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Does gender stereotype threat in gamified educational environments cause anxiety? An experimental study

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Abstract

Gamification has been used by many researchers and practitioners in online education to increase students' motivation and engagement. However, studies showed that gamification elements also caused negative effects on learning. Moreover, recent investigations reported stereotype threat by gender had impacted students performance, in particular, the use of a male-dominant leaderboard affected women math performance. In this sense, we attained to conduct a hypothetical study to investigate whether gender stereotype threat in online gamified educational scenarios influences anxiety and performance. We conducted a three-stage survey where participants were asked indirectly about their anxiety, then they were redirected to a hypothetical online gamified system to solve a logic quiz. Afterward, their anxiety was assessed one more time in order to find out how much it had changed. We found evidence indicating the male-stereotyped environment affected participants' anxiety.

Keywords: gender studies, anxiety, stereotype threat, gamification in education

1. Introduction

The use of game elements in a non-game context defined by [Deterding et al. \(2011\)](#) as gamification has become very popular over the last years. Since gamification tends to engage and enjoy users, it has been used in several scenarios, e.g., in social networks to increase social interaction ([Cramer et al., 2011](#); [Frith & Frith, 2012](#)), in health and wellness for personal health-care ([Cafazzo et al., 2012](#); [Rose-Ackerman, 2013](#)). In education, a systematic review of the literature developed by [Borges et al. \(2014\)](#) showed seven different objectives when using gamification, which includes behavioral change, engagement, and skills improvement. However, recent studies have shown that gamification has also driven to negative effects on learning. For instance, [Hanus & Fox \(2015\)](#) have studied the effects of gamification in a classroom and found that some mechanic elements do not improve educational outcomes and harm motivation, satisfaction, and empowerment which aligns to other findings related to the negative effect of rewards on motivation ([Cameron, 2001](#); [Lepper et al., 1973](#)).

Given that, we suggest that other factors may be affecting the motivation and engagement of users in gamified scenarios. Searching on the literature we found that stereotype threat by gender affected women's performance ([Spencer et al., 1999](#)). Furthermore, a recent research studied a group of female participants in a virtual classroom with a male-dominant leaderboard ([Christy & Fox, 2014](#)) and the results presented those circumstances also affected women's academic performance.

Our objective is to carry out a hypothetical study to find out whether stereotype threat based on users' gender affects their anxiety in the context of gamified educational on-line environments. In order to address methodological requirements, we formulated an experiment based on the State -Trait Anxiety Inventory (STAI) ([Keedwell & Snaith, 1996](#)) where we used a Brazilian version proposed by [Fioravanti-Bastos et al. \(2011\)](#). Based on the studies that involve gamification on education presented in three systematic reviews

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