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Exploring how individual traits influence enjoyment in a mobile learning game

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ABSTRACT

This study investigated individual traits as predictors of game enjoyment by including learning style, intrinsic motivation, collaboration skills, and computer game attitude as key parts of a model that also included achievement. Results of correlation and regression analyses revealed that intrinsic motivation was the only variable to predict game enjoyment. This supports the conceptualization of enjoyment as need satisfaction of intrinsic needs. Enjoyment was also found to be positively correlated with achievement. Other significant relations emerged, particularly how a player's attitude toward games predicted intrinsic motivation. The present study examined children's enjoyment experiences in the mobile version of the Minecraft game. It also highlights the complexity of game enjoyment as it relates to mobile learning games.

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1. Introduction

For many years, the role of play in children's development has been widely recognized by researchers and educators. Children often play either individually or collaboratively for fun and enjoyment. Play provides a means for children to learn and explore in a more meaningful way. In a sense, play is an autotelic and voluntary act that requires intrinsic reasons (Feezell, 2010). However, when placed in the context of work or education, play is often seen as a frivolous activity. Despite such criticism, play was shown to contribute to children's social, cognitive, and emotional development (Fisher, Hirsh-Pasek, Golinkoff, & Gryfe, 2008). Additionally, Brown (2009) contends that the improvisational potential of play makes individuals less rigid in their ways of doing things and more open to change, including displaying new behaviors and thoughts.

Perhaps the most interesting behaviors that an individual displays when engaging in play are devotion and persistence. In video games, for instance, it is common for players to extend their interactive experiences with the game and persist in accomplishing their goals regardless of failure. In fact, experiencing failure has been shown to be an important element in game enjoyment (Juul, 2009). The importance of the element of enjoyment has been widely stressed in learning and education. Lack of enjoyment and boredom can be linked to disengagement and failure in learning (Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2003).

In video games, engagement is considered a replication of pleasurable associations similar to the ones experienced in childhood play where mistakes are expected and tolerated (Hoffman & Nadelson, 2010). More importantly, while also considering the complexity and multifaceted nature of the concept of engagement, empirical investigations had indicated that engagement can predict enjoyment (Lyons et al., 2014; Ryan, Rigby, & Przybylski, 2006). Thus, in various situations, notably in the academic context, engagement triggers positive emotional experiences including fun, enthusiasm, and commitment to hard work (Niemi et al., 2014). Taken in sum, learning can only take place if there is a willingness to engage and persist. But, unless the tasks are perceived enjoyable, motivation and persistence are less likely to occur (Lumby, 2011).

Facing the popularity of video games in educational settings and the complexity of player psychology, researchers had begun to investigate various factors that contribute to enjoyment, including interactivity (Klimmt, Hartmann, & Frey, 2007), suspense (Klimmt, Rizzo, Vorderer, Koch, & Fischer, 2009), competition (Vorderer, Hartmann, & Klimmt, 2003), and spatial presence and perceived

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reality (Shafer, Carbonara, & Popova, 2011). To date, little empirical work has been done to describe the association between individual traits and video game enjoyment, particularly in mobile game settings. In sum, the current study aims to test an integrative model that examines (1) the relationships between enjoyment and certain individual traits, notably learning styles, collaboration skills, intrinsic motivation, and game attitude and (2) the association between enjoyment and achievement. The relationships included in the model are theoretically and empirically supported to provide a more comprehensive understanding of how players' traits can determine the level of game enjoyment rather considering single traits separately.

1.1. Individual traits and enjoyment

Researchers have attempted to define the concept of enjoyment without universal consensus. In the particular context of media enjoyment, past studies have broadly defined enjoyment as a pleasure response but are still short of conceptual clarity (Tamborini, Bowman, Eden, Grizzard, & Organ, 2010). To provide a more comprehensive model to complement the hedonic components and highlight the non-hedonic aspect of the enjoyment concept, Tamborini et al. (2010) proposed and validated a model of enjoyment as need satisfaction by investigating the three basic needs in self-determination theory: autonomy, competence, and relatedness. Their findings also suggested that media enjoyment can potentially be the result of the satisfaction of intrinsic needs. Based on their study, which built on the work of Ryan et al. (2006), Tamborini et al. broadly defined media enjoyment as need satisfaction. Thus, enjoyment may not only be limited to pleasure responses of media use. The tripartite model by Nabi and Krcmar (2004) conceptualized enjoyment as an attitude and suggested cognitive, affective, and behavioral reactions to game enjoyment. That is, the type of attitude shown towards a particular media offering is a strong indicator of the extent to which the media have been enjoyed. Other concepts of video game enjoyment may also reside in control or performance itself (Grodal, 2000), flow states (Sherry, 2004), and social interactions (Gajadhar, De Kort, & Ijsselsteijn, 2008). This complex process of enjoyment goes beyond the assumption that enjoyment is merely a product of positive feelings or inputs, particularly in video games (Shafer, 2012). For instance, Oliver (2009) highlights that even media that produce negative emotions, such as sadness, can be enjoyed to some extent.

There are implications within media enjoyment theories that a player's personality and enjoyment are closely related (Fang & Zhao, 2010). The study by Fang and Zhao (2010) in particular has shown that sensation seeking and self-forgetfulness, as two personality traits, may have a significant impact on computer game enjoyment among university students. To reinforce past video game studies, the present study investigates the combined effect of both attitude and intrinsic motivation on enjoyment, which previous studies have addressed separately. Additionally, this article explores other factors such as learning styles and collaboration skills that have often been overlooked as determinants of enjoyment, particularly in video games used in educational and mobile settings.

1.1.1. Learning style and enjoyment
The concept of learning style, used interchangeably with cognitive style (Simpson & Du, 2004), refers to the idea that individuals are different with respect to what is considered the most effective method of instruction or study (Pashler, McDaniel, Rohrer, & Bjork, 2008). According to Cano-Garcia and Hughes (2000), it is difficult to find consensus on the definition of learning style

because researchers tend to focus on one of the dimensions of the learning process. Previous studies suggest that learning performance could be improved when learning style dimensions are adequately addressed in the design of learning systems (Filippidis & Tsoukalas, 2009; Hsieh, Jang, Hwang, & Chen, 2011). For instance, it was shown that fifth graders who learned with personalized educational video games that addressed their learning styles performed better than those who used computer games that did not meet their learning styles (Hwang, Sung, Hung, Huang, & Tsai, 2012). The study by Simpson and Du (2004) explored the relationship between students' learning styles and enjoyment in a distributed learning environment and found that a student's learning style had a significant effect on student's self-reported enjoyment levels. In general, video game research has rarely explored the relationship between learning styles and enjoyment. This leads the present study to investigate the link between players' learning styles and the level of enjoyment they experience. Specifically, it is hypothesized that a student's learning style will predict the level of enjoyment in a mobile learning game.

1.1.2. Collaboration skills and enjoyment
Collaboration is broadly defined as a particular form of interaction that requires participants to engage mutually in a task. Players in shared virtual worlds can work collaboratively to achieve common goals, thus establishing a sense of community through social interactions. Previous studies showed that children who worked together in small groups experienced increased enjoyment (Scott, Mandryk, & Inkpen, 2003) and that flow experiences also occurred when children played video games in a group (Inal & Cagiltay, 2007). In general, collaborative gaming involves cooperation with other players to reach common goals. Some factors, such as competitiveness, allow players to demonstrate their game competence to other players (Kaye & Bryce, 2012), which can also lead to enjoyment of the experience. However, there is always the possibility of a conflict among group members as a result of different visions or strategies. That being said, it seems reasonable to assume that the level of enjoyment players get from a collaborative experience in gaming is dependent on how they perceive their skills to collaborate with others in the group. Therefore, it is hypothesized in this study that more positive collaboration skills will predict a higher level of enjoyment.

1.1.3. Intrinsic motivation and enjoyment
There are many reasons to expect that intrinsic motivation might increase game enjoyment. First, players who are intrinsically motivated engage in a game task to seek enjoyment or challenge while external reward may play a little to no role in the process. In fact, Ryan and Deci (2000) suggest that individuals who are intrinsically motivated enjoy an activity more when compared to those who are extrinsically motivated. More importantly, these principles of self-determination theory have been argued to be relevant in the context of video games (Przybylski, Rigby, & Ryan, 2010). For the present study, it is predicted that players who are more intrinsically motivated will experience higher levels of enjoyment.

1.1.4. Computer game attitude and enjoyment
Previous attitude studies have measured computer users' attitudes using enjoyment as a variable (Christensen & Knezek, 2001; Knezek, Christensen, & Tyler-Wood, 2011). Other empirical work supported a positive relationship between perceived enjoyment and attitude towards the use of technology (Lee, 2009; Wu & Liu, 2007). Specifically, the study by Wu and Liu (2007) showed that online gaming enjoyment was a significant predictor of attitude. In the context of mobile games, Chinomona (2013) found that mobile