15 Emerging Design Factors in Game-Based Learning: Incentives, Social Presence, and Identity Design

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Introduction

For many of the design factors described by the model of game-based learning (Plass, Homer, & Kinzer, 2015; Plass, Mayer, Homer, & Kinzer, chapter 1 in this volume), sufficient research exists to allow design recommendations for game designers. These factors include instructional support, feedback, and coaching (Lester, Spain, Rowe, & Mott, chapter 8 in this volume), self-regulation and reflection (Taub, Bradbury, Mudrick, & Azevedo, chapter 9 in this volume), adaptivity and personalization (Plass & Pawar, chapter 10 in this volume), narratives (Dickey, chapter 11 in this volume), multimedia design principles (Nelson & Kim, chapter 12 in this volume), and social mode of play (Ke, chapter 13 in this volume). A number of other design factors that are described in the model, however, only have a small body of research in the context of game-based learning. These emerging factors include incentive system design, identity design, and social presence in games. In this chapter, we define these factors and summarize the limited research available on their design and effectiveness in the context of games for learning. Other emerging factors are reviewed by Pawar, Tam, and Plass (chapter 14 in this volume).

Incentive System Design

Games are known for their ability to guide the player's behavior in a way that makes play enjoyable, often by giving incentives to perform a certain task. Incentive systems are considered one of the crucial elements for appealing and motivating games (Garris, Ahlers, & Driskell, 2002; Wang & Sun, 2011). Incentive systems can consist of intrinsic and extrinsic reward elements, such as scores, stars, badges, trophies, and power-ups (Plass, Homer, & Kinzer, 2015). Intrinsic rewards give a player special abilities that can be used in gameplay, while extrinsic rewards do not contribute to gameplay directly. Both intrinsic and extrinsic aspects of incentive systems play an important role in engaging learners. Reward mechanisms that provide a fun and intrinsically rewarding

experience may be more useful than extrinsic rewards (Wang & Sun, 2011). According to self-determination theory (Ryan & Deci, 2000), satisfactions of the three basic psychological needs—autonomy, competence, and relatedness—can lead to intrinsically and extrinsically motivated behaviors. Autonomy refers to a sense of volition, competence refers to a sense of efficacy, and relatedness refers to a sense of connection with others and one's community (Ryan & Deci, 2000). Przybylski, Rigby, and Ryan (2010) propose that performance feedback and rewards for achievement in video games have the potential to satisfy these basic psychological needs. Elements of incentive systems have also been applied in nongame contexts to foster motivation and engagement (Mekler, Brühlmann, Tuch, & Opwis, 2015; Muntean, 2011). Rewards provide extra motivation for learners to pursue tasks that otherwise would be less interesting, and they can improve learning outcomes (Pierce, Cameron, Banko, & So, 2003). In this section, we examine the different elements of incentive systems in games and their impacts on learners.

Summary of the Construct of Incentive System Design

Incentive systems consist of a series of design features that provide rewards to players, often with the goal of guiding player behavior. Intrinsic rewards do this by relating directly to the game mechanics and objectives, which can involve giving the player access to special abilities and power-ups, unlocked content, new tools, or hints related to gameplay. Extrinsic rewards, in contrast, are not directly related to the game mechanics and objectives and are usually given in the form of points, scores, stars, coins, and the like. Some rewards could be intrinsic or extrinsic, such as badges or trophies (Plass et al., chapter 1 in this volume).

Incentive systems are vital in game-based learning interventions to provide rewards and performance feedback (McKernan et al., 2015). They can motivate players to replay the game to improve their performance (Garris et al., 2002). Incentive systems that provide feedback may enhance the gameplay experience by allowing players to understand their short-term goals more easily (Wang & Sun, 2011). Rewards may enhance extrinsic motivation, but they may also undermine intrinsic motivation (Deci, Koestner, & Ryan, 1999). Intrinsic motivation is defined as performing an activity for its own satisfaction and enjoyment, while extrinsic motivation is defined as performing an activity in order to attain rewards (Ryan & Deci, 2000). According to cognitive evaluation theory, effects of extrinsic motivation on intrinsic motivation are influenced by a player's perception of the rewards as informational or controlling (Ryan & Deci, 2000). The perception of controlling rewards diminishes the sense of autonomy and hence decreases intrinsic motivation. Direct and positive informational rewards support the needs of competence and, in turn, boost intrinsic motivation. However, both intrinsic and extrinsic motivations are important constructs in promoting learning performance (Cerasoli, Nicklin, & Ford, 2014). Intrinsic motivation has also been associated with

improved creativity and learning outcomes as well as psychological well-being (Ryan & Deci, 2000).

Incentive Systems, Motivation, and Learning

Achievement goal theory has identified two major types of motivational learning goals (Elliot, 2005). Performance goals reflect a desire to perform and demonstrate ability in comparison to others, while mastery goals reflect a desire to develop competence and achieve mastery oneself. Learners adopt different goals, which influence their behaviors, thoughts, and affects. Effects of incentive systems are heavily influenced by learners' goal orientations (Abramovich, Schunn, & Higashi, 2013). Different types of rewards can be invoked based on a learner's goal orientation to increase its impact on motivation and learning outcomes (Biles, Plass, & Homer, 2018).

The expectancy-value theory of motivation posits that learners' ability beliefs, expectancies for success, and subjective values are crucial factors for determining learners' performance, effort, and persistence (Wigfield & Eccles, 2000). Ability beliefs are defined as learners' perceptions of their competence to perform tasks. Expectancies for success are defined as probabilities of success on a task, and subjective values are defined as the values learners place on tasks. Reid, Paster, and Abramovich (2015) argue that learners' ability beliefs and expectancies for success can be task contingent or domain contingent, and subjective values can be related to identity or intrinsic value. Abramovich, Schunn, and Higashi (2013) contend that an incentive system has the potential to change learners' subjective values and expectancies for success.

Incentive Systems in Games

Wang and Sun (2011) identified eight forms of rewards in video games: feedback messages, unlocking mechanisms, developable avatars, item-granting systems, score systems, achievement systems, game resources, and plot animations. Points, leaderboards, and badges have been identified as the key elements in an incentive system (McKernan et al., 2015). Research on some of these forms of rewards exists, namely badges, points, levels, and leaderboards.

Badges According to Gibson, Ostashewski, Flintoff, Grant, and Knight (2015), "A digital badge is a representation of an accomplishment, interest or affiliation that is visual, available online, and contains metadata including links that help explain the context, meaning, process and result of an activity" (Gibson, Ostashewski, Flintoff, Grant, & Knight, 2015, p. 404). The function of badges should be to provide a sense of achievement to players (Wang & Sun, 2011). Badges should be issued to learners once they have met the requirements for earning the badges, and should contain metadata about the learner as well as the badge issuer (Reid et al., 2015). Badges can also be a hybrid of two assessment models, merit badges and gaming achievements, to recognize

both formal and informal learning achievements. Biles and Plass (2016) implemented two types of badges in a geometry learning game and studied their impacts on learners with different goal orientations. Mastery badges were designed to reward the learner's own knowledge and skill by acknowledging personal progress. Performance badges, in contrast, were designed to reward the learner's performance in comparison to the other learners. Biles and Plass conducted a study with middle school students and found that badges that emphasized performance achievement led to better learning outcomes overall but that students with greater situational interest showed better learning outcomes with mastery badges. In a study by Filsecker and Hickey (2014) using a complex social inquiry educational game, middle school students gained a deeper understanding of scientific inquiry with the incorporation of badges as external rewards than did students who did not receive rewards.

Points, levels, and leaderboards Points, levels, and leaderboards are implemented to provide performance feedback and a sense of accomplishment to players (Przybylski et al., 2010; Wang & Sun, 2011). Points provide feedback to players for self-assessment (Wang & Sun, 2011), while levels and leaderboards can help players determine progress toward short-term and long-term goals (Nebel, Beege, Schneider, & Rey, 2016). A leaderboard is a visual display of players' rankings based on their accomplishment in the game, which players can use to compare their performance against those of other players (Christy & Fox, 2014). Leaderboards can also induce competition among players (Nebel, Schneider, Beege, & Rey, 2017). Competitive factors, and how leaderboards are embedded within gameplay mechanics, influence learner behavior and learning outcomes. Landers and Landers (2014) concluded that leaderboards can increase motivation to retry the game as well as increase time on task if leaderboard information is displayed at the end of the game. Willems et al. (2014) suggested that leaderboards should only be used when there are enough players to ensure fair and comparable competition among players. Nebel et al. (2016) observed an improvement in learning outcomes and a higher competitive effort when leaderboards were integrated into a game for college students for learning about allegorical paintings. They concluded that leaderboards in learning games enhance the focus on the learning tasks and hence improve knowledge retention among college students. On the other hand, in a game to train college-level learners about decision-making behavior, McKernan et al. (2015) found that learning was not affected by reward elements, including points and feedback. In addition, Deleeuw and Mayer (2011) found that adding a point system leading to prizes in an electrical circuit game had a positive effect for women but a negative effect for men.

Future Directions for Research on Incentive System Design

There is a paucity of studies focusing on the effects of incentive systems in games for learning, such as their impacts on learners' motivation and learning outcome. Future research should examine how incentive systems in different game types and genres

impact learners' motivation and learning outcomes. We need a better understanding of the relationship between game genres, types of rewards, and their impacts on motivation, both intrinsic and extrinsic, as well as on learning. Another important area that requires further investigation is the relation between learning goals, interest level, rewards, and learning outcomes. More evidence is needed to understand how different types of rewards impact learning under different learning goals and interests. Lastly, a significant amount of research was conducted with university students. Future studies should consider including a more diverse population.

Identity Design

Many games have persistent virtual worlds populated by player avatars. In these worlds, each player is represented by a virtual agent that portrays their identity. Players experience these worlds through the lens of these agents. They take actions, develop skills, and interact with other players while embodying their avatars. As players spend more time in these worlds, they start developing a psychological connection with their avatars and start identifying with them (Turkay & Kinzer, 2014; Van Reijmersdal, Jansz, Peters, & Van Noort, 2013). This connection between the player and the avatar has been shown to increase gaming motivation and game enjoyment and evoke positive emotions (Ganesh, van Schie, de Lange, Thompson, & Wigboldus, 2011; Hefner, Klimmt, & Vorderer, 2007; Van Reijmersdal et al., 2013). Identity design is a practice that helps enhance this connection. It aims to recognize and develop game elements and features that promote identification with game avatars.

Summary of the Construct of Identity Design

Virtual identity has been a topic of interest in the media and games literature (Boellstorff, 2015; Turkle, 1994, 1996). Recently, many scholars have discussed the role of identity in games for learning (Barab & Duffy, 2000; Gee, 2003; Squire, 2006). In the book *What Video Games Have to Teach Us about Learning and Literacy*, Gee (2007) discusses three types of identities in games: real identity, virtual identity, and projected identity. Real identity comes from the player and is based on real-world values derived from the player's life experiences. Virtual identity is defined by the game character and the game narrative. This type of identity is ascribed to the character by the designers, and it is based on the background narrative and personality traits of the character. The projected identity is the interface between the real and virtual identities and allows players to craft the narrative of the avatar. Players generate this identity by projecting real-world values onto their virtual representations. This breakdown of types of identities has provided a framework for researchers to study identity in games as a reciprocal relation between players and avatars (Bessière, Seay, & Kiesler, 2007; Lim & Reeves, 2009; Turkay & Kinzer, 2014).

Theoretical claims regarding identification in games are supported by empirical findings (Bessière et al., 2007; Ganesh et al., 2011). Research has shown that players project their real-life values onto their avatars and perceive the avatars to be a close representation of their ideal selves (Bessière et al., 2007). In a study conducted by Bessière et al. (2007), players completed a personality survey from three different perspectives: their ideal selves, their real selves, and their virtual selves. Whereas the ideal self-perspective was about the person they want to be, the real self-perspective referred to players as themselves, and the virtual self-perspective referred to the personality of their avatar. Results of this study showed significant differences in ratings of these three personalities. The outcomes of the study also revealed that players rated their virtual identity to be a closer representation of their ideal selves than of their real selves. These findings provide support to the proposition that there are three types of gaming identities (Gee, 2003).

In addition to these findings, identity theory is also backed by neuroscientific evidence. In a study conducted by Ganesh et al. (2011), neural activity (as measured by fMRI) of *World of Warcraft* (Blizzard Entertainment, 2004) players was compared to a control group consisting of nongamers. During the study, participants in the treatment group were shown pictures of their gaming avatars along with images of humans and syllables, which were included as neutral stimuli. The control group was shown the same images, except that the avatar images were replaced by images of their favorite cartoon character. Results from the study showed that players had a significantly stronger emotional response to their avatar than to their favorite cartoon character. The results also showed that players' neurological response to their avatars was similar to their response to human beings, while this was not the case for nongamers' response to their favorite cartoon character (Ganesh et al., 2011). These findings suggest the existence of an emotional association between long-term gamers and their gaming identity.

Identity and Learning

The phenomenon of identification has an effect on in-game as well as out-of-game outcomes. Studies have shown that the sense of identity affects game enjoyment, gaming motivation, and learning outcomes (Hefner et al., 2007; Schmierbach, Limperos, & Woolley, 2012; Van Reijmersdal et al., 2013). In a study with *Battlefield 2* (Digital Illusions CE, 2005) players, Hefner et al. (2007) found that players' identification scores were strongly correlated with their game enjoyment. This effect is observed even when the player avatars are nonhumanoid. In a study conducted by Schmierbach et al. (2012), players were represented by customizable race cars. When investigating the effect of identity on game enjoyment, the researchers found that players who customized their cars had a higher sense of identity and in turn enjoyed the game significantly more than the noncustomizing control group. In addition to game enjoyment, players

are also more motivated when there is a strong sense of identity. In a survey with 2,261 female players of the game *goSupermodel*, Van Reijmersdal et al. (2013) studied the relation between identity and gaming motivations. Results showed that players who associated strongly with their avatars also had higher gaming motivations. These studies shed light on the effects of identity on gaming outcomes. This increase in gaming motivation and enjoyment has an influence beyond gameplay and can, in turn, improve learning outcomes. Some researchers have conducted direct investigations to uncover this association (Cordova & Lepper, 1996; Ng & Lindgren, 2013).

The effects of game identification on learning have been discussed by many scholars (Barab & Duffy, 2000; Gee, 2003; Squire, 2006), but empirical evidence on the topic is scarce. A few studies, however, have provided preliminary evidence in support of the theoretical claims (Cordova & Lepper, 1996; Ng & Lindgren, 2013). Cordova & Lepper (1996) studied the effects of avatar selection and personalized narrative on learning outcomes in a math learning game. In this experiment, one of the groups was allowed to choose the visual appearance, as represented by game icons, of their own character and of the enemy character. Players in this condition were also allowed to name their character and pick a starting point on the game board. These choices were made randomly for the control group players. Results showed that players who were given choices had significantly better learning outcomes than those under the control condition. Similar results were found in an experiment conducted by Ng and Lindgren (2013). In this study, participants played a custom level of the game *Spore* (Maxis, 2008), a real-time simulation about evolution of organisms. After the gameplay session, researchers compared gameplay-related learning outcomes and found that students who were given the choice of customizing their characters had marginally higher scores than players who did not customize their characters. Although these results do not provide conclusive evidence, they are a substantial step toward uncovering the association between learning and identity in games.

Identity Design in Games for Learning

Early evidence of the positive effect of identification on learning outcomes promotes the use of different game elements for identity design. Studies have shown that game features such as avatar customization and game narrative have the potential to enhance player identification (Brookes, 2010; Turkay & Kinzer, 2014). A commonly studied game feature is customization of visual traits of avatars (Bessière et al., 2007; Lim & Reeves, 2009; Ng & Lindgren, 2013; Turkay & Kinzer, 2014). Allowing players to customize their avatar affects players' emotional arousal (Lim & Reeves, 2009) and sense of identity (Turkay & Kinzer, 2014). Researchers have studied the effect of allowing players to customize visual traits such as gender, skin color, hairstyle, facial structure, and body type. While most experiments have analyzed customization of many different traits together (Bessière et al., 2007; Ng & Lindgren, 2013), few have observed the effect

of modifying a single trait. For example, Lim and Reeves (2009) studied the effect that choosing the avatar's gender had on the emotional arousal of players. Results showed that this choice had a significant effect on participants' emotional arousal response. The effect of customization on identity has also been studied longitudinally. Turkay and Kinzer (2014) conducted a study with *Lord of the Rings Online* (Turbine, 2007) players over two weeks, with a total gameplay time of 10 hours. The results indicated that the customization group identified significantly more with their avatars compared to the noncustomization group. Another interesting finding from the study was the effect of gameplay duration on the strength of identification. This effect showed that the bond of identification between players and their avatars grows stronger with time.

The game narrative is another feature that promotes identification with characters. In games where players embody a predesigned protagonist, the behavior and traits of the character moderate the degree of identification (Cohen, 2001; Flanagan, 1999). Some researchers have suggested that players identify with fictional characters based on character traits and personality. Brookes (2010) studied this effect by comparing two groups playing the same game but with different narrative dosages. The high-narrative group received a background narrative of the game character, while the low-narrative group wasn't given this narrative background. Results showed that the high-narrative group identified more with the game character at the end of a 30-minute gameplay session compared to the low-narrative group. These results are consistent with other studies showing the impact of narrative on identity and learning (Cordova & Lepper, 1996; Schmierbach et al., 2012). In addition to the background narrative, the emergent narrative of games also affects identity. As players spend more time in virtual worlds, they write their own stories through gameplay. While progressing in the game, players are also building a narrative that defines their game character. Although this phenomenon has not been studied directly, it is supported by evidence showing that player identification grows with time spent on gameplay (Bessière et al. 2007; Turkay & Kinzer, 2014; Van Reijmersdal, 2013). This evidence suggests that the bond between the player and the avatar evolves with time and can be associated with the evolving narrative of the avatar.

Future Directions for Research on Identity Design

The importance of identity in video games has been made clear by research (Bessière et al. 2007; Ganesh et al. 2011). Studies have found positive effects of identity on learning outcomes (Cordova & Lepper, 1996; Ng & Lindgren, 2013) and have highlighted the need for future work in the domain. However, scholars have raised concerns regarding the lack of experimental studies on the effects of identity design on learning outcomes (Turkay & Kinzer, 2014). To overcome this gap, more design manipulations and associated studies need to be conducted. So far, studies have only explored a fraction of the features available for identity design. Most research has focused on visual

customization of avatars and game narrative but avoided other features, such as emergent narrative, social interactions, skill customization, and movement customization. Exploring the effects of these features may reveal additional ways of strengthening a sense of identity in players. The increasing popularity of new hardware, including virtual and augmented reality devices, has also provided new ways of increasing identification. These media have made presence and immersion design new factors in identity design.

Along with design innovation, there is also a need for new research designs. Factorial designs, as utilized by Cordova and Lepper (1996), can be a useful method for research on player identity. These designs help uncover the effect of individual factors as well as their interactions on identity design. Researchers also need to consider conducting long-term studies in authentic gaming environments. Previous research has established the connection between gameplay duration and identity (Bessière et al., 2007; Turkay & Kinzer, 2014; Van Reijmersdal, 2013) and has suggested the need to consider longitudinal designs in research. Finally, the effect of identity on learning needs to be studied using different learning outcomes and with different game genres. Research in this domain can further improve the effectiveness of learning games by utilizing the power of player identity.

Social Presence

The terms presence and immersion are often used interchangeably, which causes confusion (Bowman & McMahan, 2007). It is important to recognize the distinction between immersion and presence. Slater (2003) defines immersion as presentation of what technology can re-create in relation to the real world, which can be measured objectively. On the other hand, presence is defined as human perception or experience in an immersive environment, which typically is measured subjectively. Presence—the feeling of "being there"—has been studied by many different academic fields, including communication, psychology, computer science, and philosophy. Lombard and Ditton (1997) define presence as "the perceptual illusion of nonmediation." This illusion occurs when a person responds and interacts in a medium as if it doesn't exist, thereby making the experience feel real. Games have been described as a medium that possesses a unique quality to induce and promote presence (Kallinen, Salminen, Ravaja, Kedzior, & Sääksjärvi, 2007; Tamborini & Skalski, 2006). Different types of presence can be induced through games, such as spatial presence, social presence, and self-presence (Tamborini & Skalski, 2006). Spatial presence is determined by a game's ability to induce the feelings of involvement and immersion, while self-presence concerns how games cultivate a player's self-awareness (Tamborini & Skalski, 2006). Short, Williams, and Christie (1976) contend that social presence exists along a continuum and that its degree of salience is affected by individual perception and the capacity of the

communication medium. In this section, we will explore the role of social presence in educational games and its impact on learning.

Summary of the Construct of Social Presence

Social presence can be simply defined as a "sense of being with another" and "being together with another" (Biocca, Harms, & Burgoon, 2003). This "another" can be a human being or a different form of intelligence, including a computer, robot, agent, and artificial intelligence. Social presence exists along a continuum rather than simply being present or not present (Biocca et al., 2003). Gunawardena (1995) described two concepts associated with social presence: intimacy and immediacy. Both intimacy and immediacy influence the level of social presence. Intimacy refers to a sense of connectedness in a relationship. Intimacy depends on physical distance, eye contact, and topics covered during communication (Argyle & Dean, 1965). Immediacy is a measure of psychological distance during interaction (Wiener & Mehrabian, 1968). Psychological distance can be measured in the form of nonverbal immediacy, such as physical orientation, facial expression, and attitude or verbal immediacy through speech and written communications. The medium plays an important role in social presence. The level of presence is subject to the player's interaction with and perception of the medium (Lombard & Ditton, 1997). Lombard and Ditton (1997) identified three concepts that are related to social presence and medium, namely presence as social richness, presence as a social actor within the medium, and presence as medium as social actor. Presence as social richness is related to the affordance and user's perception of the medium. Presence as a social actor within the medium describes how users interact with objects in the medium, such as virtual actors and characters. Lastly, presence as medium as social actor refers to social responses by users in responding to cues provided by the medium.

Social Presence and Online Learning

Studies have been conducted to examine the relation between social presence and performance. Most of the existing literature has focused on traditional classroom settings and online learning environments. Social presence has been associated with promoting different aspects of learning, including learning outcomes and learning satisfaction in an online learning environment (Kim, Kwon, & Cho, 2011; Liu, Gomez, & Yen, 2009). Social presence has been reported as a critical factor in determining a student's learning outcome (Kim, Kwon, & Cho, 2011). Picciano (2002) found that students in a high social presence group scored higher than students in a low social presence group on written assignments. Swan, Matthews, Bogle, Boles, and Day (2012) redesigned their online course with the community of inquiry (CoI) framework. The CoI framework includes three types of presences that support online learning: social presence, teaching presence, and cognitive presence. The revised version of the online course, based on the CoI framework, was linked to improved learning outcomes. Kearney, Plax, and

Wendt-Wasco (1985) reported that teacher nonverbal immediacy is critical for student affective learning outcomes in college-level classes. Christophel (1990) has also reported similar findings, showing that the use of immediacy improves student motivation and increases learning at the college level. In a study on using video in educational materials, Homer, Plass, and Blake (2008) found that media that present information in ways that enhance social presence can lead to increases in learner engagement and retention compared to media that do not enhance social presence.

Social Presence in Games

Biocca et al. (2003) identified three dimensions of social presence: copresence, psychological involvement, and behavioral engagement. Copresence refers to the sensory awareness of the other and the mutual awareness of the existence of the other. Psychological involvement refers to the sense of intelligence in the other, salience of the interpersonal relationship, sense of intimacy and immediacy, and mutual understanding. Behavioral engagement refers to behavioral interaction. Social presence triggers psychological effects on behavior. Tamborini and Skalski (2006) argued that these three dimensions of social presence can be experienced in games. They suggested that copresence can be achieved in most of the games with nonplayable characters sharing the game world. Copresence can be further enhanced by mutual awareness among players and agents. Psychological involvement can be experienced when players perceive that intelligence is present in agents. Artificial intelligence in nonplayable characters creates cues required for players to believe they are interacting with social beings and can increase their psychological involvement. Von der Pütten et al. (2012) found that perceived interactivity of a virtual character and social presence was positively correlated in an augmented reality game. Heeter (1992) suggests that increases in avatar communications and interactions lead to increases in social presence. Behavioral engagement can be introduced through talking, chatting, and identifying nonverbal cues from other players or agents. Dialogues and eye contact between players and agents, and voice or text chatting among players, are some of the examples.

Studies have concluded that players experience higher levels of social presence when they are playing against human-controlled opponents (Heeter, 1992; Weibel, Wissmath, Habegger, Steiner, & Groner, 2008). Xu et al. (2008) found that a mobile augmented reality board game with shared space increased social presence among players compared to playing with a shared board or separate board. Lee, Jeong, Park, and Ryu (2011) found that networked interactivity features (i.e., real-time online connections among players) in an educational quiz game have positive effects on social presence as well as test performance. Takatalo, Häkkinen, Kaistinen, and Nyman (2010) identified game components and player behaviors that influence the level of social presence. Narrative and the player's role engagement are crucial factors. Takatalo et al. also pointed out that it's important to establish similarity between the game world

and real-world objects as well as people. Guadagno, Blascovich, Bailenson, and McCall (2007) reported that players experience high social presence when agents are high in behavioral realism. Nowak and Biocca (2003) suggested that the use of less anthropomorphic images in virtual human representation increases the perceived level of social presence compared to no images or highly anthropomorphic images. A plausible explanation is that highly anthropomorphic images set up high expectations. However, a failure to meet these expectations reduces the level of social presence. Lastly, a strong correlation between social presence and player satisfaction in virtual worlds (e.g., virtual reality and augmented reality) has been reported (Bulu, 2012; Jung, tom Dieck, Lee, and Chung, 2016).

Future Directions for Research on Social Presence

There are a lot of studies looking into social presence in games. However, studies examining social presence in educational games and its effect on learning are scarce. Most of the existing studies investigating presence and learning are focusing on college-level learners in an online learning environment. Future research should further investigate how different game design elements impact levels of presence perceived by learners. It's also important to examine the effects of presence on learning performance. More diversity in types of games should be investigated, as different game types might induce different types and levels of presence in learners. More diversity in culture, ethnic background, and age groups of participants is also needed. Lastly, studies should consider confounding factors such as learners' game-playing experience and skills.

Conclusion

The empirical research available for the design factors described in the model of game-based learning (Plass et al., chapter 1 in this volume; Plass et al., 2015) varies greatly. While sufficient research is available for some of these factors, for others only a small body of literature exists that reports on empirical research on the effect of these factors on learning outcomes for games for learning and that could guide designers. In this chapter, we therefore focused on three of these design factors: incentive systems, identity design, and social presence. Incentive systems, which consist of a number of design features that provide rewards to players, are often used to motivate and guide player behavior. Even though only limited research exists in the context of games for learning, the existing research from entertainment games, as well as their use for gamification, makes it likely that incentives can have similar effects in learning games. However, future research is needed to provide designers with guidance, especially on the benefit of extrinsic versus intrinsic rewards and their relation to learning variables such as goal orientation.

Identity design is a practice that supports the development of a psychological connection between the players and their avatars in order to support learning. Even

though some research has found a connection between identity design and players' motivation, facilitated especially by giving players choices in customizing visual traits of their avatars and by using a narrative, the connection to learning outcomes requires increased empirical evidence.

Social presence is the sense of having other players in the game. While research in traditional classroom settings and online learning has established a connection between social presence and motivation as well as learning outcomes, only limited empirical research makes the same connection in the context of games for learning.

Overall, these three design factors are worth investigating, as they show promise in being able to enhance motivation and outcomes in games for learning. We included recommendations for future research at the end of each section that would provide evidence for designers of learning games and that establishes a stronger link between these design factors and learning outcomes.

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