Based on this assumption, this research examines the relationships among need satisfaction, intrinsic motivation, engagement, and learning (namely, the development of generic skills and perceived learning) in the context of business simulation games.

Overall, the findings of this study provide strong support for the use of business simulation games in management training as a tool to promote intrinsic motivation among players, foster engagement, develop skills, and increase learning in the field of management. Our findings confirm that if players feel that their needs for competence, autonomy, and relatedness are satisfied within the business simulation game, they will be more intrinsically motivated to play the game. This is in line with previous studies in other gaming contexts, which also confirmed that experiences of competence, autonomy, and relatedness are major contributors to game enjoyment and motivation (Przybylski et al., 2010; Tamborini et al., 2010). Likewise, our findings confirm that intrinsic motivation facilitates engagement during gameplay and that both intrinsic motivation and engagement enhance players' development of generic skills, such as decision-making, working under pressure, and teamwork. They also enhance perceived learning related to the field of management, such as understanding the integration of different business functions, analysing competitive advantages, and understanding the positioning of products.

The current study offers a number of theoretical contributions. First, although a large number of studies (e.g., Ryan et al., 2006; Przybylski et al., 2010; Eseryel et al., 2014) have analysed the impact of need satisfaction on intrinsic motivation in a gaming context, to the best of our knowledge, this is the first study to analyse this relationship in the context of business simulation games. Drawing on SDT, this study sheds new light on how to promote intrinsic motivation within business simulation games, as well as on the relationships of motivation and engagement with players' development of generic skills and perceived learning. Specifically, while previous studies have emphasised the multifaceted nature of engagement in academic contexts (Fredricks et

al., 2004), few have included all the dimensions related to the engagement construct in the context of business simulation games. Therefore, this study extends previous research by exploring cognitive, emotional, and behavioural dimensions of engagement in this specific context.

This research also has a number of practical contributions regarding how to design activities with business simulation games that promote intrinsic motivation and engage players in the learning experience. First, in order for players to experience intrinsic motivation, it is important to satisfy their needs for competence, autonomy, and relatedness. As explained before, competence is the ability to produce desired outcomes and to experience mastery and effectiveness. Optimal challenges were found to facilitate intrinsic motivation by increasing the feeling of competence during an action (Ryan & Deci, 2000). In addition, feedback mechanisms within the game are important for developing a sense of competence because they inform players about how well they are performing in the game (Csikszentmihalyi, 1990). Other factors that affect players' perceived competence include the difficulty of the tasks and the usability of the game (Eseryel et al., 2014). Besides competence, SDTs suggest that people must also experience their behaviour as self-determined; that is, they must experience a sense of autonomy, which refers to the ownership of one's behaviour (Ryan & Deci, 2000). Intrinsically motivated activities are activities that people do spontaneously when they feel free to follow their inner interests (Deci, 1975). Thus, autonomy is essential for intrinsic motivation and has been associated with greater interest, more creativity, and better learning (Deci & Ryan, 1987). Game-based environments should provide learners with opportunities for autonomous choices. In particular, business simulation game design should try to avoid any constraints that may limit choices. Perceived autonomy would thus be enhanced in business simulation game contexts that provide considerable flexibility over strategies undertaken and the sequence of actions and that structure rewards so as to provide feedback, rather than to control players' behaviour. Although autonomy and competence have been found to have the strongest influence on intrinsic motivation, relatedness is also important in the maintenance of intrinsic motivation (Deci & Ryan, 2000). Relatedness refers to the need to experience a sense of community and to be connected to other individuals and collectives in some form or

another. In this sense, instructors should design business simulation game activities in groups instead of individually.

There have been limitations to this study, which suggest directions for further research. First, in this study, we have focused on one form of motivation (namely, intrinsic motivation). Although it is the most desirable type of motivation, other forms of motivation exist. Thus, future research could focus on other types of motivation (i.e., external regulation, introjection, identification, and integration) to fully understand the motivational power of business simulation games and its consequences for management training. Second, the use of retrospective and self-report measures in this study may be another limitation. Third, although surveys that use quantitative items (e.g., Likert scales) are commonly used for measuring engagement in academic settings, qualitative measures are another approach to measuring student engagement (Henrie et al., 2015). Thus, future research could use observations of individuals' behaviours; interviews and focus groups; and even physiological sensors (e.g., eye-tracking) as part of the methodology. Likewise, as the questionnaire was answered anonymously, we could not link students' responses to objective measures of student performance, such as student grades. Therefore, future research could include objective measures of students' performance (e.g., student grades) to further explore whether students' intrinsic motivation and engagement while playing business simulation games influence their learning. Moreover, it would be interesting to focus on the business game characteristics that influence the satisfaction of the needs for competence, relatedness, and autonomy, such as the challenges that individuals face and the feedback provided by the simulation, among others. Finally, another promising avenue for further research would be to analyse the proposed model for management training in non-academic contexts, such as a company's training program for its employees.

Despite these limitations, the findings derived from this empirical study contribute to understanding how to promote intrinsic motivation in business simulation gameplay and how this fosters engagement and enhances the development of skills and perceived learning in management training. We hope that the conceptual framework drawn from SDT and the results of the research offer new insights into the reasons why the use of business simulation games may facilitate learning outcomes.

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CHAPTER VI

THE ROLE OF FLOW FOR MOBILE ADVERGAMING EFFECTIVENESS

6.1. INTRODUCTION

Advergames are one of the newest tools through which advertisers are creating entertaining experiences to engage young adults (Cicchirillo & Mabry, 2016). While different forms of advertising, such as TV ads or banners, can be easily skipped or quickly forgotten, advergames can create hours of engagement. Defined as electronic games designed with the specific purpose of promoting a brand or product (Winkler & Buckner, 2006), advergames represent an effort to make the game itself the brand message by embedding brand-specific information into features central to the game play (Kinard & Hartman, 2013). The rapid growth of interest in advergames indicates that marketers acknowledge their potential benefits for marketing (Lee & Cho, 2017), such as increasing the perceived value of the embedded brand (Okazaki & Yagüe, 2012), capturing consumers' attention, increasing traffic on the website, building brand awareness, offering product information, or persuading the consumer to form a positive attitude toward the brand or product promoted (Terlutter & Capella, 2013).

Mobile devices (smartphones and tablets) are an increasingly popular way to access advergames (Tuten & Ashley, 2016). During the last few years, mobile devices' technical aspects have improved, including increased storage capacity, higher quality graphics display, and better graphical and audio capabilities (Terlutter & Capella, 2013). All these aspects, combined with the spread of 3G and 4G services, have helped mobile gaming to reach new levels of user experience (Wei & Lu, 2014).

Furthermore, mobile devices are a small but powerful screen when it comes to gain Millennials' attention, having the potential to create big impact. According to a study by Google (2014), smartphones reach 18- to 34-year-olds more than any other device. As mobile games can capture players' full attention anytime and anywhere, marketers are trying to make this an opportunity to connect with their audiences by creating mobile advergames. Past research has focused primarily on the first generation of advergames –those played on personal computers (e.g., Gross, 2010; Steffen et al., 2013; Vashisht & Royne, 2016; Wang et al., 2015). However, little attention has been paid to the second generation of advergames –those played on mobile devices. As such, mobile gaming platforms are an especially underresearched area in this field (Terlutter

& Capella, 2013), and, therefore, more investigation examining advergames within mobile phone apps has been required (Kinard & Hartman, 2013).

Nowadays, with thousands of games available for download in the App Store, creating a successful mobile advergame is a challenge. Previous studies have shown that games are most successful and engaging when they facilitate the flow experience (Kiili, 2005). Hence, flow theory is a particularly suitable framework for the study of mobile advergames. The flow experience refers to an optimal experience in which individuals are highly involved in a certain activity (Csikszentmihalyi, 1975), experiencing high levels of concentration, time distortion, loss of self-consciousness, and a feeling that doing the activity is rewarding. As a result, the flow experience is perceived as very pleasurable and can lead to positive outcomes (Csikszentmihalyi & Lefevre, 1989). Despite the relevance of flow theory to mobile advergaming, compared with other types of flow-inducing media experiences, few research studies on advergames have been built on this theory.

In this context, it is worthwhile to analyse whether players experience flow while they are playing a mobile advergame, and if such flow state influences brand-related persuasion outcomes. In addition, it is critical to understand which elements can promote flow within this context. Therefore, the purpose of this study is twofold. First, we examine the influence of five flow antecedents proposed by Hoffman and Novak (1996) –namely, skills, challenge, interactivity, focused attention and telepresence– on players' flow experience while playing a mobile advergame. Second, we investigate the impact of flow on players' attitude toward the brand promoted and purchase intention of their products.

This study contributes to the extant literature in several ways. First, although mobile devices (smartphones and tablets) are a growing way to access advergames (Tuten & Ashley, 2016), they are an underresearched area in this field (Kinard & Hartman, 2013; Terlutter & Capella, 2013). Therefore, our empirical findings provide new insights into the effectiveness of mobile advergames. Second, although previous studies have emphasised the importance of experiencing flow in gaming contexts (e.g., Badrinarayanan et al., 2015; Procci et al., 2012; Su et al., 2016), there is a shortage of

studies examining the impact of flow on the persuasive power of advergames. Therefore, by drawing on online flow theory proposed by Hoffman and Novak (1996), we offer a conceptual framework for understanding why the use of mobile advergames can enhance players' brand perceptions and purchase intentions. In addition, despite the call of Terlutter and Capella (2013) to deep into the role of the five antecedents of flow within an advergaming context, there is a lack of studies analysing the impact of all flow prerequisites on the flow experience within this context. Therefore, the current research sheds new light on the impact of flow antecedents on the flow experience in the mobile advergaming context. Finally, contrary to previous studies that used fictitious brands (e.g., Ham et al., 2016) or invented games (e.g., Wang et al., 2015) to analyse flow in advergames, this study uses a real mobile advergame created by a real brand to analyse the impact of flow on players' brand attitude and purchase intentions on a real market situation, which increases the generalisability of the results. In sum, the results can help both academia and industry understand how to enhance mobile advergames' persuasiveness by knowing which features of mobile advergames affect their effectiveness.

6.2. THEORETICAL FRAMEWORK AND RESEARCH HYPOTHESES

6.2.1. Flow experience

Advergames are a form of branded entertainment, so it is important that they produce a significant level of enjoyment to players (Peters & Leshner, 2013). As noted earlier, one of the most popular constructs used to describe the subjective game experience is the concept of flow (Procci et al., 2012), which refers to the holistic sensation that people feel when they act with total involvement (Csikszentmihalyi, 1990). More specifically, flow can be described as a state of optimal experience that is characterised by a complete absorption in an activity (Csikszentmihalyi, 1975). During the optimal experience, concentration is so intense that nothing else seems to matter, time becomes distorted, and self-consciousness disappears (Csikszentmihalyi, 1990). As a result, the activity becomes intrinsically motivating, and it is perceived as worth doing for its own sake (Nakamura & Csikszentmihalyi, 2002).

The concept of flow, which was initially proposed to analyse activities in everyday life and work, was adapted and considered applicable to the online environment by Hoffman and Novak (1996). These authors proposed a model of flow in interactive computer-mediated environments that include skills, challenges, interactivity, focused attention, and telepresence as prerequisites to experience flow. This model has been widely used as the basis to analyse flow in different gaming contexts, such as mobile gaming (Su et al., 2016), and massively multiplayer online role playing games (Badrinarayanan et al., 2015). However, it has not yet been used to investigate flow within mobile advergames.

According to Hoffman and Novak's (1996) model, the first necessary condition for achieving a state of flow is an ideal balance between an individual's own skills and the challenge of the activity (Csikszentmihalyi, 1977). Suboptimal solutions are either a too challenging situation, which leads to anxiety, or a less challenging situation, which leads to boredom (Nakamura & Csikszentmihalyi, 2002). In the advergaming context, if the player's gaming skills are lower than the challenge proposed by the game, the player will be overloaded and will experience anxiety, resulting in abandoning the advergame. On the contrary, if the player's gaming skills are beyond the level of difficulty of the advergame challenge, the player will experience boredom, which might also result in game abandoning. Thus, advergames have to offer an optimal level of challenge to engage players in an immersive, fun environment (Hernández, 2011). In fact, producing challenging advergames is crucial to ensure that the advergames will work and show the promised effects of branding (Waiguny et al., 2012). Once induced, the maintenance of the state of flow requires a constantly evolving challenge, because the player's skills are likely to improve after playing the game a few times. Thus, we hypothesise:

H_1. Skills at playing games has a positive influence on flow

H_2. Challenge has a positive influence on flow

Besides a high level of skills and challenge, interactivity is another important source of flow (Novak et al., 2000). Csikszentmihalyi (1990) suggested that the most successful websites are the ones that offer interactive experiences, and not simply content. Interactive features in computer-mediated environments were also found to

boost the online flow experience (Hoffman & Novak, 2009), so that participants who perceived a higher level of interactivity experienced more online flow (van Noort et al., 2012). Interactivity is one of the most important defining characteristics of advergames. While playing an advergame, players can interact with the advertising message and the game features (Ping et al., 2010), which makes it more engaging. Interactivity within an enjoyable advergame has a positive effect on players' brand related responses, increasing brand recall and recognition (Sreejesh & Anusree, 2017), and enhancing brand attitude (Ping et al., 2010; Sukoco & Wu, 2011). In addition, contrary to traditional advertising in which consumers are passively exposed to the content, advergames evoke a certain degree of activity with consumers, engaging them with the interactive content (Van Reijmersdal et al., 2012). Therefore, we postulate:

H3. Interactivity has a positive influence on flow

The presence of focused attention is also necessary to experience flow (Hoffman & Novak, 1996). Csikszentmihalyi (1977; p. 40) characterised flow as "*a centering of attention on a limited stimulus field*". Within this state, players allocate their available cognitive resources to the task at hand (playing the advergame) and do not reflect upon their actions consciously (Csikszentmihalyi, 1977). When explaining the factors influencing human-technology interactions, Csikszentmihalyi (1990) suggested that, during flow, the individual's attention is limited (or focussed) to the narrow stimulus represented by the technology. Similarly, within a mobile advergaming context, players are focussed on playing the advergame, which is expected to increase their propensity of entering in a state of flow. Consequently, we propose:

H4. Focused attention has a positive influence on flow

Finally, previous studies have suggested that within virtual environments, telepresence leads to flow (Cauberghe et al., 2011; Pelet et al., 2015). Telepresence has been defined as the sense of being there in a virtual environment, forgetting that you are actually sitting in front of a TV or PC (Kim & Biocca, 1997). This characteristic is very representative of videogames and advergames, as they transport players to virtual worlds. Nelson et al. (2006) found higher levels of telepresence for players than for spectators. Thus, a greater level of telepresence can be expected when individuals play

advergames too. Previous studies have demonstrated that telepresence enhances the flow state (Hernández, 2011; Hoffman & Novak, 1996; Novak et al., 2000), which in turns increases the effectiveness of advertising (Cauberghe et al., 2011; van Noort et al., 2012). Therefore, we hypothesise:

H5. Telepresence has a positive influence on flow

6.2.2. Advergaming effectiveness

One of the ultimate goals of advertising is persuasion (Barry, 1987) and this is also true for advergaming (Ping et al., 2010). One of the most important factors of persuasiveness of advergames is related to the flow experience or perceived entertainment (Roettl et al., 2016). The primary objective of advergames is to deliver the brand message in a way that is fun and entertaining to keep people engaged (Ham et al., 2016). Advergames are designed to trigger enjoyable experiences, and thus the concept of flow plays an important role in explaining the effectiveness of advergames (Steffen et al., 2013). Common to the concept of effectiveness are brand attitude and purchase intention.

In an advergaming context, we first expect that experiencing flow will elicit a pleasurable experience transferred to the brand. This is in line with the idea of affect transfer theory, which suggests that the positive feelings the advergame elicits can impact the featured brand (Waiguny et al., 2012). Previous studies have demonstrated that playing an advergame positively affects gamers' perception of brand personality if they experience flow (Wang et al., 2015). In addition, players who experience a state of flow tend to communicate to more people than those who find the advergame boring (Gurau, 2008) and have a positive attitude towards advergames (Hernández, 2011). Entertainment has also been found as a factor contributing to a more favourable attitude toward the brand placed in the advergames (Marti-Parreño et al., 2013).

Flow is considered as a highly enjoyable psychological state that can lead to positive marketing consequences, including attitude formation, purchase intentions, and behaviours (Chen et al., 1999; Hoffman & Novak, 1996, 2009). Brand placements in digital games are aimed at improving brand attitude (Terlutter & Capella, 2013), which

has long been considered a key variable in advertising research (Bergkvist & Langner, 2017). Some studies have demonstrated that flow has a positive impact on brand attitudes and buying behaviour (Gurau, 2008). Previous research with children showed that experiencing flow while playing advergames can be a facilitator of brand attitude. More precisely, brand attitudes were the highest for those children who were optimally challenged (in flow) and lowest for those who were underchallenged (Waiguny et al., 2012). This positive relationship between experiencing flow and brand attitude has also been found in Ham et al. (2016), who showed a positive impact of flow on attitudes toward the advergame and on purchase intention. Therefore, we postulate:

H_6. Flow has a positive influence on brand attitude

H_7. Flow has a positive influence on purchase intention

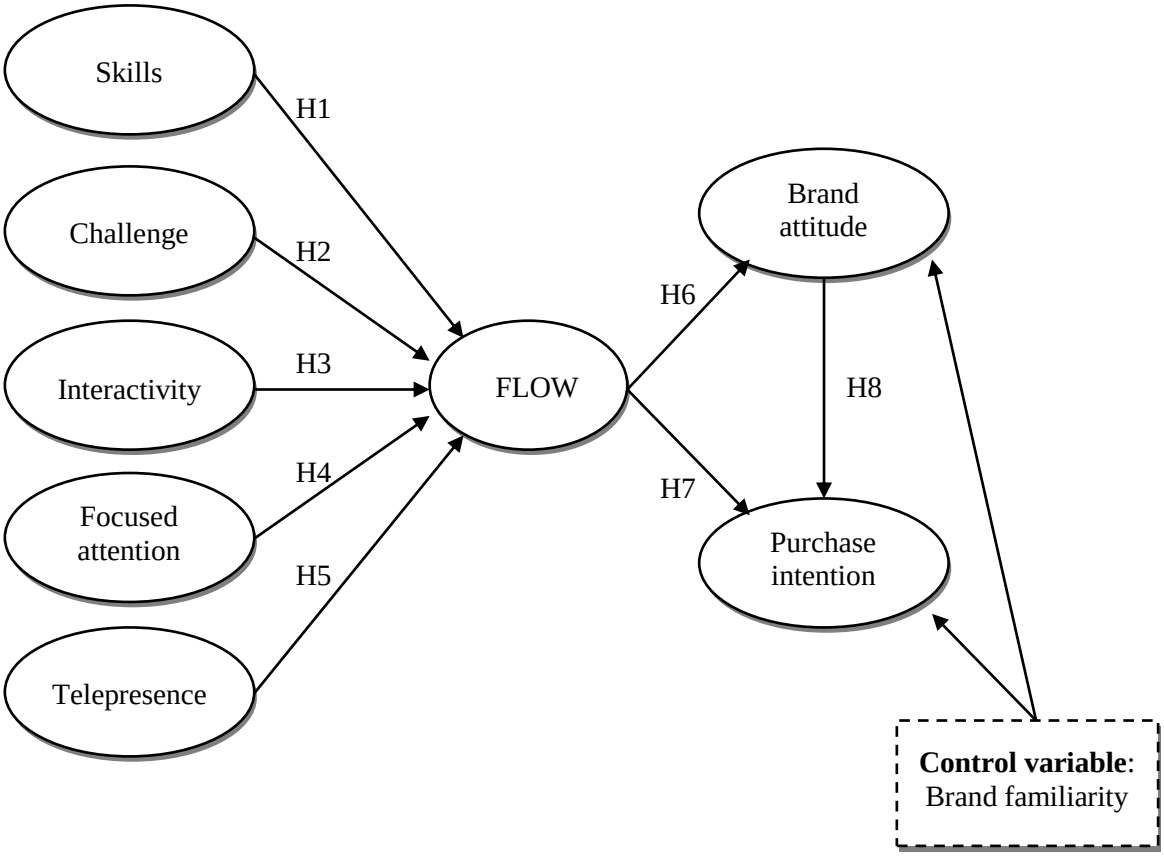
Furthermore, a change in brand attitude can be a leading indicator of a change in purchase behaviour (Bellman et al., 2014; Morris et al., 2002). Thus, it is also expected that flow experienced while playing advergames influences purchase intention both directly and via affective responses (i.e., attitude toward the featured brand). According to this, we hypothesise the following:

H_8. Brand attitude has a positive influence on purchase intention

Finally, previous research in the advergaming context suggests that individual's brand familiarity may affect attitude toward the brand as well as behavioural intentions (Kinard & Hartman, 2013; Waiguny et al., 2013). Specifically, previous studies suggest that advergames might work more effectively for brands that are already known to the player in some way (Winkler & Buckner, 2006). Therefore, this study includes individuals' familiarity with the featured brand as a control variable.

Figure 6.1 shows the proposed model underlying this research.

Figure 6.1: Proposed model



6.3. METHOD

6.3.1. Stimuli

To test the hypotheses, a mobile advergame of the well-known snack food company Oreo was used. Within this product category, advergames constitute a common advertising strategy (Steffen et al., 2013). In fact, several companies within the food and beverage industry are incorporating advergames on their websites (e.g., M&M's, Pringles, Lays, Pepsi, Chips Ahoy).

For decades, the focus of Oreo advertising has been in the fun of eating Oreos: the twisting, the licking, the dunking. This worldwide known ritual has been transferred to the mobile advergame "Oreo: Twist, Lick, Dunk!". "Oreo: Twist, Lick, Dunk!" mostly resembles a combination of Fruit Ninja (one of the most popular gaming apps consisting on fruit slicing) and Slam Dunk King (a popular game to test players' basketball skills in dunking balls). In the game, Oreos are hurled into the air and players

must swipe across them twice. The first swipe corresponds to the "twist" –this separates one of the chocolate cookies from the Oreo-, while the second one corresponds to the "lick" –putting the cream away-. This second swipe also puts the Oreos together, becoming a super Oreo that players must drag to the glass of milk appearing at the bottom of the screen. Each Oreo that is twist, lick, and dunk in every single set makes players earn a higher score that is turned into coins. Players can spend the earned coins to unlock virtual Oreos that have been commercialised over the years (e.g., Golden Oreos, Green Tea Oreos, and Birthday Cake Oreos, among others), as well as to purchase different screens to play (e.g., Paris, China, or the Biscuit World). Players can also make in-app purchases, ranging from €0.89 (1,000-coin pack) to €39.99 (100,000-coin pack). In addition, there is a social component in the game, as players can access the game via their Facebook accounts, so they can compare their scores with their friends' ones in a ranking.

Since its launch in November 2012 until its latest update in May 2017, "Oreo: Twist, Lick, Dunk!" has reached over 5 million organic downloads (the Google Play Store has it in the 5,000,000-10,000,000 downloads category, while the Apple Store does not make that data available) and it is now available in seven different languages (i.e., English, French, German, Italian, Portuguese, Spanish, and Chinese).

6.3.2. Procedure and sample

The main study was preceded by a pre-test and a pilot study, which were used to survey a small subset of the population to determine whether the research instrument and method to collect data as well as the stimulus (the Oreo advergame) were relevant, reliable, and appropriate for the purpose of the study.

Data collection was based on a self-administered questionnaire. This instrument allows respondents to complete the survey on their own, which eliminates interviewers' bias and has the ability to reach large populations (Bhattacherjee, 2012). The main disadvantages of self-administered questionnaires are the low response rates if they are disseminated via mail or e-mail, and the difficulty in obtaining large quantities if they are too long (Duffet, 2015). To avoid this inconvenient, questionnaires were distributed

on a face-to-face basis and participants were also told that the questionnaire took no longer than five minutes to complete.

The participants of the pre-test, pilot test and main study were selected from a large Irish university. Recent studies have reported that most of young adults are gamers (Vashisht & Sreejesh, 2017). Therefore, the use of a student sample is appropriate for this study. In addition, OREO, the brand whose advergame has been selected in this study, is well-known to Irish consumers.

The questionnaire was pre-tested during June 2017 using an independent sample (n = 10) to check the question order, the wording, and the ability of respondents to understand the meaning of the questions. Once exposed to the advergame, participants, who had previously been informed about the purpose of the pre-test, responded to the survey. As a result, some of the questions were reworded. Subsequently, a pilot study of an additional independent sample (n = 36) was conducted during September 2017 to ensure the readability and comprehension, as well as the time it took to answer the questionnaire.

The data collection involved a two-step process. First, researchers contacted participants during classes and give them the link to download the advergame from the app store (free to download). Participants were asked to play the game in their free time as many times as they wanted (at least once). Second, after one week, the same groups were contacted in the same classes and were given a link to the survey questionnaire, which was provided on SurveyMonkey. As an incentive, those students who participated in the study were included in a draw for four shopping vouchers of €50 each. A total of 212 completed questionnaires were collected for the main study during October 2017. 55% of the participants were women and the mean age was 20 (SD = 3.43).

6.3.3. Measurement instrument

To measure the different variables included in this study, a questionnaire was developed from relevant previous literature and carefully modified to ensure that the items fit this context (see Appendix 3). As can be seen in Table 6.1, the measures of the

antecedents of flow (i.e., skills, challenge, interactivity, focused attention, and telepresence) were adapted from Novak et al. (2000). These include statements such as 'I consider myself knowledgeable about playing games' (skills), 'Playing the game challenges me' (challenge), 'Interacting with the game is slow and tedious' (interactivity), 'When I play the game I am totally absorbed in what I am doing' (focused attention), and 'Playing the game makes me forget where I am' (telepresence). Participants were asked to indicate their degree of agreement with each statement on a seven-point Likert scale ranging from 1 (Strongly disagree) to 7 (Strongly agree). To measure feelings of flow, the measure of flow developed by Novak et al. (2000) was also used. A narrative description of flow was provided and three items were measured: (1) Do you think you have ever experienced "flow" while playing the game? (1= Not at all, 7= very much), (2) In general, how frequently would you say you have experienced "flow" while playing the game? (1= Not frequently, 7= very frequently), and (3) Most of the time I play this game, I feel I am in "flow" (1= Strongly disagree, 7= strongly agree).

Regarding variables related to advergames effectiveness, brand attitude was measured using a semantic differential scale adapted from Wise et al. (2008). The anchoring word pairs were unfavourable/favourable, bad/good, negative/positive, rated on a seven-point scale. Purchase intention was measured using three items adapted from Doods et al. (1991). This includes statements such as 'My likelihood of purchasing OREO's products is…', rated also on a seven-point scale (1=Very low, 7=very high). Finally, both a control question and a control-variable were included in the questionnaire. The purpose of the control question was to filter possible respondents. Hence only respondents who played the advergame participated in the study. The control variable (i.e., brand familiarity) was measured using three items adapted from Ping et al. (2010), including the questions 'How familiar are you with the OREO's products?', 'How often have you purchased OREO's products in the past?', and 'How knowledgeable are you about OREO's products?'. Again, the items were measured on a seven-point scale with anchors not at all familiar/very familiar, not often/very often, not very knowledgeable/very knowledgeable.

Table 6.1: Constructs and items

Constructs, sources, and items
Skills (Novak et al., 2000)
S1. I am extremely skilled at playing games
S2. I consider myself knowledgeable about playing games
S3. I know somewhat less than most gamers about playing games (R)
Challenge (Novak et al., 2000)
C1. Playing the game challenges me
C2. Playing the game challenges me to perfom to the best of my ability
C3. Playing the game provides a good test of my skills
C4. I find that playing the game stretches my capabilities to my limits
Interactivity (Novak et al., 2000)
I1. When I play the game there is very little waiting time between my actions and the game's response
I2. Interacting with the game is slow and tedious (R)
I3. The game loads quickly
Focused attention (Novak et al., 2000)
FA1. I don't think about other things when I play the game
FA2. When I play the game, I am totally absorbed in what I am doing
FA3. I cannot be easily distracted when I play the game
Telepresence (Novak et al., 2000)
T1. I forget about my immediate surroundings when I play the game
T2. Playing the game makes me forget where I am
T3. After playing the game, I feel like I come back to the 'real world' after a journey
T4. Playing the game creates a new world for me, and this world suddently disappears when I stop playing
Flow (Novak et al., 2000)
The word flow is used to describe a state of mind sometimes experienced by people who are deeply involved in some activity. Many people report this state of mind when playing games, engaging in hobbies, or working. When one is in flow, time may seem to stand still, and nothing else seems to matter. Flow may not last for a long time on any particular occasion, but it may come and go over time. Flow has been described as an intrinsically enjoyable experience.
F1. Do you think you have ever experienced 'flow' while playing the game?
F2. In general, how frequently would you say you have experienced 'flow' while playing the game?
F3. Most of the time I play this game, I feel I am in 'flow'
Brand attitude (Wise et al., 2008)
BA1. Unfavourable – Favourable
BA2. Bad – Good
BA3. Negative – Positive

Table 6.1: Constructs and items (continuance)

Constructs, sources, and items
Purchase intention (Doods et al., 1991)
PI1. My likelihood of purchasing OREO's products is...
PI2. The probability that I would consider buying OREO's products is...
PI3. My willingness to buy OREO's products is...
Brand familiarity (Ping et al., 2010)
BF1. How familiar are you with the OREO's products?
BF2. How often have you purchased OREO's products in the past?
BF3. How knowledgeable are you about OREO's products?

Note: (R) = reverse item

6.4. ANALYSIS AND RESULTS

The research model was tested using partial least squares (PLS) structural equation modelling (SEM) with the software Smart PLS 3 (Ringle et al., 2015). Compared to other methods, such as the covariance-based structural equation method, this methodology is suitable when the focus of the study, as in our case, in on prediction and on theory development rather than on strong theory confirmation (Reinartz et al., 2009). In addition, this methodology involves non-parametric procedures and therefore has less restrictive assumptions about the distribution of data. PLS simultaneously assesses the reliability and validity of the measurement model and the estimation of the structural model. These two steps are described next.

6.4.1. Measurement model

First, the reliability and validity of the research constructs were assessed. The indicator reliability was evaluated based on the criterion that loadings should be higher than 0.7 (Churchill, 1979). Items S3 and I3 were eliminated because they had factor loadings lower than 0.7. As Table 6.2 shows, all standardised factor loadings were above 0.7 and statistically significant at 0.01 (Carmines & Zeller, 1979), which indicates that the individual item reliability was adequate.

Moreover, all the constructs were internally consistent, since their composite reliabilities were greater than 0.7 (Nunnally & Bernstein, 1994). The constructs also met the convergent validity criteria, as the average variance extracted (AVE) values were above 0.5 (Fornell & Larcker, 1981). Finally, the discriminant validity was also supported. In all cases, the square root of the AVE for any two constructs was greater than the correlation estimate among the constructs (Fornell & Larcker, 1981).

Table 6.2: Measurement model results

Construct	Item	FL	CR	AVE
Skills	S1	0.943	0.945	0.896
	S2	0.951		
Challenge	C1	0.753	0.901	0.696
	C2	0.845		
	C3	0.862		
	C4	0.872		
Interactivity	I1	0.826	0.833	0.714
	I2	0.863		
Focused attention	FA1	0.857	0.890	0.730
	FA2	0.868		
	FA3	0.837		
Telepresence	T1	0.822	0.913	0.725
	T2	0.870		
	T3	0.863		
	T4	0.849		
Flow	F1	0.915	0.927	0.809
	F2	0.869		
	F3	0.914		
Brand attitude	BA1	0.932	0.962	0.894
	BA2	0.947		
	BA3	0.958		
Purchase intention	PI1	0.959	0.971	0.919
	PI2	0.957		
	PI3	0.959		

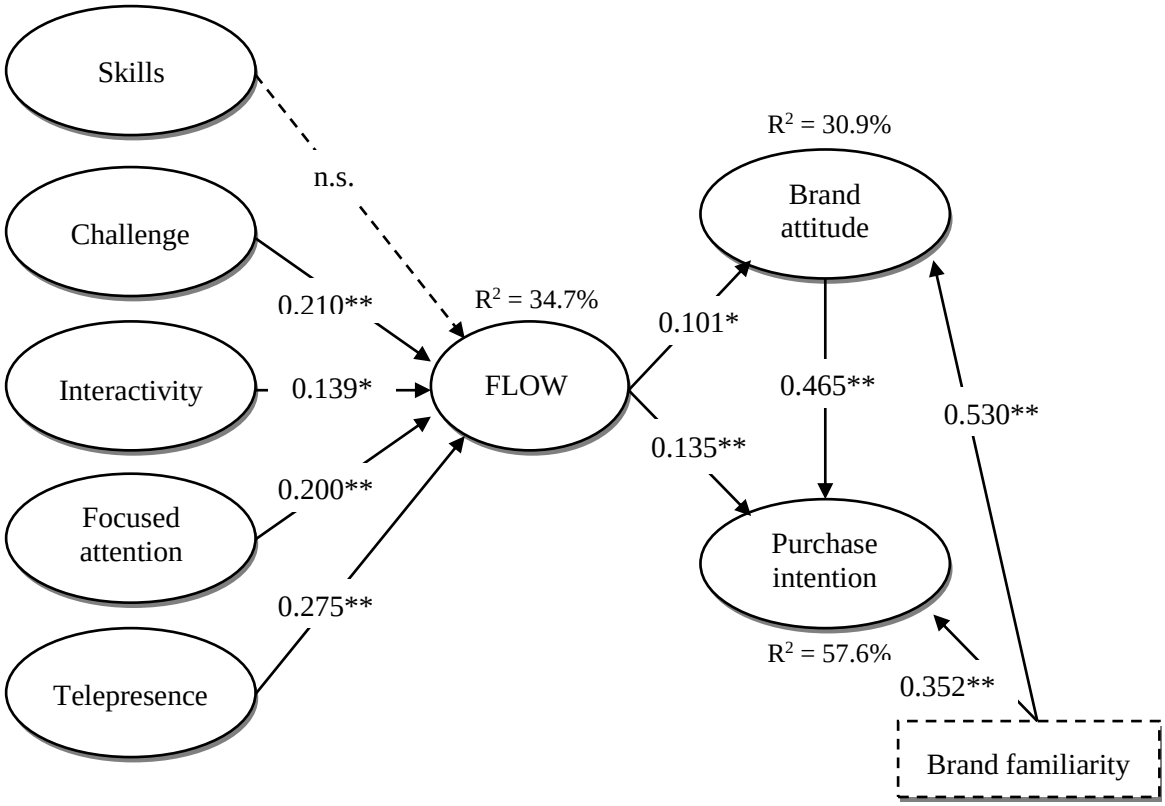
Note: FL: factor loadings; CR: composite reliability; AVE: average variance extracted

6.4.2. Structural model and hypotheses testing

The analysis of hypotheses and constructs' relationships was based on the examination of standardised paths. The path significance levels were estimated using a bootstrapping procedure with 5,000 iterations of resampling (Chin, 1998). The model

accounted for 34.7% of variation in flow state, 30.9% of variation in brand attitude, and 57.6% of variation in purchase intention of the featured brand. The predictive relevance of the model was also assessed through the Stone-Geisser test. The results showed that the Q^2 value of this test for the dependent variables was positive. Therefore, it can be accepted that the dependent variables can be predicted by the independent variables and that the model presents predictive relevance. The results are summarised and presented in Figure 6.2.

Figure 6.2: Structural model results



Note: * $p < 0.05$; ** $p < 0.01$

The results indicate that challenge (β = 0.210; t = 3.111), interactivity (β = 0.139; t = 1.792), focused attention (β = 0.200; t = 2.658), and telepresence (β = 0.275; t = 3.096) were statistically significant in explaining the flow experience. Thus, H2, H3, H4, and H5 were supported. On the contrary, the relationship between skills and the flow state was not significant (β = 0.054; t = 1.029). Therefore, H1 was not supported. In terms of the impact of flow on advergame effectiveness, the influence of flow on brand attitude (β = 0.101; t = 1.922) and purchase intention (β = 0.135; t = 2.835) was

statistically significant, as well as the influence of brand attitude on purchase intention ($\beta = 0.465$; $t = 8.152$), supporting H6, H7, and H8.

Concerning the control variable, brand familiarity affects both brand attitude ($\beta = 0.530$; $t = 9.257$) and purchase intention ($\beta = 0.352$; $t = 6.378$). Therefore, as expected, players that are more familiar with the brand featured in the advergame have a more positive attitude toward the brand and a higher purchase intention.

6.5. DISCUSSION

Thanks to the growing popularity of mobile devices and apps, any time of day and any location can provide a gaming context (Wei & Lu, 2014). Marketers are taking full advantage of this, using mobile advergames to create engaging experiences with consumers. This study is one of the first to associate the flow experience while playing a mobile advergame with players' perceptions of the brand promoted in the game.

The first objective of this study was to examine the influence of five flow prerequisites –namely, skills, challenge, interactivity, focused attention and telepresence– on players' flow experience while playing a mobile advergame. The analysis indicates that the level of challenge of the game significantly promotes the flow experience among players. This finding is in agreement with a number of authors. For instance, Hernández (2011) reported that challenges offered by advergames are the most important predictor for flow experience. Su et al. (2016) also found that players are interested in mobile games that are challenging because that has a positive effect on perceived entertainment. Finally, Waiguny et al. (2012) revealed that producing challenging advergames is crucial to ensure that the advergames will work. Besides game challenge, interactivity was also found to be a significant predictor of the flow experience. This is in line with previous studies who reported that perceiving interactivity within a technology-mediated environment was related with experiencing more flow (Hoffman & Novak, 2009; van Noort et al., 2012). Focused attention had also a significant impact on the optimal experience. Hoffman and Novak (1996) proposed focused attention as one of the prerequisites to experience flow. However,

Novak et al. (2000) could not empirically find a direct relationship between these constructs. This study, by contrast, provides empirical support for the direct relationship between focused attention and flow experience. This is a very interesting finding, as it advances existing knowledge by empirically confirming the direct and positive relationship between focused attention and flow. Finally, telepresence significantly promoted the flow experience among players, which confirms findings from previous studies in which telepresence within virtual environments leads to flow (Cauberghe et al., 2011; Hernández, 2011; Hoffman & Novak, 1996; Novak et al., 2000; Pelet et al., 2015). Contrary to predictions, players' gaming skills did not have a significant influence on flow state. This result can be explained because most advergames are designed as casual games (Redondo, 2012). As such, they are created with the intent that any individual can play the game without advanced experience of gaming techniques (Cicchirillo & Mabry, 2016). Accordingly, this finding suggests that, within a mobile advergaming context, players can experience flow independently of their level of gaming skills.

The second objective of the research was to examine the impact of flow on players' attitude toward the brand promoted and purchase intention of their products. The findings revealed a significantly positive impact in that the more flow the players experienced, the more favourable attitudes and the higher purchase intention of the featured brand. These findings demonstrate the powerful entertaining impact of mobile advergames on branding, which is in line with previous studies (Gurau, 2008; Ham et al., 2016; Terlutter & Capella, 2013), and consistent with the idea of affect transfer theory: the positive feelings the advergame elicits can impact the featured brand (Waiguny et al., 2012). In addition, findings revealed that brand attitude has a positive influence on purchase intention. These findings confirm that brand attitude is a leading indicator of a change in purchase behaviour (Bellman et al., 2014; Morris et al., 2002).

Finally, a significant impact was revealed in terms of players' familiarity with the brand. This finding is line with previous studies which reported that familiarity with the brand affects attitude toward the brand as well as behavioural intentions (Kinard & Hartman, 2013; Waiguny et al., 2013).

The potential benefits that mobile advergames have for marketing are generating a growing interest in this field (Lee & Cho, 2017). The flow construct describes entertainment best for game settings (Waiguny et al., 2013) and is a suitable framework to analyse the effectiveness of advergames. However, there have been few academic studies that empirically analyse flow within a mobile advergaming context. This study contributes to both theory and practice.

From the theoretical viewpoint, this study makes several contributions to research. First, despite the increasing use of smartphones and tables to access advergames (Tuten & Ashley, 2016), past research has focussed primarily on the first generation of advergames –those played on personal computers– and little attention has been paid to the second generation of advergames –those played on mobile devices– (Kinard & Hartman, 2013; Terlutter & Capella, 2013). The empirical findings from this study advance knowledge by analysing the effectiveness of advergames within mobile phone apps. Another contribution of this study to theoretical research is that it successfully applies flow theory to examine the impact of flow on the persuasive power of advergames. Although previous studies had shown the importance of experiencing flow in gaming contexts (e.g., Badrinarayanan et al., 2015; Procci et al., 2012), few studies had examined how playing mobile advergames can enhance players' brand perceptions and purchase intentions. In addition, there was a shortage of studies examining the impact of all flow prerequisites on the flow experience within this context. Therefore, this study sheds new light on the impact of flow antecedents of the flow experience in the mobile advergaming context, as well as its impact on brand-related persuasion outcomes. Finally, this study advances knowledge by analysing the impact of flow on players' brand attitude and purchase intentions on a real market situation. This is, using a real mobile advergame created by a real brand, which increases the generisability of results of this study in comparison with those that use fictitious brands or invented games.

This study has practical implications for advertisers and mobile advergames' designers. Understanding the key features that increase the effectiveness of mobile advergames is of main importance for practitioners. With this regard, the findings of this study show that experiencing flow is a key variable affecting advergames' success,

promoting more favourable attitudes and increasing the purchase intention toward the featured brand. Based on this finding, we advocate that creating an engaging advergame is vital for its later success. Players do not necessarily have to be aware of the commercial intent behind the advergame, but the advergame has to be as entertaining as any other mobile gaming app.

Another practical implication of this study is understanding game features that promote the flow experience. According to our findings, game challenge promotes flow. Although advergames are usually less complex than a 'real' videogame in which brands can be placed (Cauberghe & De Pelsmacker, 2010), game challenge within a mobile advergame is crucial for players to be engaged. Once induced, the maintenance of the state of flow requires a constantly evolving challenge, because the player's skills are likely to improve after playing the game a few times. Special attention should be paid to the design of features that create increasing challenges to the players, which in turn would conduct to greater flow. One way to do this is designing the advergame with progressive levels in which more difficult tasks are required. Another way to increase the challenge is to ask for the same task, but in a more difficult condition (e.g., having less time to complete it).

Another implication of this research is that, besides game challenge, other game features such as interactivity, focused attention, and telepresence also affect flow. This implies that advergames should be created to let players interact with the advertising content in a way that makes them be completely focused in what they are doing. Finally, in order to reach a greater telepresence, advergame developers should enhance the quality of the game in terms of graphics and audio to create a more realistic world in which players can be transported into.

While the study contributes significantly to the advergaming literature, it also has limitations, which offers suggestions for future research. First, although the sample was highly appropriate for the purpose of the study, a broader sample would enhance generalisability. In addition, since this research was conducted in Ireland, findings of this study could be extended and further tested in different countries. Hence, future research should use a wider range of participants. Moreover, it would be interesting to

compare the use and effects of playing a mobile advergame between players from countries with higher vs. lower usage of non-traditional advertising media. Another limitation of this study is that only one kind of advergame was selected for this study. Future studies should examine other genre types of advergames (e.g., racing, shooting, puzzles…) to determine if this factor impacts flow. Finally, research on advergames needs to better address behavioural measures after game play. While brand attitudes and purchase intentions are worthwhile of examination, research needs to be conducted to see if advergames can impact actual purchase behaviour of players.

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CONCLUSIONS, IMPLICATIONS, LIMITATIONS, AND FUTURE RESEARCH LINES

This section presents the main conclusions and implications for theory and practice derived from this doctoral dissertation, as well as the limitations and lines for future research.

CONCLUSIONS

In recent years, gamification has become an interesting topic among scholars, practitioners, and educators (Huotari & Hamari, 2017). Despite this increasingly interest, previous studies have pointed out a lack of theoretical foundation to explain the motivational effects of gamification, and the need for empirical evidence on its effectiveness (Hamari et al., 2014; Sailer et al., 2017; Seaborn & Fels, 2015). Taking into account the gaps identified in the literature, the overall aim of this doctoral dissertation has been to draw on different theoretical frameworks –namely flow theory, control-value theory of achievement emotions, and self-determination theory– to understand how gamification impacts behaviour, as well as to provide empirical support for this impact. In particular, this doctoral dissertation has addressed the following research objectives proposed in the introduction.

The first research objective aimed to examine the effectiveness of gamified activities –in particular, a clicker competition– based on flow theory and control-value theory of achievement emotions. More specifically, to investigate which variables affect players' flow experience while using clickers, and how flow impacts on learning. In addition, the doctoral dissertation sought to explore the factors that influence players' emotions and evaluate the effect of these emotions on their motivation and learning. As shown in Chapters II and III, findings have provided strong support for the use of clickers in academic settings as a gamified tool to foster flow experiences, promote positive emotions among students, and enhance the learning experience.

According to results obtained in Chapter II, we can conclude that students who feel that their skill level is adequate for the challenges presented during the clicker activity experience deeper concentration, higher sense of control, and higher enjoyment or autotelic experience, which are variables characteristic to the flow experience. Likewise, immediate feedback and goal clarity are important factors for students' learning because of their direct impact on students' level of concentration and sense of

control. The results have also confirmed that concentration, sense of control, and autotelic experience have a positive impact on perceived learning. Autotelic experience has also predicted students' level of satisfaction with the gamified activity. Finally, the results suggested that students who consider the clicker activity to be useful for their learning are more satisfied with the use of this technology.

Based on the results shown in Chapter III, feedback provided by clickers encourages students' perceived academic control and self-efficacy, and also increases the subjective importance of the activity in which clickers are used. Perceived academic control and self-efficacy positively predict pride. Likewise, self-efficacy correlates negatively with boredom. In addition, value was found to have a positive effect on enjoyment and pride, and a negative effect on boredom. Our findings also showed a direct impact of students' emotions on their motivation. In particular, enjoyment encouraged both intrinsic and extrinsic motivation, pride predicted extrinsic motivation, and boredom was detrimental for intrinsic motivation. Finally, both students' intrinsic and extrinsic motivation were found to have a positive effect on perceived learning and satisfaction with the clicker activity.

The second research objective was to explore the effects of playing a business simulation game based on flow theory and self-determination theory. In particular, this doctoral dissertation sought to investigate the drivers of players' flow experience when using business simulation games and the relationship between flow and students' skills acquisition and learning, as well as to examine which factors promote the intrinsic motivation of players and explore the impact of intrinsic motivation on players' engagement, skills acquisition, and learning. Studies developed in Chapter IV and V have provided strong support for the use of business simulation games as a gamified tool to promote flow experiences, intrinsic motivation and engagement, which are positively associated with students' skills development, perceived learning and satisfaction.

Specifically, according to results obtained in Chapter IV, if students feel that their ability or skill level is adequate for the challenges presented during the business simulation game, they will experience flow in terms of absorption, higher enjoyment,

and higher intrinsic motivation. Likewise, feedback received during the business simulation game was positively related to students' likelihood of engaging in the activity. Finally, our results showed a positive association between students' level of flow experienced while playing business simulation games and the development of generic skills, perceived learning, and satisfaction.

Regarding results from Chapter V, findings confirm that when players feel that their needs for competence, autonomy, and relatedness are satisfied within the business simulation game, they will be more intrinsically motivated to play the game. Likewise, our results showed that intrinsic motivation facilitates engagement during gameplay and that both intrinsic motivation and engagement enhance players' development of generic skills, as well as their perceived learning related to the field of management.

Finally, the third research objective attempted to evaluate the effectiveness of advergames to promote a brand based on players' flow experience while playing the advergame. In particular, our aim was to analyse which variables affect players' flow experience while playing advergames and how flow influences on different brand-related outcomes.

The empirical study in Chapter VI is one of the first to associate the flow experience while playing a mobile advergame with players' perceptions of the brand promoted in the game. The analysis indicated that game challenge, interactivity, focused attention, and telepresence significantly promoted the flow experience among players. However, contrary to predictions, players' gaming skills did not have a significant influence on flow state. In addition, the findings revealed a significantly positive impact in that the more flow the players experienced, the more favourable attitudes and the higher purchase intention of the featured brand. Likewise, brand attitude was found to have a positive influence on purchase intention. Finally, familiarity with the brand positively affected both brand attitude and purchase intentions.

IMPLICATIONS FOR THEORY

This doctoral dissertation has offered a number of theoretical contributions to the gamification literature in general, and to three specific applications –clickers, business simulation games, and advergames– in particular.

First, recent literature reviews (e.g., Chien et al., 2016; Hunsu et al., 2016) had highlighted a lack of theoretical discussions that explain how clickers, which integrate a game approach into traditional lectures, may help learning. In addition, the effectiveness of various gamification elements had not been sufficiently investigated (Hanus & Fox, 2015), and there was a lack of research that empirically examined game design elements (e.g., goals, feedback, challenges) and the gaming experience in learning contexts (Hou & Li, 2014). In response to these calls, this doctoral dissertation has extended previous clicker research by providing new insights into the effectiveness of this technology, building on flow theory and the control-value theory of achievement emotions. Existing research on achievement emotions had primarily investigated students' anxiety and there had been a call for research to further investigate other achievement emotions as well as their effects (Pekrun, 2006; Pekrun et al., 2009; Peterson et al., 2015). Therefore, this thesis has extended these previous findings by investigating the effects of enjoyment, pride, and boredom. In addition, our research has overcome limitations of previous clicker studies, such as a bias toward qualitative work, the narrow range of educational settings in which clickers have been explored (e.g., mathematics and science), and the absence of validity and reliability analysis of the measurement instruments (Kay & LeSage, 2009).

Second, few studies had provided theoretical frameworks based on motivational theories to explain how business simulation games impact learning. Drawing on flow theory and self-determination theory, this doctoral dissertation sheds new light on how to promote flow and intrinsic motivation within business simulation games, as well as on the relationships of flow, motivation and engagement with players' development of generic skills and perceived learning. While previous studies had emphasised the multifaceted nature of engagement in academic contexts (Fredricks et al., 2004), few had explored all the dimensions related to the engagement construct in the context of

business simulation games. Therefore, this study has extended previous research by exploring cognitive, emotional, and behavioural dimensions of engagement in this specific context.

Finally, academia had largely ignored the intersection of marketing and gamification (Lucassen & Jansen, 2014), and only few academic papers had discussed the use of gamification for marketing (Xu et al., 2017), specially for the purpose of advertising (Terlutter & Capella, 2013). In particular, mobile gaming platforms are an especially underresearched area in the advergaming field (Terlutter & Capella, 2013), and, there had been a call for more investigation examining advergames within mobile phone apps (Kinard & Hartman, 2013). There was also a shortage of studies examining the persuasive power of advergames under the lenses of motivational theories. In addition, few studies had examined how playing mobile advergames can enhance players' brand perceptions and purchase intentions. This doctoral dissertation applies flow theory to examine the impact of flow on the persuasive power of advergames, and sheds new light on the impact of flow antecedents in the mobile advergaming context, as well as its impact on brand-related persuasion outcomes. In addition, this investigation advances knowledge by analysing the impact of flow on players' brand attitude and purchase intentions when playing advergames on a real market situation. That is, using a real mobile advergame created by a real brand, which increases the external validity of our study in comparison with previous research that use fictitious brands or invented games.

IMPLICATIONS FOR PRACTICE

This doctoral dissertation has also provided implications for practice. First, the use of clickers has evoked the flow experience as well as different achievement emotions within students. Therefore, instructors that use gamified activities based on clickers in their classrooms should pay special attention to the design of the activity in which clickers are used. In particular, in order to help students becoming immersed in the clicker competition, instructors should provide them with challenges that balance with their skills (e.g., difficulty of questions balanced with explanations given in class), ensure that the activity offers clear goals for students to pursue, and provide immediate

feedback in real time to enable students to understand how well they are performing. Similarly, in order to promote students' positive achievement emotions while playing, clickers should provide students with instant feedback on their achievement, enabling them to evaluate their level of understanding of the material. In addition, instructors should highlight the benefits of clicker activities, as well as enhance students' sense of control.

Second, this doctoral dissertation also has a number of practical contributions regarding how to design activities with business simulation games that promote flow, intrinsic motivation, and engage players in the learning experience. To promote flow experiences, instructors should provide students with the correct level of challenge, which is neither too high nor too low, in order to meet students' level of skills. This means that the difficulty of decision-making during the business simulation game must be balanced with explanations given by the instructors in class, as well as the materials provided to students. Business simulation games should also be designed to adequately provide students with immediate feedback regarding different market information, such as competitors' prices and sales, profits, product positioning, etc. Instructors should also pay attention to debriefing sessions, as these improve the potential of business simulation games to benefit learning. In order promote intrinsic motivation, it is important to satisfy students' needs for competence, autonomy, and relatedness. In this regard, business simulation game design should try to avoid any constraints that may limit choices, as well as provide considerable flexibility over strategies undertaken. In addition, instructors should design business simulation game activities in groups instead of individually.

Finally, this doctoral dissertation provides practical implications for advertisers and mobile advergames' designers. Practitioners should create engaging advergames with progressive levels of difficulty, in order to create increasing challenges to the players. They should also let players interact with the advertising content in a way that makes them be completely focused in what they are doing. Finally, advergame developers should enhance the quality of the game in terms of graphics and audio to create a more realistic world in which players can be transported into.

LIMITATIONS AND FUTURE LINES OF RESEARCH

Although we have outlined specific limitations and have provided future lines of research for each of the five studies that we have carried out in this doctoral dissertation, this section aims to outline general limitations of the doctoral dissertation as well as to propose general lines for future research.

First, this doctoral dissertation has drawn on three theoretical frameworks –namely flow theory, control-value theory of achievement emotions, and self-determination theory– to analyse the impact of gamification on individuals. As these theories are complex and include a vast amount of variables, this thesis has used a limited set of variables to summarise them. For instance, according to previous literature, flow has been operationalised in three different forms. Similarly, our research has investigated three achievement emotions –enjoyment, pride, and boredom–, leaving others aside. Likewise, we have focused on intrinsic and extrinsic motivation. Thus, future research should focus on additional variables related to flow, different emotions, and other types of motivation (i.e., external regulation, introjection, identification, and integration) to fully understand the motivational power of gamification.

Second, the use of retrospective measures in all studies may be a limitation of the thesis. In particular, while most studies have used questionnaires and retrospective measures to measure the flow experience, Csikszentmihalyi and LeFevre (1989) recommended using the experience sampling method to measure respondents' flow experience. Future research could apply this procedure. Similarly, all studies employed self-report measures. Likewise, although surveys that use quantitative items are commonly used for measuring flow, motivation or engagement, qualitative measures are another alternative approach. Thus, future research could use observations of individuals' behaviours, interviews and focus groups, and even physiological sensors (e.g., eye-tracking) as part of the methodology.

Another limitation in relation to the methodology could be that all questionnaires were answered anonymously. Therefore, we could not link students' responses to objective measures of student performance, such as student grades, neither in the context of clickers, nor in the context of business simulation games. Thus, future

research should include objective measures of students' performance (e.g., student grades) to further explore the influence of gamification on actual learning performance. Similarly, future research on advergames should better address behavioural measures after game play. While brand attitudes and purchase intentions are worthwhile of examination, research needs to be conducted to see if advergames can impact actual purchase behaviour of players.

Finally, another promising area for future research is analysing gamification at other contexts, such as work (Cardador et al., 2017; Liu et al., 2018), and especially for purposes of recruitment (Collmus, et al., 2016; Joy, 2017; Langer et al., 2018). In this context, business simulation games are being used in personnel selection procedures, particularly for headhunting purposes. Gamified recruitment processes are very attractive for Millennials. Thus, it would be interesting to analyse their opinion about using business simulation games with this aim as well as their perceptions of the organisations that use such innovative procedures.

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APPENDIX 1

We are a group of academics from the University of Zaragoza. We are researching students' opinions about the clicker competition, and your views about it are extremely important to us. Please, read carefully the following sentences and indicate your level of agreement with them (1= I completely disagree; 7= I completely agree).

What is your opinion about the clicker competition?

I find the clicker competition funny	1	2	3	4	5	6	7
I find the clicker competition interesting	1	2	3	4	5	6	7
I find the clicker competition pleasant	1	2	3	4	5	6	7
I find the clicker competition fairly dull	1	2	3	4	5	6	7
When I play the clicker competition I can't wait for the class to end because I feel bored	1	2	3	4	5	6	7
I think about what else I might be doing rather than playing the boring clicker competition	1	2	3	4	5	6	7

Before starting the clicker competition…

The goals were clearly defined	1	2	3	4	5	6	7
I knew what I had to do	1	2	3	4	5	6	7
I knew what I had to achieve	1	2	3	4	5	6	7
I expected to do well	1	2	3	4	5	6	7
I expected to receive an excellent grade	1	2	3	4	5	6	7
I was confident I could learn interesting concepts	1	2	3	4	5	6	7
I believed my skills would allow me to meet the challenge in the clicker competition	1	2	3	4	5	6	7
I considered the challenge of the competition and my skills to be at an equally high level	1	2	3	4	5	6	7
I felt I was competent enough to meet the high demands of the clicker competition	1	2	3	4	5	6	7

While I am taking part in the clicker competition…

It is really clear to me that I am doing well	1	2	3	4	5	6	7
I am aware of how many questions I am performing well	1	2	3	4	5	6	7
I know how well I am doing	1	2	3	4	5	6	7
I am completely focused on the competition	1	2	3	4	5	6	7
My attention is focused entirely on what I am doing	1	2	3	4	5	6	7
It does not require any effort to keep in mind on what is happening	1	2	3	4	5	6	7
I feel proud if my group does better than other groups	1	2	3	4	5	6	7
I am proud of the contributions I have made in my group	1	2	3	4	5	6	7

When I contribute to my group winning, I get even more motivated	1	2	3	4	5	6	7
Getting a good grade in the clicker competition is the most satisfying thing for me right now	1	2	3	4	5	6	7
I would like to get better grades than the other groups in the clicker competition	1	2	3	4	5	6	7
I want to do well in the clicker competition because it is important to show my ability to my classmates and teachers	1	2	3	4	5	6	7

Assess your performance during the clicker competition

The greater the effort, the better my performance	1	2	3	4	5	6	7
I consider myself responsible for the results of the clicker competition	1	2	3	4	5	6	7
I have a high degree of control over my performance on the clicker competition	1	2	3	4	5	6	7

Finally, what is your opinion about your experience during the clicker competition?

I think the clicker competition is useful for me to learn the material	1	2	3	4	5	6	7
I think I will be able to use what I have learnt through the clicker competition	1	2	3	4	5	6	7
Understanding the material through the clicker competition is very important to me	1	2	3	4	5	6	7
The clicker competition was useful for my learning	1	2	3	4	5	6	7
The clicker competition helped me understand the material	1	2	3	4	5	6	7
The clicker competition helped me learn	1	2	3	4	5	6	7
I found the clicker competition valuable	1	2	3	4	5	6	7
I was very satisfied with the clicker competition	1	2	3	4	5	6	7
I had a very positive learning experience during the clicker competition	1	2	3	4	5	6	7
I really enjoy the clicker competition	1	2	3	4	5	6	7
I feel good during the clicker competition	1	2	3	4	5	6	7
I found the experience with the clicker extremely rewarding	1	2	3	4	5	6	7

Gender: ☐ Female ☐ Male **Age**:

THANK YOU FOR YOUR PARTICIPATION!

APPENDIX 2

We are a group of academics from the University of Zaragoza. We are researching students' opinions about the business simulation game (BSG), and your views about it are extremely important to us. Please, read carefully the following sentences and indicate your level of agreement with them (1= I completely disagree; 7= I completely agree).

I am extremely skilled at playing the business simulation game (BSG)	1	2	3	4	5	6	7
I consider myself knowledgeable about playing the BSG	1	2	3	4	5	6	7
I know somewhat more than most of my colleagues about the BSG	1	2	3	4	5	6	7
I know how to find what I am looking for when playing the BSG	1	2	3	4	5	6	7

Playing the BSG challenges me	1	2	3	4	5	6	7
Playing the BSG challenges me to perform to the best of my ability	1	2	3	4	5	6	7
Playing the BSG provides a good test of my skills	1	2	3	4	5	6	7
I find that the BSG stretches my capabilities to the limits	1	2	3	4	5	6	7

At the beginning of the business simulation game…

The goals were clearly defined	1	2	3	4	5	6	7
I knew what I had to do	1	2	3	4	5	6	7
I knew what I had to achieve	1	2	3	4	5	6	7

While I am playing the business simulation game

I receive feedback on my progress in the game	1	2	3	4	5	6	7
I am notified of the results of decision making	1	2	3	4	5	6	7
I receive information on my score within the BSG	1	2	3	4	5	6	7
I think about nothing else	1	2	3	4	5	6	7
I get carried away by the game	1	2	3	4	5	6	7
I forget everything else around me	1	2	3	4	5	6	7
I am totally immersed in the game	1	2	3	4	5	6	7

Playing the BSG gives me a good feeling	1	2	3	4	5	6	7
I get a lot of enjoyment from playing the BSG	1	2	3	4	5	6	7
I feel happy whilst playing the BSG	1	2	3	4	5	6	7
I feel cheerful when I play the BSG	1	2	3	4	5	6	7

I would still play the BSG, even if I was not rewarded for it	1	2	3	4	5	6	7
I find that I also want to play the BSG in my free time	1	2	3	4	5	6	7
I play the BSG because I enjoy it	1	2	3	4	5	6	7
I get my motivation from playing the BSG, and not from the reward of winning it	1	2	3	4	5	6	7

I think that the business simulation game is…

Interesting	1	2	3	4	5	6	7
Pleasant	1	2	3	4	5	6	7
Fun	1	2	3	4	5	6	7

When I am playing the business simulation game…

I try to connect it with what I am learning through my degree	1	2	3	4	5	6	7
I try to make all the decisions fit together and make sense	1	2	3	4	5	6	7
I try to relate what I am learning to what I already know	1	2	3	4	5	6	7
I try hard to do well in the game	1	2	3	4	5	6	7
I participate in group discussions	1	2	3	4	5	6	7
I listen very carefully to the teacher	1	2	3	4	5	6	7
I feel good	1	2	3	4	5	6	7
I feel interested	1	2	3	4	5	6	7
I have fun	1	2	3	4	5	6	7
I feel involved	1	2	3	4	5	6	7

I experienced a lot of freedom in the BSG	1	2	3	4	5	6	7
The BSG provides me with interesting options and choices	1	2	3	4	5	6	7
I could always find something interesting in the BSG to do	1	2	3	4	5	6	7

I feel competent at the BSG	1	2	3	4	5	6	7
I feel very capable when playing the BSG	1	2	3	4	5	6	7
I feel effective in the BSG	1	2	3	4	5	6	7

I find the relationship with my group mates gratifying	1	2	3	4	5	6	7
I find the relationship with my group mates important	1	2	3	4	5	6	7
I feel close to my group mates	1	2	3	4	5	6	7

The BSG helped me understand the practical integration of business functions	1	2	3	4	5	6	7
The BSG helped me develop and analyze competitive advantages for my business.	1	2	3	4	5	6	7
The BSG gave me a thorough understanding of the target market	1	2	3	4	5	6	7
The BSG gave me a thorough understanding of the products' positioning	1	2	3	4	5	6	7

The business simulation game helped me develop skills related to…

Decision making	1	2	3	4	5	6	7
Working under pressure	1	2	3	4	5	6	7
Adapting to new situations	1	2	3	4	5	6	7
Teamwork	1	2	3	4	5	6	7
Applying theory into practice	1	2	3	4	5	6	7

Overall, I found the BSG valuable	1	2	3	4	5	6	7
Overall, I was very satisfied with the BSG	1	2	3	4	5	6	7
Overall, I had a very positive learning experience	1	2	3	4	5	6	7

Gender: ☐ Female ☐ Male **Age**:

THANK YOU FOR YOUR PARTICIPATION!

APPENDIX 3

Do you play mobile games? If so, please add your views on this short survey.

We are a group of academics who are researching consumers' use of Mobile Gaming Apps, and your views about them are extremely important to us. The questionnaire is completely confidential, and will only be used as part of our research study.

To what extent do you agree or disagree with the following sentences? (1= strongly disagree, 7 = strongly agree)

I am extremely skilled at playing games	1	2	3	4	5	6	7
I consider myself knowledgeable about playing games	1	2	3	4	5	6	7
I know somewhat less than most gamers about playing games	1	2	3	4	5	6	7

In which screen did you play the game?

□ Kitchen □ France □ China □ Cookie World

Next, here are several statements about this game. To what extent do you agree or disagree with them? (1= strongly disagree, 7 = strongly agree)

Playing the game challenges me	1	2	3	4	5	6	7
Playing the game challenges me to perform to the best of my ability	1	2	3	4	5	6	7
Playing the game provides a good test of my skills	1	2	3	4	5	6	7
I find that playing the game stretches my capabilities to my limits	1	2	3	4	5	6	7
When I play the game there is very little waiting time between my actions and the game's response	1	2	3	4	5	6	7
Interacting with the game is slow and tedious	1	2	3	4	5	6	7
The game loads quickly	1	2	3	4	5	6	7

To what extent do you agree or disagree with the following statements about this game? (1= strongly disagree, 7 = strongly agree)

I forget about my immediate surroundings when I play the game	1	2	3	4	5	6	7
Playing the game makes me forget where I am	1	2	3	4	5	6	7
After playing the game, I feel like I come back to the "real world" after a journey	1	2	3	4	5	6	7
Playing the game creates a new world for me, and this world suddenly disappears when I stop playing	1	2	3	4	5	6	7
I don't think about other things when I play the game	1	2	3	4	5	6	7
When I play the game I am totally absorbed in what I am doing	1	2	3	4	5	6	7
I cannot be easily distracted when I play the game	1	2	3	4	5	6	7

The word flow is used to describe a state of mind sometimes experienced by people who are deeply involved in some activity. Many people report this state of mind when playing games, engaging in hobbies, or working. When one is in flow, time may seem to stand still, and nothing else seems to matter. Flow may not last for a long time on any particular occasion, but it may come and go over time. Flow has been described as an intrinsically enjoyable experience.

Do you think you have ever experienced 'flow' while playing the game?

Not at all	1	2	3	4	5	6	7	Very much

In general, how frequently would you say you have experienced 'flow' while playing the game?

Not frequently	1	2	3	4	5	6	7	Very frequently

Please, indicate the extent to which you agree wih the following statement:
Most of the time I play this game I feel that I am in 'flow'

Strongly disagree	1	2	3	4	5	6	7	Strongly agree

Next, there are some statements about OREO's products. Please, answer as accurately as you can.

How familiar are you with the OREO's products?

Not at all familiar	1	2	3	4	5	6	7	Very familiar

How often have you purchased OREO's products in the past?

Not often	1	2	3	4	5	6	7	Very often

How knowledgeable are you about OREO's products?

Not very knowledgeable	1	2	3	4	5	6	7	Very knowledgeable

Please, using the scale below, could you indicate your attitude towards the brand OREO?

Unfavourable	1	2	3	4	5	6	7	Favourable
Bad	1	2	3	4	5	6	7	Good
Negative	1	2	3	4	5	6	7	Positive

My likelihood of purchasing OREO's products is…

Very low	1	2	3	4	5	6	7	Very high

The probability that I would consider buying OREO's products is…

Very low	1	2	3	4	5	6	7	Very high

My willingness to buy OREO's products is…

Very low	1	2	3	4	5	6	7	Very high

Gender: □ Male □ Female **Age:** _____

THANK YOU! Your participation in this study has been invaluable to us - thank you for your time.

RESUMEN Y CONCLUSIONES

RESUMEN

En los últimos años, la gamificación se ha convertido en una nueva tendencia en diversos contextos, así como en una prominente área de investigación (Hamari & Parvinen, 2018). Asimismo, el uso de la gamificación como una herramienta para motivar a los individuos se ha incrementado (Ritcher et al., 2015; Sailer et al., 2017). Sin embargo, a pesar del creciente interés que ha suscitado, no existe una definición universalmente aceptada de la gamificación (Sailer et al., 2017; Seaborn & Fels, 2015), si bien la idea detrás de la mayoría de conceptualizaciones es aplicar elementos del diseño de juegos (ej., puntos, reglas, retos, recompensas, competición…) en contextos no lúdicos (Deterding et al., 2011; Seaborn & Fels, 2015). En otras palabras, el propósito de la gamificación es aprovechar la motivación y atractivo de los juegos y, mediante la inclusión de elementos propios de los juegos en otros contextos, hacer que los individuos alcancen niveles de motivación y *engagement* similares en dichos contextos.

Además de incrementar la motivación y el *engagement*, la gamificación ofrece otros beneficios igualmente importantes, como incrementar el conocimiento de la marca, mejorar las experiencias de los usuarios, o incrementar la lealtad de los consumidores (Xu et al., 2017). Asimismo, la gamificación aumenta la actividad de los usuarios (Hamari, 2013) así como su participación (Morschheuser et al., 2016). La gamificación también se relaciona con un mayor aprendizaje (Hamari et al., 2016; Kolb & Kolb, 2010), así como con otros resultados en el contexto de trabajo, como la gestión de empleados (Xu et al., 2017) o el desarrollo de liderazgo (Kark, 2011).

En lo que respecta a la primera característica de la gamificación, el uso de elementos de juego, no existe consenso sobre una única clasificación de los mismos. Tras examinar diferentes aplicaciones de la gamificación, Werbach y Hunter (2012) proponen una clasificación de los elementos de juego en tres grupos, de menor a mayor grado de abstracción, distinguiendo componentes, mecánicas y dinámicas de juego. Los componentes son los elementos más específicos del juego, como los puntos, los niveles, o los rankings. Éstos sirven para crear mecánicas de juego, que hacen referencia a los procesos que impulsan determinadas acciones, como los retos, los turnos, o los sistemas

de recompensas. Finalmente, las dinámicas corresponden con los elementos que dan estructura al juego, como la progresión, las interacciones entre participantes, o la narrativa.

Por su parte, la segunda característica de la gamificación hace referencia a su aplicación en contextos no lúdicos. Werbach y Hunter (2012) proponen categorizar la gamificación en función del contexto donde se aplica, distinguiendo tres tipos: interna, externa y de cambio de comportamiento. La gamificación interna es aquella que tiene lugar en el seno de la empresa y está dirigida a sus empleados, mientras que la gamificación externa es la que se dirige hacia los clientes de la empresa. Finalmente, la gamificación para el cambio de comportamientos tiene como objetivo motivar conductas deseadas en la población, tales como incentivar a las personas a comer más sano, hacer más deporte, estar comprometidos con el aprendizaje, etc.

La gamificación ha generado un gran interés en diferentes áreas, incluyendo trabajo, sanidad, redes sociales, comunidades online, etc. (Buckley & Doyle, 2016; Hamari & Koivisto, 2015; Jones et al., 2014; Oprescu et al., 2014; Seaborn & Fels, 2015; Xu et al., 2017). De entre ellas, la educación (Domínguez et al., 2013; de Marcos et al., 2014) y el marketing (Bittner & Schipper, 2014; Hamari, 2013, 2017; Terlutter & Capella, 2013; Xu et al., 2017) destacan especialmente.

Por un lado, la educación es una de las áreas más prometedoras en las que aplicar gamificación (Lee & Hammer, 2011; McGonigal, 2011), por lo que cada vez más docentes están gamificando diversos aspectos del aula para captar la atención de los estudiantes y hacer frente a los problemas de falta de motivación (Buckley et al., 2017). Además, dado que la mayoría de estudiantes han crecido en una era dominada por los videojuegos, gamificar aspectos de la clase puede resultarles especialmente atractivo y motivador (Glover, 2013). Un ejemplo de actividad gamificada en el aula que ha generado especial interés en los últimos años son las competiciones de mandos de respuesta (o *clickers*). Los mandos de respuestas son unos dispositivos móviles que transmiten las respuestas de los estudiantes a preguntas realizadas en clase. Mediante esta herramienta, los docentes pueden convertir una clase teórica tradicional en una competición amistosa, con el fin de motivar a los estudiantes a responder a las preguntas

y prestar atención en clase, a la vez que se divierten. Los juegos de simulación empresarial son otro ejemplo de gamificación en educación que permite a los docentes crear un puente entre la teoría y la práctica, favoreciendo un mayor *engagement* con la experiencia de aprendizaje (Loon et al., 2015). Su potencial ha sido ampliamente analizado y se han encontrado numerosos beneficios, como la mejora del aprendizaje y la adquisición y desarrollo de habilidades y competencias (Sitzmann, 2011; Vogel et al., 2006).

Otra área en la cual la gamificación puede tener un gran impacto es el marketing (Hofacker et al., 2016; Xu et al., 2015). De hecho, algunos autores sostienen que el concepto de gamificación tiene "*sus raíces en los esfuerzos de marketing*" (Seaborn & Fels, 2015; p. 16), como las tarjetas de fidelización, a través de las cuales los consumidores acumulan puntos para intercambiarlos por regalos o descuentos. En particular, una de las áreas más prometedoras para aplicar gamificación es la publicidad (Yang et al., 2017), ya que, debido a la saturación de los medios tradicionales, los anunciantes buscan nuevos formatos para publicitar sus productos (Küster & Castillo, 2012). De este modo, añadiendo incentivos que incrementen la diversión de los consumidores, la gamificación puede hacer que la publicidad sea más divertida (Bittner & Schipper, 2014). Con este propósito, en los últimos años se han creado unos juegos electrónicos, conocidos como "advergames", para promocionar marcas y productos (Winkler & Buckner, 2006). Esta nueva herramienta cuenta con importantes beneficios para los anunciantes, como crear experiencias atractivas para los adultos más jóvenes (Cicchirillo & Mabry, 2016), captar la atención de los consumidores, incrementar el conocimiento de la marca, o persuadir a los consumidores para que formen una actitud más positiva hacia la marca y sus productos (Terlutter & Capella, 2013).

Independientemente del contexto en el que se aplique, la gamificación tiene potencial para motivar a los individuos a comportarse de una cierta manera (Werbach & Hunter, 2012). Por lo tanto, entender la motivación de los individuos es fundamental a la hora de diseñar actividades gamificadas de éxito. En este sentido, diversas teorías proporcionan fundamentos para los efectos de la gamificación. Uno de los constructos más populares a la hora de describir la motivación de los jugadores es el concepto del *flow* (Procci et al., 2012), el cual se refiere a un estado de total absorción en una

actividad que se percibe como divertida (Csikszentmihalyi, 1975). Los juegos son, incuestionablemente, actividades que inducen a un estado de *flow* (Csikszentmihalyi, 1975). Además de incentivar este estado de *flow* entre los jugadores, los juegos también son conocidos por causar respuestas emocionales entre éstos, como diversión, curiosidad o frustración (Küster & Castillo, 2012; McGonigal, 2011). Estas emociones son especialmente relevantes en contextos académicos, en los cuales el aburrimiento y la apatía son las principales causas de no estar comprometido con el aprendizaje (Shernoff et al., 2014). En este sentido, la teoría del control-valor de las emociones de logro (Pekrun et al., 2002) proporciona un marco teórico para entender las emociones en educación, así como aquellas que surgen en contextos gamificados. Finalmente, la teoría de motivación por excelencia, la teoría de la auto-determinación (Deci, 1975), considera que la motivación reside en un continuo, pasando por la motivación intrínseca, la motivación extrínseca y la amotivación (Ryan & Deci, 2000). La motivación intrínseca se refiere a llevar a cabo una actividad porque es interesante y divertida (Deci & Ryan, 2015), mientras que la motivación extrínseca surge cuando la actividad se realiza para conseguir algún incentivo externo (Deci et al., 1996). La gamificación tiene un efecto tanto en la motivación intrínseca como en la motivación extrínseca de los jugadores. Dado que los elementos de juego son intrínsecamente motivadores, los individuos se sienten atraídos por las actividades gamificadas, ya que las consideran interesantes (Kim & Ahn, 2017). Por su parte, las actividades gamificadas también proporcionan incentivos externos en forma de puntos, medallas, o rankings a cambio de participar en ellas (Hanus & Fox, 2015; Seaborn & Fels, 2015).

A pesar del creciente interés en torno a la gamificación, la investigación existente tiene ciertas carencias. En primer lugar, a pesar del potencial de diversas teorías como la teoría del *flow*, la teoría del control-valor de las emociones de logro y la teoría de la auto-determinación, estudios previos han señalado una falta de fundamento teórico para explicar los efectos motivadores de la gamificación (Hamari et al., 2014; Sailer et al., 2017; Seaborn & Fels, 2015), así como la necesidad de investigar los mecanismos psicológicos subyacentes que puedan explicar los efectos de la gamificación en los individuos (Deterding, 2015). En segundo lugar, hay una escasez de evidencias empíricas sobre la efectividad de la gamificación (Hamari et al., 2015; Seaborn & Fels, 2015) y los resultados son contradictorios (Hamari, 2017). En

contextos educativos, a pesar del creciente número de trabajos que analizan empíricamente los efectos de actividades gamificadas, como aquellas basadas en las competiciones de mandos de respuesta (e.g., Blasco-Arcas et al., 2013; Castillo-Manzano et al., 2016; Ludvigsen et al., 2015; McDonough & Foote, 2015; Stowell, 2015; Sun, 2014), los resultados no son concluyentes (Hunsu et al., 2016). Además, escasos estudios analizan el uso de gamificación en el contexto de marketing (Xu et al., 2017), especialmente con fines publicitarios (Terlutter & Capella, 2013). En este contexto específico, diversos autores han señalado que la investigación en advergames para plataformas móviles es escasa (Kinard & Hartman, 2013; Terlutter & Capella, 2013).

Teniendo en cuenta el atractivo de la gamificación y los gaps identificados en la literatura, la presente tesis doctoral se apoya en diferentes marcos teóricos –la teoría del *flow*, la teoría del control-valor de las emociones de logro y la teoría de la auto-determinación– para explicar de qué manera afecta la gamificación al comportamiento de los individuos, así como para proporcionar evidencias empíricas de dicho efecto. Este objetivo general se puede subdividir en los siguientes objetivos de investigación específicos:

1. Examinar la efectividad de una actividad gamificada basada en una competición de mandos de respuesta, tomando como base la teoría del *flow* y la teoría del control-valor de las emociones de logro.
2. Analizar los efectos de los juegos de simulación empresarial, tomando como base la teoría del *flow* y la teoría de la auto-determinación.
3. Evaluar la efectividad de los advergames para promocionar una marca, tomando como base la experiencia de *flow* de los jugadores cuando juegan el advergame.

Para conseguir dichos objetivos de investigación, esta tesis doctoral presenta cinco estudios empíricos.

El primer estudio empírico (Capítulo II) se centra en analizar el *flow* que experimentan los estudiantes cuando participan en una competición de mandos de respuesta. En concreto, este estudio analiza la influencia de tres antecedentes del *flow* – el equilibrio entre las habilidades del individuo y el reto al que se enfrenta, la

información que recibe y la claridad de los objetivos– en la experiencia de *flow*, la cual se conceptualiza en base a la concentración, sensación de control y diversión experimentadas por los estudiantes. Finalmente, se analiza el impacto de las dimensiones del *flow* en el aprendizaje percibido y la satisfacción de los estudiantes que participan en la competición de mandos de respuesta. A partir de una muestra de 204 estudiantes que participaron en la competición, los resultados del estudio proporcionan apoyo al uso de este tipo de actividades gamificadas en contextos académicos como una herramienta para promover la experiencia de *flow* y mejorar el aprendizaje. En concreto, los resultados confirman que los estudiantes que sienten que sus habilidades son adecuadas para hacer frente al reto que se les presenta durante la competición de mandos de respuesta, experimentan una mayor concentración, una elevada sensación de control y una mayor diversión. Por otro lado, tanto la información recibida como la claridad de objetivos son factores determinantes en el aprendizaje por su impacto directo en su nivel de concentración y en la sensación de control de los estudiantes. En particular, los resultados sugieren que la información recibida durante la competición de mandos de respuesta, en términos de cuán bien está actuando el equipo, mejora tanto la concentración en la actividad como la sensación de control sobre la misma. Además, si los alumnos reconocen claramente el propósito de la actividad y los objetivos a alcanzar, se concentrarán más en lograr dichos objetivos y experimentarán una mayor sensación de control. Los resultados obtenidos también muestran que la concentración, la sensación de control y la diversión tienen un efecto positivo en el aprendizaje percibido. Sin embargo, sólo la diversión predice el nivel de satisfacción de los alumnos con la actividad gamificada. Finalmente, los resultados sugieren que los alumnos que consideran la competición de mandos de respuesta útil para su aprendizaje están más satisfechos con la actividad.

El segundo estudio empírico de la presente tesis (Capítulo III) toma como marco teórico la teoría del control-valor de las emociones de logro para explicar cómo la implementación de una competición de mandos de respuesta en el aula puede mejorar la motivación, el aprendizaje percibido y la satisfacción de los estudiantes. Basándonos en los datos obtenidos de una encuesta realizada a 207 estudiantes que habían participado en la competición de mandos de respuesta, los resultados del estudio empírico realizado proporcionan un fuerte apoyo al uso de este tipo de actividades en contextos académicos

como una herramienta para mejorar la experiencia de aprendizaje. La competición de mandos de respuesta proporciona a los estudiantes información en tiempo real sobre sus logros, permitiéndoles evaluar su nivel de comprensión de la materia. Los resultados muestran que dicha información sobre su progreso favorece una mayor percepción de control académico y una mayor auto-eficacia por parte de los estudiantes. Del mismo modo, incrementa la importancia subjetiva o valor de la actividad. Así, si los estudiantes están informados sobre su nivel de desempeño, tienen una mayor seguridad en sí mismos y un mayor grado de control sobre sus resultados futuros. Además, perciben la actividad como útil para su aprendizaje. De acuerdo con la teoría control-valor, las estimaciones relativas al control y el valor son los principales antecedentes de las emociones de logro. En lo que respecta a las estimaciones de control, el control académico percibido y la auto-eficacia predicen positivamente el orgullo de los alumnos. Por lo tanto, la intensidad de esta emoción de carácter retrospectivo relacionada con los resultados es mayor cuando los alumnos atribuyen su éxito a sus habilidades y esfuerzos en la preparación de la competición de mandos de respuesta. Del mismo modo, la auto-eficacia se relaciona negativamente con el aburrimiento, de manera que las creencias de los alumnos sobre su habilidad para participar en la competición disminuyen la probabilidad de que se aburran. Por otro lado, en lo que respecta a las estimaciones de valor, los resultados han demostrado que, cuando los estudiantes consideran que la competición de mandos de respuesta tiene valor, es más probable que experimenten emociones positivas activadoras, como la diversión y el orgullo. Por el contrario, cuanto mayor es el valor que se otorga a la actividad, menores son las emociones negativas, como el aburrimiento. Asimismo, los resultados han mostrado un impacto directo de las emociones de los estudiantes en su motivación. Por un lado, la diversión experimentada favorece tanto la motivación intrínseca como la extrínseca. Además, el orgullo predice positivamente la motivación extrínseca. Por otro lado, las emociones negativas, como el aburrimiento, van en detrimento de la motivación intrínseca. Finalmente, tanto la motivación intrínseca como la extrínseca tienen un efecto positivo en el aprendizaje y la satisfacción de los estudiantes con la competición de mandos de respuesta. Además, aquellos que consideran la competición útil para su aprendizaje están más satisfechos con el uso de esta actividad gamificada.

El tercer estudio empírico (Capítulo IV) utiliza como base teórica la teoría del *flow* para demostrar que el uso de juegos de simulación empresarial en el aula mejora la experiencia de los estudiantes. En concreto, este estudio analiza el efecto de cuatro antecedentes del estado de *flow* –las percepciones sobre las habilidades que el individuo posee, el reto al que se enfrenta, la información recibida a lo largo del juego de simulación y la claridad de los objetivos– en la experiencia de *flow*, conceptualizada como un constructo de segundo orden que incluye las dimensiones de concentración (o absorción), diversión y motivación intrínseca. Asimismo, analiza el impacto de la experiencia de *flow* en el desarrollo de competencias, el aprendizaje percibido y la satisfacción con la actividad. Los resultados del estudio realizado a 167 estudiantes que habían jugado un juego de simulación empresarial han demostrado que el uso de este tipo de juegos en contextos académicos promueve la experiencia de *flow*, la cual está relacionada positivamente con el desarrollo de competencias, el aprendizaje percibido y la satisfacción. Respecto de la relación entre los antecedentes del *flow* y la experiencia de *flow*, los resultados han confirmado que los estudiantes que perciben que el juego de simulación empresarial supone un elevado reto o desafío, pero que sus habilidades son adecuadas para hacerle frente, experimentan *flow* en términos de una mayor concentración, una mayor diversión y una elevada motivación intrínseca. Asimismo, los resultados confirman que la información recibida durante el juego está positivamente relacionada con la experiencia de *flow* de los jugadores. Los resultados también muestran una relación positiva entre el nivel de flow experimentado por los estudiantes cuando juegan el juego de simulación empresarial y el desarrollo de competencias genéricas, aprendizaje percibido y satisfacción. Finalmente, los resultados de este estudio sugieren que los estudiantes que consideran que los juegos de simulación empresarial son útiles para el desarrollo de competencias genéricas perciben un incremento en su aprendizaje y están más satisfechos con el juego. Del mismo modo, los estudiantes que consideran el juego útil para su aprendizaje están más satisfechos con el mismo.

El cuarto estudio empírico (Capítulo V) analiza si el uso de juegos de simulación empresarial en el aula favorece la motivación intrínseca de los estudiantes, así como un mayor *engagement*. Para ello, utiliza la teoría de la auto-determinación, la cual considera que, para que un individuo esté intrínsecamente motivado a realizar una

actividad, dicha actividad debe satisfacer sus tres necesidades psicológicas básicas: competencia, autonomía y relación. De este modo, el estudio empírico analiza el impacto de la satisfacción de dichas necesidades en la motivación intrínseca de los jugadores, así como el efecto de ésta en el *engagement*, el desarrollo de competencias genéricas y el aprendizaje percibido. Asimismo, analiza el impacto del *engagement* en el desarrollo de competencias genéricas y el aprendizaje percibido. Los datos obtenidos de 360 estudiantes que habían jugado un juego de simulación empresarial proporcionan un fuerte apoyo al uso de juegos de simulación empresarial en la formación en gestión de empresas como una herramienta para promover una mayor motivación intrínseca entre los jugadores, favorecer el *engagement*, desarrollar habilidades y competencias, e incrementar el aprendizaje en dicho campo. Los resultados confirman que, si los jugadores perciben que sus necesidades básicas de competencia, autonomía y relación se satisfacen en el juego de simulación empresarial, están más motivados intrínsecamente para jugar. Esta motivación facilita un mayor *engagement* durante el juego y, tanto la motivación intrínseca como el *engagement*, favorecen el desarrollo de habilidades y competencias (ej., trabajo en equipo, toma de decisiones, trabajo bajo presión…) y mejoran el aprendizaje en el campo de la gestión empresarial (ej., entender la integración práctica de las diferentes unidades de negocio, analizar las ventajas competitivas de la empresa, entender el posicionamiento de los productos…).

Por último, el quinto estudio de la tesis doctoral (Capítulo VI) analiza el efecto del *flow* experimentado por los usuarios que juegan un advergame para plataformas móviles (*smartphones* y *tablets*) en la efectividad del mismo. En concreto, este estudio examina la influencia de cinco antecedentes del flow –percepciones sobre las habilidades del jugador, el reto del advergame, la interactividad, la atención que se presta al juego y la telepresencia (capacidad del juego para transportarte a un mundo virtual)– en la experiencia de *flow* de los jugadores. Asimismo, relaciona la experiencia de *flow* con la actitud de los jugadores hacia la marca promocionada en el juego y la intención de compra de los productos de la misma. A partir de una muestra de 212 jóvenes que habían jugado un advergame, los resultados indican que el nivel de reto al que se enfrentan los jugadores en el advergame, la interactividad, la atención que prestan y la telepresencia promueven significativamente la experiencia de *flow*. Asimismo, los resultados revelan un impacto positivo y significativo de la experiencia

de *flow* en las percepciones sobre la marca, de manera que cuanto más *flow* experimentan los jugadores, más favorables son las actitudes y mayor es la intención de compra de la marca. Además, los resultados muestran que la actitud hacia la marca influye positivamente en la intención de compra de la misma. Finalmente, se ha encontrado un efecto significativo de la familiaridad con la marca con la actitud hacia la marca y la intención de compra, de manera que los jugadores que están más familiarizados con la marca y sus productos, tienen una actitud más positiva hacia la misma y una mayor intención de compra.

En definitiva, a partir de los cinco estudios presentados en esta tesis doctoral, se ha analizado empíricamente el efecto de actividades gamificadas basadas en el uso de mandos de respuesta, juegos de simulación empresarial y advergames en las áreas de educación y marketing. Los resultados obtenidos en dichos estudios nos han permitido observar el impacto que tiene la gamificación en los individuos, sustentando la explicación de dicho impacto en la teoría del *flow*, la teoría del control-valor de las emociones de logro y la teoría de la auto-determinación.

CONCLUSIONES

En los últimos años, la gamificación ha suscitado un gran interés entre investigadores, profesionales y docentes (Huotari & Hamari, 2017). A pesar de ello, recientes estudios han destacado una falta de fundamento teórico a la hora de explicar los efectos motivadores de la gamificación, así como la necesidad de una mayor evidencia empírica sobre su efectividad (Hamari et al., 2014; Sailer et al., 2017; Seaborn & Fels, 2015). Teniendo en cuenta las limitaciones identificadas en la literatura, el objetivo general de esta tesis doctoral ha sido utilizar diferentes marcos teóricos –en concreto, la teoría del *flow*, la teoría del control-valor de las emociones de logro y la teoría de la auto-determinación– para explicar el impacto de la gamificación en el comportamiento de los individuos, así como proporcionar evidencias empíricas de dicho impacto. En concreto, la presente tesis doctoral ha abordado los siguientes objetivos de investigación.

El primer objetivo de investigación planteaba tomar como base teórica la teoría del *flow* y la teoría del control-valor de las emociones de logro para examinar la efectividad de una actividad gamificada –en concreto, una competición de mandos de respuesta. De manera más específica, el objetivo era investigar qué variables afectaban al *flow* experimentado por los jugadores cuando participan en una competición de mandos de respuesta, y cómo ese *flow* afecta a su aprendizaje. Además, la tesis doctoral tenía como objetivo analizar los factores que influyen en las emociones de los jugadores y evaluar el efecto de dichas emociones en su motivación y aprendizaje. Como se muestra en los capítulos II y III, los resultados han proporcionado un fuerte apoyo para el uso de mandos de respuesta en contextos académicos como una herramienta gamificada a través de la cual favorecer la experimentación de un estado de *flow*, promover emociones positivas entre los estudiantes y mejorar la experiencia de aprendizaje.

De acuerdo con los resultados obtenidos en el Capítulo II, se puede concluir que los estudiantes que consideran que sus habilidades son adecuadas para hacer frente a los retos que plantea la competición de mandos de respuesta experimentan una mayor concentración, una mayor sensación de control y una mayor diversión, variables que

caracterizan la experiencia de *flow*. Del mismo modo, la información recibida a lo largo de la competición así como la claridad de los objetivos son factores importantes para el aprendizaje de los estudiantes debido a su efecto directo en el nivel de concentración y en la sensación de control. Asimismo, los resultados nos han permitido confirmar que la concentración, la sensación de control y la diversión tienen un efecto positivo en el aprendizaje percibido. Además, la diversión experimentada durante la actividad gamificada predice el nivel de satisfacción de los estudiantes con la misma. Finalmente, los resultados sugieren que aquellos estudiantes que consideran que la competición de mandos de respuesta es útil para su aprendizaje están más satisfechos con el uso de esta tecnología.

Por otro lado, basándonos en los resultados obtenidos en el Capítulo III, la información recibida a lo largo de la competición de mandos de respuesta incrementa el control académico percibido por los estudiantes, así como sus percepciones de auto-eficacia. Del mismo modo, incrementa la importancia subjetiva o valor de la actividad en la cual se utilizan los mandos de respuesta. Tanto el control académico percibido como la auto-eficacia predicen de manera positiva el orgullo que experimentan los estudiantes durante la actividad. Por su parte, la auto-eficacia tiene un impacto negativo en el aburrimiento. Además, se ha encontrado que el valor de la actividad tiene un efecto positivo en la diversión y el orgullo, mientras que incide de manera negativa en el aburrimiento. Los resultados han mostrado un efecto directo de las emociones de los estudiantes en su motivación. Específicamente, la diversión incentiva tanto la motivación intrínseca como la extrínseca, mientras que el orgullo predice la motivación extrínseca. Por su parte, el aburrimiento es perjudicial para la motivación intrínseca. Finalmente, se ha demostrado que tanto la motivación intrínseca de los estudiantes como la extrínseca tienen un efecto positivo en el aprendizaje percibido y la satisfacción con la competición de mandos de respuesta.

El segundo objetivo de investigación planteaba analizar los efectos de jugar un juego de simulación empresarial, tomando como la base la teoría del *flow* y la teoría de la auto-determinación. En particular, la presente tesis doctoral tenía como objetivo investigar los determinantes de la experiencia de *flow* de los jugadores cuando utilizan un juego de simulación empresarial, así como la relación entre el *flow*, el desarrollo de

competencias y el aprendizaje. Del mismo modo, se pretendía examinar qué factores incentivan la motivación intrínseca de los jugadores, analizando el efecto de la motivación intrínseca en el *engagement* de los jugadores, el desarrollo de competencias y el aprendizaje. Los estudios empíricos desarrollados en los capítulos IV y V proporcionan un gran apoyo para el uso de juegos de simulación empresarial como una herramienta gamificada para promover experiencias de *flow*, motivación intrínseca y *engagement*, los cuales están positivamente relacionados con el desarrollo de competencias, el aprendizaje percibido y la satisfacción de los estudiantes.

En concreto, de acuerdo con los resultados obtenidos en el Capítulo IV, los estudiantes que sienten que sus habilidades son adecuadas para hacer frente al reto que presenta el juego de simulación empresarial, experimentan un estado de *flow* que se caracteriza por una mayor concentración, una elevada diversión y una mayor motivación intrínseca. Asimismo, la información recibida durante el juego de simulación empresarial fomenta que los estudiantes estén más centrados en la actividad. Finalmente, los resultados obtenidos han mostrado una relación positiva entre el nivel de *flow* experimentado por los estudiantes mientras juegan juegos de simulación empresarial, el desarrollo de competencias genéricas, el aprendizaje percibido y la satisfacción con la actividad.

En cuanto a los resultados obtenidos en el Capítulo V, se han confirmado que, cuando los jugadores sienten que sus necesidades de competencia, autonomía y relación se satisfacen con el juego de simulación empresarial, están más motivados intrínsecamente para jugar dicho juego. Del mismo modo, los resultados han mostrado que la motivación intrínseca facilita un mayor *engagement* durante el juego y que, tanto la motivación intrínseca como el *engagement*, favorecen el desarrollo de competencias genéricas por parte de los estudiantes, aumentando también su aprendizaje en el campo de la gestión empresarial.

Finalmente, el tercer objetivo de investigación planteaba evaluar la efectividad de los advergames para promocionar una marca, basándose en el *flow* experimentado por los jugadores mientras juegan el advergame. En concreto, el objetivo ha sido analizar qué variables afectan a la experiencia de *flow* de los jugadores cuando juegan

un advergame y cómo ese *flow* influye en diferentes resultados relacionados con la marca.

El estudio empírico desarrollado en el Capítulo VI es uno de los primeros en relacionar la experiencia de *flow* cuando se juega un advergame con las percepciones de los jugadores sobre la marca promocionada en el advergame. Los análisis han indicado que el reto que plantea el juego, la interactividad, la atención y la telepresencia promueven de manera significativa la experiencia de *flow* entre los jugadores. Sin embargo, en contra de lo que se había predicho, las habilidades de los jugadores influyen a la hora de experimentar *flow*. Además, los resultados han revelado que cuanto mayor es el *flow* que experimentan los jugadores, más favorables son sus actitudes hacia la marca y mayor es la intención de compra de dicha marca. Del mismo modo, se ha demostrado que la actitud hacia la marca tiene una influencia positiva en la intención de compra. Finalmente, la familiaridad con la marca afecta positivamente tanto a la actitud hacia la marca como a la intención de compra.

Implicaciones para la teoría

La presente tesis doctoral ofrece una serie de contribuciones teóricas para la literatura de gamificación, en general, y para tres aplicaciones específicas de la misma –mandos de respuesta, juegos de simulación empresarial y advergames– en particular.

En primer lugar, recientes revisiones de la literatura (ej., Chien et al., 2016; Hunsu et al., 2016) habían destacado la falta de discusiones teóricas que explicasen cómo los mandos de respuesta, los cuales integran un enfoque de juego en una clase tradicional, podían fomentar el aprendizaje. Además, la efectividad de varios elementos de gamificación no había sido suficientemente analizada (Hanus & Fox, 2015), y había una falta de investigaciones empíricas que examinasen los elementos de diseño de juego (ej., objetivos, retos…) y la experiencia de juego en contextos académicos (Hou & Li, 2014). Para dar respuesta a esto, la presente tesis doctoral ha ampliado investigaciones previas en el contexto de los mandos de respuesta proporcionando nuevas perspectivas sobre la efectividad de esta tecnología, tomando como base la teoría del *flow* y la teoría del control-valor de las emociones de logro. Las investigaciones existents sobre las emociones de logro se habían centrado fundamentalmente en la ansiedad de los

estudiantes y había una necesidad de investigar otras emociones de logro, así como sus efectos (Pekrun, 2006; Pekrun et al., 2009; Peterson et al., 2015). En este sentido, esta tesis doctoral ha ampliado las investigaciones existentes investigando los efectos de la diversión, el orgullo y el aburrimiento. Además, esta tesis ha sobrepasado limitaciones de investigaciones previas sobre mandos de respuesta, como el rango limitado de contextos educativos en los cuales se ha analizado el uso de mandos de respuesta (ej. Matemáticas y Ciencias), y la ausencia de análisis de fiabilidad y validez de los instrumentos de medida (Kay & LeSage, 2009).

En segundo lugar, escasos estudios habían proporcionado marcos teóricos basados en teorías motivacionales para explicar cómo los juegos de simulación empresarial impactan en el aprendizaje. Basándonos en la teoría del *flow* y la teoría de la auto-determinación, la presente tesis doctoral muestra cómo incentivar la experiencia de *flow* y la motivación intrínseca a través de juegos de simulación empresarial, así como las relaciones entre el *flow*, la motivación, el *engagement* y el desarrollo de competencias genéricas por parte de los jugadores, así como el aprendizaje percibido. De hecho, de entre todos los estudios analizados, esta investigación ha sido la primera en analizar el efecto de la satisfacción de necesidades psicológicas en la motivación intrínseca en el contexto de juegos de simulación empresarial. Asimismo, mientras que investigaciones previas habían enfatizado la naturaleza multidimensional del *engagement* en contextos académicos (Fredricks et al., 2004), escasos estudios habían analizado todas las dimensiones del *engagement* en el contexto de los juegos de simulación empresarial. Así, esta tesis ha ampliado investigaciones previas analizando las dimensiones cognitiva, emocional y comportamental del *engagement* en este contexto específico.

Por último, la investigación académica ha ignorado la intersección entre el marketing y la gamificación (Lucassen & Jansen, 2014) y escasos estudios han discutido el uso de la gamificación en marketing (Xu et al., 2017), especialmente con propósitos publicitarios (Terlutter & Capella, 2013). En particular, en relación con los advergames, las plataformas de juegos móviles son un área en la cual la investigación es especialmente reducida (Terlutter & Capella, 2013), lo cual ha llevado a diversos autores a señalar la necesidad de más investigaciones que examinen los advergames en

el contexto de las apps de teléfonos móviles (Kinard & Hartman, 2013). Además, existe una escasez de estudios que examinen el poder persuasivo de los advergames desde el punto de vista de teorías motivacionales. Por otro lado, escasos estudios han investigado cómo jugar advergames a través de móviles puede mejorar las percepciones de la marca de los jugadores, así como sus intenciones de compra. Esta tesis doctoral aplica la teoría del *flow* para examinar el efecto del *flow* en el poder persuasivo de los advergames, y arroja luz en el impacto de los antecedentes del *flow* en el contexto de advergames para móviles, así como su efecto en los resultados relacionados con la marca. Además, esta investigación avanza el conocimiento existente analizando el impacto del *flow* experimentado por los jugadores en la actitud hacia la marca y la intención de compra cuando están jugando un advergame en una situación real de mercado. Eso es, usando un advergame móvil real creado por una marca real, lo que incrementa la validez externa de nuestro estudio en comparación con investigaciones previas que analizaban marcas ficticias o juegos inventados.

Implicaciones para la práctica

La presente tesis doctoral también ha proporcionado implicaciones para la práctica. En primer lugar, el uso de mandos de respuesta provoca la experiencia de *flow*, así como diferentes emociones de logro, entre los estudiantes. Por lo tanto, los docentes que utilizan actividades gamificadas basadas en los mandos de respuesta deben prestar especial atención al diseño de la actividad. En concreto, para ayudar a los estudiantes a estar completamente inmersos en la competición de mandos de respuesta, los docentes deben proporcionarles retos que sean acordes a sus habilidades y capacidades (ej., que la dificultad de las cuestiones planteadas esté en equilibrio con las explicaciones dadas en clase), asegurarse que los objetivos que deben alcanzar los estudiantes quedan claros y proporcionar información en tiempo real para permitirles valorar cómo lo están haciendo. De manera similar, para promover emociones de logro positivas entre los estudiantes mientras juegan, la competición de mandos de respuesta debe proporcionar a los estudiantes información en tiempo real, permitiéndoles evaluar su nivel de entendimiento de la materia. Además, los docentes deben resaltar los beneficios de la actividad con los mandos de respuesta (es decir, el valor de la misma), al tiempo que incrementan la sensación de control de los estudiantes.

En segundo lugar, esta tesis doctoral tiene también una serie de implicaciones prácticas en relación a cómo diseñar actividades con juegos de simulación empresarial que promuevan el *flow*, la motivación intrínseca y el *engagement* de los estudiantes con la experiencia de aprendizaje. Para favorecer la experiencia de *flow*, los docentes deben plantear a los estudiantes un reto adecuado, ni muy elevado ni excesivamente sencillo, acorde a las habilidades de los estudiantes. Esto implica que la dificultad de la toma de decisiones durante el juego de simulación empresarial debe ir en consonancia con las explicaciones dadas por los docentes en el aula, así como los materiales docentes proporcionados a los estudiantes. Además, los juegos de simulación empresarial deberían diseñarse para proporcionar un sistema de información en tiempo real sobre datos de mercado, como el precio de los productos de los competidores, datos de ventas, beneficios, posicionamiento de los productos, etc. Del mismo modo, los docentes deberían prestar atención a las sesiones dedicadas a la evaluación de la simulación y análisis de la información, ya que éstas incrementan el potencial de los juegos de simulación empresarial para mejorar el aprendizaje. Para incentivar la motivación intrínseca, es importante satisfacer las necesidades de competencia, autonomía y relación de los estudiantes A este respecto, los juegos de simulación empresarial deben intentar evitar cualquier tipo de restricción que pueda limitar las opciones de los jugadores, y proporcionar flexibilidad respecto a las posibles estrategias a elegir. Además, los docentes deben diseñar las actividades con juegos de simulación empresarial en grupos y no individualmente.

Finalmente, la presente tesis doctoral proporciona implicaciones prácticas para los anunciantes y los diseñadores de advergames para dispositivos móviles, los cuales deben crear advergames atractivos, con niveles de dificultad progresivos, para crear retos cada vez mayores para los jugadores. Además, deberían permitir a los jugadores interactuar con el contenido del anuncio de manera que estén completamente concentrados en lo que están haciendo. Finalmente, los desarrolladores de advergames deben mejorar la calidad del juego en términos de gráficos y audio para crear un mundo ficticio más realista al cual los jugadores se puedan transportar.

Limitaciones y futuras líneas de investigación

A lo largo de la tesis doctoral se han señalado limitaciones específicas y se han proporcionado futuras líneas de investigación para cada uno de los cinco estudios empíricos que conforman dicha tesis. En esta sección, se señalan limitaciones generales de la tesis doctoral, así como se proponen líneas generales para investigaciones futuras.

En primer lugar, la presente tesis se ha basado en tres marcos teóricos –la teoría del *flow*, la teoría del control-valor de las emociones de logro y la teoría de la auto-determinación– para analizar el impacto de la gamificación en los individuos. Dado que estas teorías son complejas e incluyen una elevada cantidad de variables, esta tesis ha usado un conjunto limitado de variables para resumirlas. Por ejemplo, de acuerdo con investigaciones previas, el *flow* se ha operacionalizado de tres formas diferentes. De manera similar, esta tesis ha analizado tres emociones de logro –diversión, orgullo y aburrimiento–, dejando a un lado otras. Del mismo modo, nos hemos centrado en la motivación intrínseca y la motivación extrínseca. Por lo tanto, futuros estudios deberían centrarse en otras variables relacionadas con el *flow*, diferentes emociones y otros tipos de motivación (ej., regulación externa, identificación, integración…) para completar el entendimiento del poder motivador de la gamificación.

En segundo lugar, el uso de medidas retrospectivas en todos los estudios podría ser una limitación de la tesis. En concreto, mientras que la mayoría de estudios previos han usado cuestionarios y medidas retrospectivas para medir la experiencia de *flow*, Csikszentmihalyi y LeFevre (1989) recomiendan utilizar el método de muestreo de experiencia (o *experience sampling method*) para medir la experiencia de *flow* de los encuestados. Futuros estudios podrían aplicar este procedimiento. Asimismo, todos los estudios empíricos de la tesis doctoral emplearon cuestionarios auto-administrados. A pesar de que es común utilizar cuestionarios que usan ítems cuantitativos para medir el *flow*, la motivación o el *engagement*, un enfoque alternativo podría utilizar medidas cualitativas. Por lo tanto, futuros estudios podrían utilizar la observación del comportamiento de los individuos, entrevistas y grupos de discusión, así como sensores fisiológicos (ej., *eye-tracking*) como parte de la metodología de estudio.

Otra limitación relacionada con la metodología podría ser el hecho de que todos los cuestionarios se respondieron de manera anónima. De ese modo, no pudimos relacionar las respuestas de los estudiantes con medidas de rendimiento académico, como las notas, ni en el contexto de los mandos de respuesta ni en el contexto de los juegos de simulación empresarial. Por lo tanto, futuras investigaciones deberían incluir medidas objetivas del rendimiento de los estudiantes (ej., notas) para ampliar el análisis de la influencia de la gamificación en el aprendizaje. De manera similar, futuros estudios en advergames deberían incluir otras medidas de comportamiento después del juego. Mientras que la actitud hacia la marca y la intención de compra son medidas habituales, nuevas investigaciones deberían llevarse a cabo para ver si los advergames tienen un impacto en la compra real de los jugadores.

Finalmente, otra área prometedora para futuras investigaciones es analizar la gamificación en otros contextos, como el trabajo (Cardador et al., 2017; Liu et al., 2018) y, especialmente, para procesos de contratación (Collmus et al., 2016; Joy, 2017; Langer et al., 2018). En este contexto, los juegos de simulación empresarial están siendo cada vez más usados en procesos de selección de personal, especialmente con propósitos de "cazar jóvenes talentos". Los procesos de procesos de contratación gamificados son especialmente atractivos para la Generación Millennial. Por lo tanto, sería interesante analizar su opinión sobre el uso de juegos de simulación empresarial con este propósito, así como sus percepciones de las organizaciones que utilizan estos procedimientos tan innovadores.

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