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DOES THE WINNER TAKE IT ALL? – TOWARDS AN UNDERSTANDING OF WHY THERE MIGHT BE NO ONE-SIZE-FITS-ALL GAMIFICATION DESIGN

Research in Progress

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Abstract

Despite the popularity of gamification, and the positive effects of games in daily life, many gamification projects fail. A possible explanation for this observation is that most projects follow a one-size-fits-all approach without considering what the intended users really want. Closely related to this, most approaches focus on the integration of competitive game structures even though several mechanisms are available. This applies especially for the learning context of the study. Consequently, we aim to investigate the effectiveness of multiple gamification configurations based on different underlying motivational structures of users. To achieve our goal, we combine social comparison and social interdependence theory. This integration of theories helps to identify reward structures. They serve to analyze differences in user needs concerning their motivation to learn. We develop hypotheses that expose four different reward structures: autonomous, competitive, cooperative, and co-competitive. Our research-in-progress paper closes with an outline of an upcoming experiment. Once our research is completed, we expect to be able to better understand how differences in the users' motivational structures influence their motivation in the context of learning, and how gamification configurations can be adapted based on a user's underlying motivational structures.

Keywords: Gamification, Motivation, Reward Structures, User Differences, Competition, Cooperation, Autonomy, Co-Competition.

1 Introduction

One example of information systems (IS) are learning management systems (LMS) (Santhanam *et al.*, 2016). LMSs are often referred to as technology-mediated learning, e-learning, and virtual learning, and they are used to support students or employees in improving their learning experience (Urh *et al.*, 2015). Because LMSs have shown a high drop-out rate, previous research highlighted that relying on mechanics of computer games is one effective way to influence and change the behavior of LMS users (Bedwell *et al.*, 2012; Demetrovics *et al.*, 2011; Gupta and Bostrom, 2009; Shang and Lin, 2013). According to this, the concept of gamification has been developed. Gamification can be described as the use of game design elements in a non-gaming context to improve user engagement (Deterding *et al.*, 2011; Thiebes *et al.*, 2014). For gamifying a LMS, elements such as points or badges, or dynamics such as competition or collaboration, can be used (Biro, 2013; Blohm and Leimeister, 2013; Zaman *et al.*, 2012; Santhanam *et al.*, 2016).

However, contrary to the forecasts, the concept of gamification faces criticism as most approaches still have some major weaknesses (Fogel, 2015). While some criticism concerns the overall gamification approach, most gamification projects often fail due to a missing consideration of the needs of users (Seaborn and Fels, 2015; Smalls, 2013). Fleming (2014) and de-Marcos *et al.* (2014), for example, highlight that current gamification concepts are designed without knowing which game design ele-

ments the intended users really want to have implemented. The motivation underlying individuals' use of gamification approaches and what determines their attitudes toward the respective approaches is still not well understood (Hamari and Koivisto, 2015). Concerning the motivation of individuals, most approaches are designed as a one-size-fits-all solution with the assumption that individuals have the same motivational composition. However, Santhanam et al. (2016), for example, point out that there might be no one-size-fits-all competition design in gamification. Referring to this, previous gamification studies mostly focus on implementing competitive reward structures with elements such as leaderboards which offer the possibility of comparing the own performances with the performance of others (Davis and Singh, 2015; Wu et al., 2015). Despite its popularity in gamification, competition in learning can have negative effects (Reeve and Deci, 1996) because previous research did not consider context-specific adaptations of game design elements. According to gamification in education and learning, some individuals might be more motivated by reward structures that provide guidance for their individual learning progress (Schöbel et al., 2016) whereas others might be more motivated to work in groups and prefer to be rewarded for working in their group successfully (Wilson et al., 2016). Motivation is central to games and we still do not know how gamification has to be adapted to address different motivational compositions to influence the behavior of individuals (Burgers et al., 2015; Seaborn and Fels, 2015). Moreover, more research is required to further investigate the role of contextual, social, and situational aspects, as they at least partially determine the motivational effects of game design elements (Mekler et al., 2015). To address the mentioned gaps in the current gamification literature, the goal of our research in progress paper is to connect different reward structures with the different needs and preferences of users in their motivation to learn. Hence, our research in progress paper focuses on the following research question:

RQ: How can different reward structures be adapted to the needs of LMS users to impact their motivation to learn?

Concerning our overall research aim, we aim to provide theoretical implications on how to address different motivational compositions of users by considering various reward structures. Accordingly, we will analyze how gamification in learning really works. Furthermore, our research contributes practical implication for system developers or company executives on the use of gamification within their LMSs. To answer our research question, we rely on the theory of social comparison in combination with the theory of social interdependence. Both theories will help us in defining hypotheses which will be analyzed by implementing different reward structures into a LMS. These approaches and a review on gamification are presented in the following.

2 Theoretical Background

2.1 Gamification

The term gamification originated in the digital media industry. Even though a limited number of definitions of the term gamification are available, two of the most widespread definitions are outlined by Deterding et al. (2011). He defines gamification as an informal umbrella term for the use of video game elements in non-gaming systems to improve user experience and engagement. More precisely, gamification involves the use of so-called game design elements (Blohm and Leimeister, 2013) which comprise game mechanics and game dynamics. Game mechanics such as badges (Hamari, 2013) or points (Burke and Hiltbrand, 2011) are the functioning components that allow a designer ultimate control over the levers of a gamified application. Dynamics such as collaboration or competition, on the other hand, are described as the user's interaction with those mechanics (Zichermann and Cunningham, 2011). Dynamics might correspond to different motives (Blohm and Leimeister, 2013). Overall, previous research studies on gamification proceed by implementing elements without considering individual differences of users (Hamari et al., 2016). In line with this, Seaborn and Fels (2015), who summarize existing research gaps, state that it is unclear how gamification approaches should be de-

signed so that they influence users' motivation. Additionally, they explain that there are no useful approaches for designing reward structures. Nevertheless, Liu et al. (2013) developed a framework for games with four game types: individual, collaborative, competitive, and collaborative-competitive games. This framework can be adapted to identify reward structures and differences in users' motivation. For adapting this framework, we first analyzed which reward structures previous research studies used and how they considered individual differences of users. Most studies use competitive elements for rewarding users (Alcivar and Abad, 2016; Attali and Areli-Attali, 2015; Christy and Fox, 2014; Davis and Singh, 2015; Denny, 2013; Domínguez et al., 2013). In all studies, it is not considered, whether users are interested in competition which can have negative effects on users' motivation (Hanus and Fox, 2015). Other studies use collaborative reward structures (Boticki et al., 2015; Melero et al., 2015; McDaniel et al., 2012; Knutas et al., 2014; Jurado et al., 2014). Again, the needs and preferences of the users are not considered. Overall, previous research indicates that more studies should focus on analyzing how reward structures can be adapted to the needs and preference of users. In the following, we will discuss the role of motivation in gamification.

2.2 The Role and Meaning of Motivation in Gamification

Gamification in learning is used to motivate users of LMSs to pay attention and to engage with learning materials effectively (Hanus and Fox, 2015). Several motivation concepts outline the distinction between intrinsic and extrinsic motivation. Therefore, individuals might play games because they are pushed by an outside force to do so or because they wish to do so without the direct influence of another party (Cruz et al., 2015). More precisely, intrinsic motivation occurs when an individual engages in a task or activity that is initiated without external incentives (Leimeister et al., 2009). Hence, the desire to learn comes from within the student (Deci et al., 2001). Individuals are extrinsically motivated to perform, when their motivation for a behavior depends on an outside force, such as rewards (Deci et al., 2001; Hanus and Fox, 2015). Both kinds of motivational factors may play a role in an individual's reaction and behavior (Leimeister et al., 2009). Referring to motivation and learning, some studies indicate, that individual differences in students' motivation can be reduced to their personality traits and interests (Chamorro-Premuzic et al., 2007; Shen et al., 2016). Reflecting on individual differences is helpful to understand the needs and preferences of individuals (Shen et al., 2016). Mostly, intrinsic motivating elements, such as taking part in a competition or cooperation, are integrated in gamification approaches without considering the needs and preferences of users (Schöbel et al., 2016). Mostly, users do not have the option to decide if they want to compete or cooperate for their own reason. By using social comparison as well as social interdependence theory, our research will consider which reward structures are motivating for which kind of individuals. We describe both theories in the following.

2.3 Social Comparison and Social Interdependence Theory

The goal of our research in progress paper is to obtain deeper insights into different gamification reward structures to adapt them to different user needs. The most used reward structure is competition. Therefore, leaderboards are integrated into LMSs to leverage competition between users (Christy and Fox, 2014). The purpose of enhancing competition is to allow individuals to compare themselves with others, as it is difficult to make an assessment of one's ability without having a reference point (Hanus and Fox, 2015; Hoorens and van Damme, 2012). Social comparison theory predicts that individuals compare themselves to others in order to validate opinions, make judgements, and reduce uncertainty (Festinger, 1954). Furthermore, comparing themselves with others makes individuals aware of their lack of skills, abilities, status, or position relative to others, and it encourages competition (Garcia et al., 2006). Some studies point out that there are differences in social comparison (Gibbons and Buunk, 1999) that lead to different behaviors and outcomes. Gibbons and Buunk (1999) measured individual differences in social comparison types with a self-report measure that focused on seeking social comparison information (Corr and Cooper, 2016). People differ in their tendencies to engage in social

comparison and in the psychological consequences of the comparison. Due to this, social comparison orientation is a trait that reflects these individual differences (Gibbons and Buunk, 1999). Individuals who show a high level of social comparison orientation have a sensitivity to and awareness of others and they experience more uncertainty and instability regarding their self-concepts (Evans and Gibbons, 2007; Gibbons and Buunk, 1999; Krasnova *et al.*, 2015). In order to leverage social comparison in the context of gamification, several approaches use a global leaderboard where users can compare their results with the results of others (de-Marcos *et al.*, 2014). Hence, depending on the position of an individual on a leaderboard, it offers the opportunity for upward and downward comparison with other learners. However, competition in learning can have negative effects, too (Reeve and Deci, 1996). This indicates that competition is not always the key for success in motivating users.. Some users are not interested in taking part in a competition and they become bored with an activity, which harms their intrinsic motivation (Hanus and Fox, 2015; Cruz *et al.*, 2015). Therefore, competitive gamification reward structures might not be appropriate for each user (Seaborn and Fels, 2015; Santhanam *et al.*, 2016) However, empirical research on the effectiveness of gamification is limited and the results of competitive gamification approaches in educational settings are mixed (McGonigal, 2011; Hanus and Fox, 2015).

According to the differences of preferences identified in social comparison and the fact that there might be no one-size-fits-all solution in competition (Santhanam *et al.*, 2016), we assume that there might be other reward structures for gamifying LMSs. With regard to this, social interdependence theory claims that an individual's behavior is motivated by states of tension that arise from perceived desired goals and that this tension causes persistency to achieve the desired goals (Johnson and Johnson, 2008, 2009). Social interdependence theory has become one of the most successful and widespread methods of social and educational psychology in practice (Johnson and Johnson, 2009). More precisely, social interdependence exists when the goals of individuals are affected by the actions of others (DeVries and Edwards, 1973). Two kinds of social interdependence exist. Positive interdependence exists when individuals perceive that they can reach their goals only if other individuals with whom they are working with also reach their goals (Hwong *et al.*, 1993; Johnson and Johnson, 2008); thus, positive interdependence accounts for a high need of interdependence. Negative interdependence exists when individuals perceive that they can obtain their goals independent of the learning outcomes of other individuals with whom they are competitively working (Johnson and Johnson, 2007); these individuals have a low need for interdependence. Furthermore, social interdependence theory states that a learning environment without interdependence results in a situation in which individuals can reach their goals on their own without depending on other individuals (Johnson and Johnson, 2009). Each type of interdependence results in certain psychological processes (Johnson and Johnson, 2007). Cooperative game reward structures are mostly used to address positive interdependence by strengthening the team experience through shared goals, measurements, group tasks, or group communication (Wilson *et al.*, 2016). As mentioned above, competition and negative interdependence can be addressed by game mechanics such as a leaderboard (Santhanam *et al.*, 2016). Both theories indicate that individuals' behaviors and interests towards competition and cooperation can differ. Hence, reward structures need to be adapted to address their differences. Regarding different kinds of reward structures, Slavin and Tanner (1979) point out that several studies come to different results and there is no simple answer to the question which reward structure design is the most effective one. Comparing the effects of individual, cooperative, and competitive reward structures on performance, we still do not know which of these reward structures is the most effective one (Slavin and Tanner, 1979). To analyze the meaning of rewards and different motivational compositions, we combine social comparison and interdependence theory.

3 Hypotheses Development

Individuals differ in their tendencies to engage in comparing themselves with others, in their goal orientation, and in the psychological consequences incurred. Comparing themselves with others can be

positive because the others share the same goals, or it can be negative because the others have opposite goals (Gibbons and Buunk, 1999). Whereas social comparison theory analyzes why individuals like to compare themselves with others, social interdependence theory analyzes different forms of comparison and how comparison with others can occur. By combining both theories, we are able to identify four different reward structures that address the differences of individuals in their motivation to learn (see Figure 1) (Liu et al., 2013). Based on this approach, we describe our hypotheses in the following.

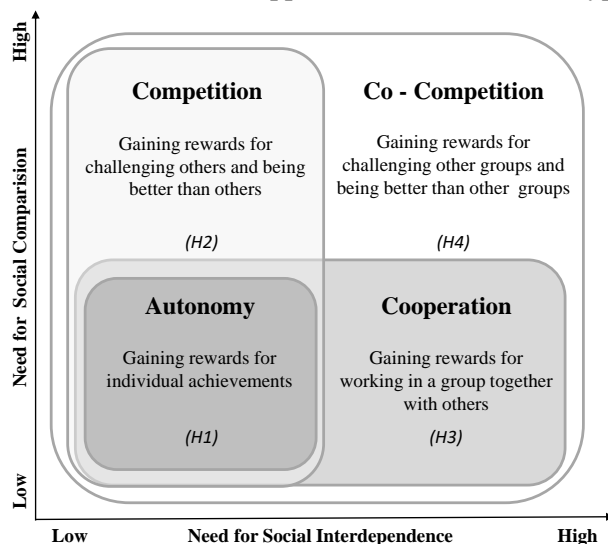


Figure 1. Research Framework.

People who are reluctant to social comparison do not look at others to compare their own behavior (Locander et al., 2015). More precisely, they have very little concern for the behaviors of others and thus, a low need for comparison (Li et al., 2015). Such persons isolate themselves from others and find own structures to evaluate their performance and results (Li et al., 2015). Individuals make social comparisons to reduce uncertainty concerning their abilities, performance, and other socially defined attributes. Furthermore, individuals compare themselves with others when they need to rely on an external standard against which to judge themselves (Li et al., 2015; Collins, 1996; Ertac, 2005). Happy people have a less affective vulnerability to the available social comparison information; they simply do not pay as much attention to how well others are doing (Corr and Cooper, 2016, Swallow and Kuiper, 1992). Considering social interdependence, no or less interaction means individuals act independently without any interchange with each other (Johnson, 1999). Hence, individuals just focus on increasing their productivity and achievements on their own by ignoring the efforts and progress of others (Johnson and Johnson, 2007). Their own goals are not related to the goals of others and individuals can reach their goals without the help or assistance of others (Johnson and Johnson, 2009; Hwang et al., 1993). From a gamification perspective, people with a low need to compare themselves with others and whose goals are not related to the goals of others are motivated by gamification approaches that do not involve others (Deci et al., 2001; Deci et al., 1994). In the context of learning, they are interested in regulating their learning processes, to take control over their own learning, to increase their own productivity and achievements (Johnson and Johnson, 2005). Furthermore, this type of learner is able to realistically evaluate and regulate his processes and any behavior aimed to achieve the learning objectives (Hrbackova and Suchankova, 2016). Hence, they manage their learning on their own, are aware of what they know, and set their own learning goals. Furthermore, they maintain real beliefs about the causes of success and failure in learning, can assess their capabilities to cope with learning, and they can evaluate their progress in learning on their own (Hrbackova and Suchankova, 2016; Johnson and Johnson, 2005). Overall, we hypothesize:

H1: An individual with low need for comparison and low need for interdependence will exhibit higher motivation to learn when using autonomous reward structures.

In several gamification approaches, competition is widely used as an engagement tool to provide challenges, interactivity, and excitement (Santhanam *et al.*, 2016). Users rarely compete in isolation; rather, they compete against other participants with whom they often have existing relationships (Kilduff *et al.*, 2010). With regard to this, social comparison theory posits that people require information to evaluate their options and abilities (Festinger, 1954). Individuals with a high social comparison like to take part in challenges to compare their own results with the result of others (Burgers *et al.*, 2015; Santhanam *et al.*, 2016; Aspinwall and Taylor, 1993). Competition in social interdependence predicts that individuals are more willing to take challenging tasks that visualize their abilities and improve their morale (Johnson and Johnson 2009). Hence, individuals work against each other to achieve a goal only one or a few can reach (Johnson and Johnson, 2009). Their self-interest and motives to win and to avoid losing are strengthened by a negative social interdependence (Johnson and Johnson, 2005; Johnson and Johnson, 2007). Accordingly, users with high social comparison orientation and a negative interdependence might be motivated by competitive reward structures that involve other users (Kilduff *et al.*, 2010). Such individuals have a strong sensitivity to and awareness of others and experience more uncertainty and instability regarding their self-concepts (Vogel *et al.*, 2015). Furthermore, users high in achievement orientation appear to be particularly motivated by competition (Kilduff *et al.*, 2010). Competition in learning can increase several hedonic learning outcomes such as the engagement to learn (Santhanam *et al.*, 2016). However, competition can cause positive as well as negative effects. Competition can arouse the competitive instinct of an individual to lead this individual to better performance goals, greater interest, excitement, and engagement (Shen *et al.*, 2016). On the other hand, competition can have negative impacts on the confidence, self-efficacy, attitude towards failure, and interpersonal relationships of an individual, which results in anxiety and diminished empowerment and responsibility towards learning (Shen *et al.*, 2016). Stimulating competition by gamification can be realized by showing users their results in comparison to those of their peers. Elements such as rankings are preferred by individuals with a high social comparison orientation and they allow direct and immediate comparisons, compared to other elements like levels or badges (Wu *et al.*, 2015). Hence, we hypothesize:

H2: An individual with high need for comparison and low need for interdependence will exhibit higher motivation to learn when using competitive reward structures.

The interest to interact with others or to connect and identify with a meaning or goal (Deci and Ryan, 2000) can lead to positive effects on the motivation. Cooperating with others encourages the feeling that an activity is connected to something beyond you, such as being a part of a team or spending time with friends (Perry, 2015). Experiencing cooperation with others means to be connected with peers, belonging to a community, and being part of things ‘greater’ than oneself (Perry, 2015). Cooperation can be supported by various social interactions such as tagging, rating, commenting and sharing with a learning community (Shi and Cristea, 2016). According to social interdependence theory, individuals with a positive interdependence realize that their efforts are required in order for the group to be successful (Johnson and Johnson, 2009). Individuals who are interested in working together with a group invest in achieving goals that benefit others as well as themselves (Johnson and Johnson, 2007). Furthermore, all members of a group share similar or common goals and individuals share the openness towards being influenced by others as well as they influence others that joint efforts are more effective (Johnson and Johnson, 2009; Gabbert *et al.*, 1986). According to social comparison theory, individuals who are certain about themselves do not have the need to compare themselves with others and they are more willing to work with others instead of comparing their own results with the results of others (Vogel *et al.*, 2015). Cooperative learning occurs when people work together to succeed at their tasks whereby their cooperation is separated from the results of their collaboration (Tjosvold *et al.*, 2008). The individuals’ self-interest changes into a joint interest. Hence, in a cooperative relationship individuals expect that their goals are positively related to the collaboration and that together they can reach better learning outcomes (Tjosvold *et al.*, 2008). In gamified contexts, users get the opportunity to work in teams to achieve goals that serve a higher purpose or overlap with personal goals (Bui and Veit, 2015). Rewards for a group create strong peer pressure for academic involvement among all

team members (Lew *et al.*, 1986; DeVries and Edwards, 1973). Cooperative rewards create a situation in which individuals depend on one another's performance to be rewarded such as in a collaborative project (Slavin and Tanner, 1979; Ortiz *et al.*, 1996). Overall, we hypothesize:

H3: An individual with low need for comparison and high need for interdependence will exhibit higher motivation to learn when using cooperative reward structures.

Co-competitive reward structures result from combining cooperative and competitive structures. We hypothesize that groups can compete against other groups. Certain studies on the related topic of social comparison and interdependence support the idea that individuals with a high sensitivity to and awareness of others perceive their own groups more positively than other groups (Kilduff *et al.*, 2010; Johnson and Johnson, 2008). According to positive social interdependence, working in a group with others encourages the feeling that an activity is connected to something bigger than the single individual (Perry, 2015). Additionally, a high social comparison orientation of a group provides challenges, interactivity, and excitement (Santhanam *et al.*, 2016). More precisely, groups work against each other to achieve a goal only one or a few other groups can reach (Johnson and Johnson, 2008; Slavin and Tanner, 1979). Individuals who do not like individual competition might change their preferences when being part of a group that takes part in a competition against other groups. A group in a competitive situation is oriented towards a desired outcome, an end state, a goal, or a reward (Johnson and Johnson Book). Concerning co-competitive rewards, groups can take part in a competition by comparing the results they achieved on a leaderboard (Wu *et al.*). To make the results of different groups comparable, first, the groups have to solve tasks, as for example multiple-choice questions, and are then rewarded for this (cooperative reward structures) (Wilson *et al.*, 2016). Afterwards, the groups can compare their results with the results of other groups and they are rewarded for their group success (competitive reward structures) (Santhanam *et al.*, 2016). Hence, we hypothesize:

H4: An individual with high need for comparison and high need for interdependence will exhibit higher motivation to learn when using co-competitive reward structures.

4 Research Design

To analyze our hypotheses, we plan to conduct an experiment. The research design of our experiment can be seen in Figure 2.

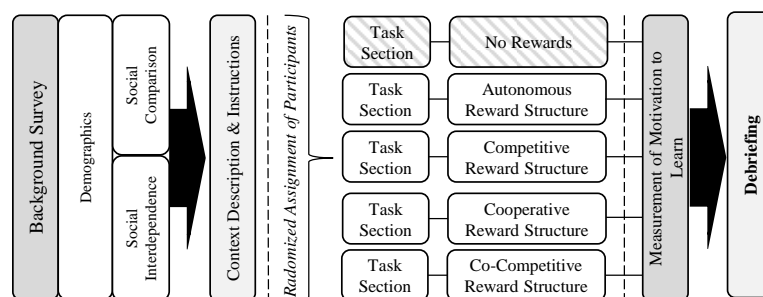


Figure 2. Overall Research Design

In the real world, individuals often choose to compete, for instance when they enter a political race or a firm enters a new market. Thus, naturally occurring rivalry may differ from competition in the laboratory (Reeve and Deci, 1996). Hence, we will gamify an LMS with which users learn the contents of a university lecture by answering tasks and questions without providing any instructions from a teacher. Hence, to examine our hypotheses, we will conduct a field experiment with a between-subject design. In a first step, each participant has to answer the same background survey. The experiment starts with a short context description and instructions. We manipulate the reward structures by randomly assigning participants to one of the four experimental groups of reward structures (treatment groups) and one group will receive no rewards (control group). Each reward structure is assigned to the same task. A

task section consists of different multiple-choice questions that are easy to answer and that are based on the course contents. Whereas the questions in each task section remain the same, the reward structures will change. For gamifying the task sections, we will use a combination of the gamification mechanics: points (Burke and Hiltbrand, 2011), level (Gnauk *et al.*, 2012), and leaderboard (Christy and Fox, 2014). Overall, the participants collect points for each right answer. They receive no points in case they give the wrong answer and the system will present them the right answer. They can see their level position after each question. In total, we will integrate 5 levels with an increasing number of points reaching from level one (5 points) to level 5 (80 points). Furthermore, for the competitive and co-competitive reward structures, we will use a leaderboard to present the current position of each participant in comparison to the other participants' positions. In the autonomous reward section, the participants will be rewarded for their own progress. In the competitive reward section, the participants can compare their results with the results of others in a leaderboard. In the collaborative reward structure, a participant works together with other participants. A group can, for example, earn 2 points for one question. Each team member must answer the same question. In a group of four participants each participant can earn 0.5 points for giving the right answer. Again, each team member can see the level progress of their group after answering each question. For the co-competitive reward structure, we will integrate a leaderboard. To examine our results, we will perform an analysis of covariates on the experiment data. Therefore, we will incorporate social comparison and social interdependence orientation as well as our reward structure treatments as independent variables, while controlling variables such as age, interest, enjoyment, goal orientation, and perceived choice (Deci *et al.*, 1994; McAuley *et al.*, 1989; Plant and Ryan, 1985; Baranik *et al.*, 2007) will be used as covariates (Shen *et al.*, 2016). Afterwards, we will measure our dependent variable: motivation to learn (Major *et al.*, 2006). The experiment will finish with a short debriefing.

5 Next Steps and Expected Contributions

The aim of our study is to identify how reward structures can address different motivational compositions of users. Therefore, we refer to social comparison as well as social interdependence theory to explain the gamification behavior of users in an LMS. We plan to conduct a pre-test aiming to verify our survey instrument before distributing it to our study participants. We plan to include both researchers and students as participants for this analysis. They will be asked to concentrate on transparency, comprehensibility, and linguistic accuracy. After pre-testing our analysis, we plan a field study. In our research, we will focus on LMSs in universities and company's knowledge management systems. Our first analysis will be useful for a second analysis in which we will analyze the effects of different reward structures on the usage behavior and learning outcomes. Furthermore, we will analyze whether the difficulty of a task influences the motivation of individuals to learn. Individuals might be more motivated by cooperative reward structures when they solve complex and difficult tasks. This research project helps us to give theoretical and practical contributions. The presented research contributes to an understanding of how and which users are motivated to learn by cooperative, competitive, or autonomous reward structures. More precisely, we will be able to explain how the need for comparison and interdependence can arise and why individuals want to compare their results with the results of others, work with others or on their own. These findings will enrich the gamification theory as we can give practical implications about how to design and implement reward structures to address the different needs and preferences of users.

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