



The effects of peer intrinsic and extrinsic motivation on MMOG game-based collaborative learning

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ABSTRACT

We combined *Massively Multiplayer Online Game* and technology-based collaborative learning methods to examine peer motivational factors influencing intention to learn; these have seldom been jointly examined. We proposed two new constructs, *peer intrinsic motivation* and *peer extrinsic motivation*, and investigated their effect on a player's *intention to learn individually* and *collaboratively*. Our survey and interview findings showed that an individual player's *peer intrinsic* and *extrinsic motivations* had significantly positive influence on his or her *intention to learn collaboratively* and *individually*. Implications for academics, educators, game developers, and players are discussed.

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1. Introduction

Massively Multiplayer Online Game (MMOG) and technology-based collaborative learning have been separate streams of research; we decided to examine how they jointly affected peer motivational factors influencing intention to learn.

As a hedonic IS, MMOG is a unique type of electronic game: "MMOGs are highly graphical 2- or 3-D videogames played online, allowing individuals, through their self-created digital characters or 'avatars,' to interact not only with the gaming software (the designed environment of the game and the computer-controlled characters within it) but with other players' avatars as well. These virtual worlds are persistent social and material worlds, loosely structured by open-ended (fantasy) narratives, where players are largely free to do as they please – slay ogres, siege castles, barter goods in town, or shake the fruit out of trees" [18]. Previous studies have shown that a player spends on average of almost 26 h per week playing MMOGs [24], with a significant impact on the player's behavior. However, the occurrence of such behavior from the motivational perspective, and the motivational drivers for learning collaboratively in this environment are not yet well known.

A number of researchers have suggested that the use of MMOG is a new generation of educational platform (e.g., [4,5,13]), allowing players to interact with each other and learn together

through collaborative game-play. Research on MMOG game-based learning has shown that several unique characteristics of MMOG (e.g., *avatar/virtual identity*, *co-presence*, *group identity* and *transparency*) may trigger learning behavior in the gaming context. When examining the constructivist belief of learning from the IS perspective, learning in MMOG can be seen as a process resulting from the adoption and continuous use of the game. This process can be triggered by intrinsic and extrinsic motivation as perceived by the players. In addition to individual engagement in the learning process, MMOG game-based learning can occur and be motivated through online player-to-player interaction.

We therefore examined the occurrence of collaborative learning behavior and motivational drivers in MMOG, attempting to extend the concept of motivation to play at the peer level, bridging the characteristics of MMOG by using peer motivations. We also investigated the effect of peer motivation on players' behavioral intention to learn in the context of MMOG.

2. Literature review

2.1. MMOG game-based learning

MMOG is designed to support dynamic social structures, consisting of several characteristics that may trigger individual and collaborative learning behavior from the problem-based, cognitive learning and constructivist point of view. Table 1 summarizes the characteristics of MMOGs, and provides definitions, etc.

An *avatar* is the player's representation that enhances the player's sense of identity and presence and helps in performing

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Table 1
Characteristics of MMOG.

| Characteristics | Research discipline | Related literature |
|-------------------------|-----------------------------|--------------------|
| Avatar/virtual identity | Virtual Reality | [5,13] |
| Co-presence | Information Systems | [2] |
| Group identity | Management; Virtual Reality | [8] |
| Transparency | Human Computer Interface | [7] |

learning tasks. The use of an *avatar* in MMOGs aligns with Gee's example of virtual identity in a gaming environment wherein the self-created *avatar* is necessary for the players to commit and take on a new identity that they value, and in which they learn deeply.

Co-presence is the sense of being together with other people in the same virtual environment. It is the fundamental prerequisite of collaborative learning and is claimed to be one of the crucial social components of computer-mediated communication.

Players can join named groups (e.g., *guilds* in *World of Warcraft* (WoW)) in order to socialize and play together. Collaborative-competition is introduced in MMOGs; it encourages collaborative interaction and learning among in-group players to compete with out-group players. According to Social Identity Theory, when individuals are faced with situations in collaborative-competition, individuals in the group tend to act for the benefit of the group and discriminate against others.

Transparency in MMOGs allows players to observe others and retrieve their performance statistics, which allows informational exchange and influence to occur between players; this leads to the generation of an internalization process, which occurs when a player learns methods and improve knowledge of the game from his or her reference group.

MMOG can also be regarded as a problem-based learning environment [12]. Within this, players learn game-based knowledge and skills (e.g., controlling an avatar, pulling a monster and solving a quest), and act together with other team players to complete the assigned tasks. In our study, we focused on the motivational factors of the MMOG game-based learning environment and their impact on players' intention to learn the game knowledge and skills.

2.2. TAM: motivation to use/play and intention to use/learn

From the player's point of view, a game is not generally designed for educational purposes. The *constructivist belief* of

learning views knowledge as the result of the active engagement of the learner in the comprehension and conception of the information. Based on this, from the IS perspective, computer games and MMOG fall under the category of a hedonic IS [19], in which learning can occur as part of the process of motivating a participant with an intention to learn and participate individually and collaboratively.

According to motivational theories, motivation to play results from both intrinsic and extrinsic motivation. Based on motivational theories, TAM considered *perceived usefulness* as an extrinsic motivation, but *perceived enjoyment* as an intrinsic motivation [6].

Moreover, MMOG has a "massively multiplayer" nature, in which player participation may be motivated by peers on the same team. According to cognitive learning theory, learning consists of personal and social components. Player-to-player interactions allow learning to occur not only individually but also collaboratively. In addition, computer-mediated learning can be initiated and motivated at the peer level through collaborative learning interaction.

Because of the importance of peer motivations, learning intentions, and collaborative interaction, this we added two new constructs, *peer intrinsic motivation* and *peer extrinsic motivation*, and examined their effect on the intention to learn individually and collaboratively in a virtual environment.

3. Research model and hypotheses

We proposed *peer intrinsic motivation* and *peer extrinsic motivation* as constructs that affected a participant's *intention to learn individually* and *intention to learn collaboratively* (see Fig. 1 for the research model, and Table 2 for the definitions of constructs). Our study was set in the context of *World of Warcraft* (WoW), an MMOG game-based virtual environment. The reason for choosing this game was that it is the bestselling MMOG in the world, with over 12 million subscribers worldwide.

3.1. Peer motivations

Many studies have demonstrated the need to include intrinsic and extrinsic motivation to explain IT acceptance, including Computer-Mediated Communication (CMC) applications like instant messaging and the internet-based learning medium. However, in contrast to traditional computer games, MMOG allows for the *co-presence* of players so that they can play and learn

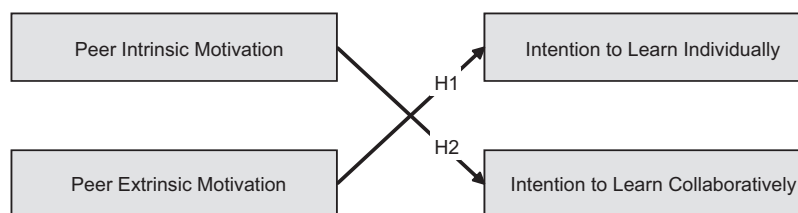


Fig. 1. Research model.

Table 2
Definitions of constructs.

| Construct | Definition |
|--|--|
| Peer Intrinsic Motivation (PIM) | ... the perception that an individual will want to perform an activity, driven by the desire to have his or her peers engage in an enjoyable, self-determined, and competence-enhancing activity |
| Peer Extrinsic Motivation (PEM) | ... the perception that an individual will want to perform an activity, driven by the desire to have his or her peers obtain tangible or intangible external rewards |
| Intention to Learn Individually (ILI) | ... the intention for an individual to learn to perform an activity by his or her own efforts continuously for a period of time |
| Intention to Learn Collaboratively (ILC) | ... the intention for an individual to learn to perform an activity together with his or her peers (i.e., helping each other) continuously for a period of time |

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