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To gamify or not to gamify? An experimental field study of the influence of badges on motivation, activity, and performance in an online learning course



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ABSTRACT

Over the last few years, the implementation of game elements like badges in non-game environments has become increasingly popular (Butler, 2014). In this study, we tested whether badges, which could be received for successful task performance and specific activities within an e-learning course in a higher education setting, had an impact on students' motivation and performance. In a between-subjects experimental field study, students were randomly assigned to three different conditions (no badges, badges visible to peers, badges only visible to students themselves). The results show that badges have less impact on motivation and performance than is commonly assumed. Independent of condition, students' intrinsic motivation decreased over time. Contrary to expectation, the badges that could only be viewed by the students themselves were evaluated more positively than those that could also be viewed by others.

1. Introduction

The aspect of gamification in non-game environments such as educational settings has been viewed with great interest (Domínguez et al., 2013; Seaborn & Fels, 2015) and is used as a method to increase student participation in classrooms (Hanus & Fox, 2015). Gamification describes the use of game elements and game design elements in non-game contexts (Deterding, Dixon, Khaled, & Nacke, 2011). It aims to combine intrinsic motivation with extrinsic motivation in order to foster engagement and motivation to participate actively (Mishra & Kotecha, 2017; Muntean, 2011). The use of badges is a typical method of gamification (Hakulinen, Auvinen, & Korhonen, 2013) and has been popularized as badgification (Butler, 2014). Badges are visual displays of users' progress (Hakulinen et al., 2013; Hanus & Fox, 2015), which, for example, indicate the achieved competence level (Boticki, Baksa, Seow, & Looi, 2015), give immediate feedback (Turan, Avinc, Kara, & Goktas, 2016), and constitute one form of extrinsic rewards (Hanus & Fox, 2015). Symbols of progression can have a huge influence on a person's behavior, with a notable example being the usage of badges in military organizations (Butler, 2014). Studies have shown that badges increase motivation and have significant effects on engagement and activity (e.g., Anderson, Huttenlocher, Kleinberg, & Leskovec, 2014; Ruipérez-Valiente, Muñoz-Merino, & Kloos, 2016b, pp. 1–8) as well as on motivation for learning (Gibson, Ostashevski, Flintoff, Grant, & Knight, 2015; Santos et al., 2013), which is especially important as motivation has been shown to be an important factor in learning (Eales, Hall, & Bannon, 2002). Furthermore, badges can be used to showcase one's performance to peers (Hakulinen et al., 2013).

Although the employment of badges in the field of education has been described in numerous papers, the number of studies that empirically assess the effects of badges is still limited. Specifically, there is a lack of studies that attempt to unravel the mechanisms

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behind the potential effects of badges. At least two such mechanisms are conceivable: On the one hand, badges might function as (extrinsic) rewards, leading people to perform specific activities in order to receive the badges. On the other hand, and perhaps more crucially, an individual might be motivated to collect badges in order to compare his/her own achievements positively with the achievements of others – as social comparison has been shown to be a powerful driver of behavior (Festinger, 1954). To disentangle these mechanisms, we varied badge visibility on three levels: no badges visible (no reward, no social comparison), badges visible only to the person receiving them (reward, no social comparison), badges visible for everyone (reward, social comparison).

In this study, we examined the influence of badges awarded over a period of five weeks on participants' motivation, activity, and performance during a large, open-access online course conducted over one semester. Thus, potential influences of badges over a longer period were analyzed. As we were able to conduct an experimental field study in a real-life context (i.e. the study took place in a real higher education setting with students who were aspiring to earn credits for passing the course), our study extends previous small-scale, lab-based research. We therefore hope to answer the question of whether badges have a relevant impact in real-life situations and determine the mechanism (reward or social comparison) through which they affect participants.

2. Theoretical background

Motivation is conceivably the most important factor in learning (Eales et al., 2002). The question of motivation gains additional relevance in online courses, in which it is even easier to skip participation than it is in face-to-face learning settings. Therefore, especially in the realm of massive open online courses (MOOCs), in which only a small percentage of those people who start a course actually successfully complete it, it has been asked by which means students can be motivated to continue (Khalil & Ebner, 2014). Awarding badges for successful task performance has been proposed as one potential tool in this respect, since badges have been demonstrated to positively increase learner motivation (Fischer, Heinz, Schlenker, & Follert, 2016; Santos et al., 2013) and to affect behavior (Hamari, 2017). However, so far, the mechanisms through which badges are able to influence motivation and performance have been neither discussed nor empirically tested. Potential aspects which can be proposed in this regard are reward (in the sense that badges can be perceived as additional extrinsic reward) and social comparison (in the sense that when badges are visible for everyone, it is possible to assess one's own achievements relative to the group, increasing the motivation to either stay on top or reach the top with regard to performance). In the following, we will first discuss reward as an explanation for the effectiveness of badges and then focus on social comparison processes.

2.1. Extrinsic and intrinsic rewards

Studies have shown that incentive systems like badges increase motivation (e.g., Anderson et al., 2014; Mekler, Brühlmann, Opwis, & Tuch, 2013). In order to be able to explain potential motivation gains from badges, one needs to distinguish between different forms of motivations. Here, Ryan and Deci (2000) suggested a self-determination continuum in which they differentiate between amotivation (nonself-determined behavior with no regulations), extrinsic motivation which “refers to doing something because it leads to a separable outcome” (p. 55) (including the increasingly autonomous subtypes external regulation, introjected regulation, identified regulation, and integrated regulation) and intrinsic motivation which refers to “[...] doing something because it is inherently interesting or enjoyable [...]” (p. 55). As amotivation is not a relevant concept for the present study, we focus on intrinsic and extrinsic motivation in the following (without explicitly distinguishing the subtypes of extrinsic motivation).

A central goal of education and learning is to motivate students to engage and be active in a course (Hanus & Fox, 2015). If students are lacking in motivation to learn, there is the possibility to motivate them extrinsically (Hamari, 2017). Accordingly, incentive systems have long been prevalent in schools and are used to motivate student learning (Deci, Koestner, & Ryan, 2001). In this line, reward systems based on badges should improve extrinsic motivation (Domínguez et al., 2013). However, previous studies have shown that extrinsic rewards have a negative effect on students' intrinsic motivation (Deci et al., 2001). To explain this, Nicholson (2012) stated that the decrease of intrinsic motivation is based on “the controlling aspect of these rewards” (Nicholson, 2012, p. 2) and that intrinsic motivation is replaced by external motivation. Domínguez et al. (2013) reported that the use of incentive systems can cause a feeling of manipulation and that the induced behavior vanishes as soon as the reward is ended. Furthermore, numerous studies (e.g., Filsecker & Hickey, 2014; Hanus & Fox, 2015) describe that adding rewards to tasks which one already finds interesting leads to a decrease of motivation and that rewards may cause a shift from intrinsic to extrinsic motivation, which is in line with cognitive evaluation theory (Deci & Ryan, 1985). However, assumptions regarding the influence of rewards on both intrinsic and extrinsic motivation are divergent: Given specific conditions, Ryan and Deci (2000) assume that interpersonal factors such as badges can enhance intrinsic motivation as long as extrinsic rewards lead to satisfaction of the psychological need for competence (Ryan & Deci, 2000). However, in order for this effect to emerge, individuals must experience not only competence, but also autonomy, in the sense that they experience their behavior to be self-determined (for more detailed information see Deci & Ryan, 1985; Ryan & Deci, 2000). In sum, although research has demonstrated that rewards can – in the long run – lead to diminishing intrinsic motivation (Deci, Koestner, & Ryan, 1999a, 1999b; Deci et al., 2001), there are also findings that extrinsic gratifications which reward specific accomplishments foster not only extrinsic but also intrinsic motivation (Cameron & Pierce, 1994).

Likewise, the discussion around gamification is relatively divergent (e.g., van Roy & Zaman, 2017) and opinions differ regarding the use of gamification elements such as badges to improve intrinsic motivation. Therefore, caution is warranted when assuming that it is possible to increase intrinsic motivation by rewards (Haaranen, Ihanola, Hakulinen, & Korhonen, 2014). Furthermore, the level of intrinsic motivation prior to the task or course should be taken into consideration: In persons with an initially high level of intrinsic motivation, the addition of extrinsic motivations like badges may lead to a decrease of intrinsic motivation. By contrast, unmotivated

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