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DEVELOPMENT ARTICLE

Game design and learning: a conjectural analysis of how massively multiple online role-playing games (MMORPGs) foster intrinsic motivation

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Abstract During the past two decades, the popularity of computer and video games has prompted games to become a source of study for educational researchers and instructional designers investigating how various aspects of game design might be appropriated, borrowed, and re-purposed for the design of educational materials. The purpose of this paper is to present an analysis of how the structure in massively multiple online role-playing games (MMORPGs) might inform the design of interactive learning and game-based learning environments by looking at the elements which support intrinsic motivation. Specifically, this analysis presents (a) an overview of the two primary elements in MMORPGs game design: character design and narrative environment, (b) a discussion of intrinsic motivation in character role-playing, (c) a discussion of intrinsic motivational supports and cognitive support of the narrative structure of small quests, and (d) a discussion of how the narrative structure of MMORPGs might foster learning in various types of knowledge.

Keywords Computer games · Intrinsic motivation · Narrative · Learning environments

Introduction

During the past two decades, the advent of new technologies and media has precipitated many changes in the field of instructional design. According to Winn (2002), the current movement within the field is toward the cultivation and development of interactive learning environments. The emergence of

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learning environments has been in part fueled by the epistemological shift towards constructivism and in part fueled by the impact and integration of technology and learning (Hannafin & Land, 1997; Hannafin, Land, & Oliver, 1999; Jonassen, 1999; Jonassen & Rohrer-Murphy, 1999; Land & Hannafin, 1996, 1997; Wilson, 1996; Winn, 2002). The theoretical assumption underlying interactive learning environments is that learners construct understandings by interacting with information, tools, and materials as well as by collaborating with other learners. Yet, these environments must also help scaffold the learning process. Although much research has been devoted to the design of learning environments (Hannafin, Hall, Land, & Hill, 1994; Hannafin et al., 1999; Jonassen, 1999; Land & Hannafin, 1997), the emergence of new tools and technology is continually challenging the field of instructional design to find models and methods for developing engaging interactive learning environments. One source of inspiration for potential models, strategies, and techniques is the design of popular video and computer games. Certainly, the purpose of video and computer games is to entertain, however, in order to engage players, game designers have become well versed in creating activities and environments which foster intrinsic motivation. The identification and appropriation of many of these techniques may be of great relevance for the creation of interactive learning environments.

There are many genres of video and computer games such as strategy games, adventure games, role-playing games, action games, and others. Although each genre can inform instructional designers and educators about engagement (Dickey, 2005), the new game genre, massively multiple online role-playing games (MMORPG), may be of great relevance in the design of interactive learning environments because it provides a flexible environmental design which provides scaffolding for problem-solving along with elements which foster intrinsic motivation. An MMORPG is a persistent, networked, interactive, narrative environment in which players collaborate, strategize, plan, and interact with objects, resources, and other players within a multimodal environment. Instructional designers and educators continually seek methods for fostering collaboration and critical thinking in rich learning environments. Collaboration and critical thinking are activities central to the MMORPG gameplay experience.

Although digital games offer potential for the field of instructional design, it is important to note that digital games have also traditionally been considered a male leisure pastime (Bryce & Rutter, 2002, 2003; Cassell & Jenkins, 1998, Dickey, 2006a). However, more recently there has been a noted influx of female players in the gameplay market and the demographics are now shifting (ESA, 2004; Yee, 2001). This may be due in part to the inclusion of such elements as engaging narratives, self-selection of roles, interactive challenges, exploration, collaboration, and community which are elements that have been associated with female-oriented design (AAUW, 2000; Cassell & Jenkins, 1998; de Castell & Bryson, 1998; Dickey, 2006a; Kafai, 1994, 1998; Miller, Chaika, & Groppe, 1996; Murray & Kliman, 1999; Rubin, Murray, O'Neil, & Ashley, 1997; Slaton, 1998; Taylor, 2003).

Within a learning environment, it is important for learners to have opportunities for exploration and manipulation in order to foster the construction of knowledge (Cognition and Technology Group at Vanderbilt, 1990, 1993; Jonassen, 1999). MMORPGs are increasingly constructed as representations of 3D spaces allowing players to move and interact in simulated realistic or fantasy environments. Additionally, conversation and discourse are important features of learning environments. Conversation and collaboration support social negotiation in learning (Lave & Wenger, 1991; Vygotsky, 1978). This in turn allows learners to share information, test understandings, and reflect on learning (Duffy & Cunningham, 1996; Jonassen, 1999). Most MMORPGs are social environments in which players communicate, collaborate, plan, strategize, and socialize with other players. Finally, learning environments should include opportunities for interactive challenges, which require players to synthesize, analyze, and evaluate multiple modes of information and use critical thinking skills to form strategies and problem-solve. MMORPGs include many of these same opportunities which educators attempt to foster in learning environments. Although much more research needs to be conducted about the design of interactive learning environments, certainly looking at game genres such as MMORPGs which engage both male and female participation may provide techniques and strategies for fostering intrinsic motivation in learning environments which are inclusive for both male and female learners.

The purpose of this paper is to present a conjectural analysis of how the structure in MMORPGs might inform the design of interactive learning and game-based learning environments by looking at the elements that support intrinsic motivation. Specifically, this analysis presents (a) an overview of the two primary elements in MMORPGs game design: character design and narrative environment, (b) a discussion of intrinsic motivation in character role-playing, (c) a discussion of intrinsic motivational supports and cognitive support of the narrative structure of small quests, and (d) a discussion of how the narrative structure of MMORPGs might foster learning in various types of knowledge. The goal of this investigation is to suggest how the narrative design of MMORPGs might aid in the instructional design of interactive and game-based learning environments.

This analysis is conjectural in as much as it is interpretive, but not conducted within the confines of a formal study. This analysis will draw upon both qualitative and quantitative research as well as cognitive and constructivist-based perspectives of learning. There are obvious parallels between game design and constructivist-based models (i.e., open learning environments and constructivist learning environments), however, there is much informative research about the design and use of game elements for learning from a cognitive perspective. Therefore, this analysis will draw on both constructivist and cognitive research. Similarly, both qualitative and quantitative research often reveals different aspects of a phenomenon or activity being studied (Lincoln & Guba, 1985, pp. 70–91).

Literature review

During the past two decades, the design of computer and video games has become a source of study for educational researchers and instructional designers investigating how various aspects of game design support intrinsic motivation and how aspects of game design might be appropriated for educational materials (Bowman, 1982; Dickey, 2005, 2006b; Gee, 2003; Malone, 1981; Prensky, 2001; Provenzo, 1991; Rieber, 1996; Squire, 2003). Bowman's (1982), Malone's (1981), Provenzo's (1991) and Rieber's (1996) respective research focused on the motivational supports in popular game design of their eras. Bowman applied Csikszentmihalyi and Lawson's (1980) *flow state interaction* to help explain motivation of extrinsic supports found in the game *Pac-Man*. Malone (1981) investigated a series of games and identified the elements of challenge, fantasy, and curiosity as being key aspects of design that fostered engagement. Provenzo (1991) applied Malone's elements of challenge, fantasy, and curiosity to deconstruct and explain the intrinsic motivational support of *Super Mario Bros. 2.* Bowman (1982), Malone (1981), and Provenzo (1991) each contemplated how game design elements might be integrated into education. Whereas Bowman's (1982) study focused primarily upon the feedback cycle and motivation, Provenzo's (1991) addressed aspects of intrinsic motivation. Rieber's (1996) research into the psychological and sociological benefits of play reveals that games support intrinsic motivation by providing feedback, fantasy, and challenge (Rieber, 1996). Rieber's work also addresses how narrative/fantasy can foster both intrinsic motivation and potentially be an aid to learning when it is integral to the gameplay experience.

Bowman's (1982), Provenzo's (1991), Rieber's (1996), and Malone's (1981) respective studies reveal commonalities of game design that include clear goals and tasks, reinforcing feedback, and increasing challenge. Each study also reveals aspects of design that foster intrinsic motivation, however, the games Bowman, Malone, and Provenzo reviewed are nearly two decades old. Games have grown increasingly sophisticated in design. The simple one screen mazes of *Pac-Man* have evolved into three-dimensional online multi-playing gaming environments with a full cast of both player and non-player characters. The arguments both Bowman (1982) and Provenzo (1991) presented for recasting game design elements into classroom instruction are revealing for the then current level of game design, however, game design has evolved and now incorporates narrative, role-playing, multi-player environments, representations of three-dimensional spaces, and interactive elements beyond the limits of games represented in the previous studies.

MMORPG game design: character and narrative environment

With the advent of high-speed networks and more sophisticated graphics capacity for computers, MMORPGs have become one of the most popular

game genres. An MMORPG is a networked game which enables thousands of players to simultaneously interact in an online gameplay environment. Among the more popular MMORPGs are *EverQuest*, *Lineage*, *World of Warcraft*, and *ToonTown*. The roots of MMORPGs can be found in digital single-player role-playing games and table-top games such as *Dungeons and Dragons*. Among the first of the online digital games were *Multi-User Dungeons or Domains* (MUDs) which are text-based games played on a computer network. Like table-top games and single-player computer games, MMORPGs are a game genre in which players adopt a character role and play the game as that character. Within the design MMORPGs are two main elements: the character design and the narrative environment. Both support intrinsic motivation in various ways.

Character design

Within the MMORPG genre, players begin by creating a character they will play. Typically players are presented with a variety of base-characters from which to select. Players customize their character by choosing from a limited number of traits, skills, adornments and attributes. These limits force players to make decisions about the types of characteristics in which to endow their characters. The individual combination of attributes, adornments, skills, and traits are what make each character unique. Throughout gameplay, players continually enhance their character's skills and attributes by participating in the narrative environment.

A key aspect within the MMORPG environment is character management. In the course of gameplay, players have opportunities to enhance their characters attributes, skills and adornments. Players continually make choices about the types of enhancements to develop characters skills, primary and secondary attributes and appearance. Skill enhancements might include such actions as combat skills, healing powers, and spell casting abilities. Primary attributes might include such features as strength, agility, intelligence, and stamina. Players typically also have the option of adding various adornments to alter or enhance their characters appearance as they progress in the game. Adornments might include clothing, armor, shields, and protection spells. Secondary attributes are often predicated on the combination of traits, skills, primary attributes and adornments. For example, depending upon the game, *the healing powers* (the amount of healing a character can provide for self or other characters) might be determined by such elements as armor and protective spells, along with a character's intelligence. The choice of skills, attributes, and adornments impacts how a player's character advances in the game. When collaborating with others, a player's skills, attributes, and adornments often indicate the potential contribution a player may provide when participating in collaborative events, which in turn may impact the type and amount of invitations to collaborate with other players.

Intrinsic motivation and character role-playing

Character development in MMORPGs is one element which fosters intrinsic motivation in the course of gameplay. There are no final victory or loss conditions in MMORPGs, therefore, the game continues to evolve. In turn, players continue to evolve their character (and/or develop new characters to play). Players may invest hundreds of hours advancing their character and interacting in the gameplay environment. Because they have great input into the development of their characters, players often feel an emotional proximity to their character. The character becomes a type of avatar of the player in the gameplay environment. Much research has been conducted about both the use of digital-based avatars and the emotional proximity that players or users develop for their characters or avatars. Individual works by such diverse researchers as Stone (1995), Turkle (1995), Curtis (1992), Reid (1994) Jakobsson (2002) and Jakobsson and Taylor (2003) have investigated how role-playing in digital environments fosters personal and social reflexivity. Turkle's (1995) investigation into Multi-User Dungeons (MUDs), a predecessor of MMORPGs, revealed that virtual environments allow users to experiment in a safe, non-threatening environment and to expand, explore, and reflect on different aspects of themselves. Dibbell's (1994) landmark article, *A Rape in Cyberspace*, illustrates the depth of emotional connection that can develop as a result of the emotional proximity users have towards their character or avatar. Jakobsson (2002) argues that users invest a great deal of time and energy into their characters or avatars and as a result these alternative identities or roles become a form of social capital or status. Social capital is the networks, norms, and trust gained by participating in community spaces (Putnam, 1995, 2000). MMORPGs are community spaces. Social capital in MMORPG gameplay is the result of a player's character's assets, and the network of affiliations accrued with the playing of one or more characters (Herz, 2001). The attributes, adornments, skills and traits of a character along with the player's actions enhance a player/character's status. Social capital that results from a player-created-character can be very instrumental in an MMORPG environment because it may assist or hinder players in advancing in gameplay. Often social connections are necessary for completing tasks which require group collaboration (Jakobsson & Taylor, 2003). Players form contacts and develop relationships of trust and accountability based on their characters' actions, profile, and affiliations.

As players develop their character, they are in a sense, taking on a role. Role-playing has long been an established technique used for educational activities. Fields such as medicine, social studies, and language learning routinely use role-playing as a teaching and learning technique. Educational researchers have also investigated how role-playing in a digital environment fosters intrinsic motivation. Resnick and Wilensky (1997) integrated role-playing activities into science and math classes and argue that role-playing can help students understand complex systems and relationships. Riner's (1996) and Riner and Clodius' (1995) research of educational multi-user domains

object oriented (MOOs) reveals that role-playing fosters opportunities for collaboration across time and space, both within and across classrooms. Similarly, Dede (1996) argues that the safety of role-playing with a character/avatar may be even greater in a digital learning environment than in a traditional setting and may foster more risk-taking. While there has been persuasive research into role-playing in both traditional classroom and digital environments, one of the more compelling studies into how character/avatar creations can be motivational is Bruckman's (1997) qualitative study of two adolescent girls' interactions in *MOOSE Crossing*, an online text-based virtual world. Bruckman's ethnographic ''thick description'' provides unique insight into how character development and alternate personae within a loosely structured learning environment can be intrinsically motivating. Bruckman's research reveals that role-playing provides new and interesting outcomes for learning including role-reversal and peer mentoring.

Narrative environment

The core of MMORPG design is a narrative interactive environment. In various computer and video genres such as single player role-playing games and adventure games, the game centers around the narrative of a single storyline which is usually linear in nature. In adventure games and single player role-playing games, the focus of gameplay is on uncovering the narrative storyline during the advent of gameplay. In both of these genres the storyline stops when the player stops playing and resumes when the player begins again. In contrast, MMORPGs are networked, persistant, communal environments. Because they are multi-player, networked environments, gameplay continues even when a player logs off. Within the MMORPG genre, there is no one-single storyline for players to uncover, but rather the gameplay experience is an environment. Embedded within the environment are thousands of short narrative storylines. These short narratives are usually embedded in the environment in the form of a non-player character posing a short narrative tale in which they request the aid or assistance of the player's character. These short narrative tales provide players with opportunities for interaction. As players move through the environment, they encounter these various non-player characters requesting their aid or assistance. The request for assistance is usually framed as a small quest (e.g., deliver a package, find a lost book, and escort an ally). Players may opt to select and complete or reject the small quest. Typically within the environment are many small quests from which players may select. Upon the sucessful completion of a small quest, a player's character is rewarded. This allows players to continually enhance their character's attributes and skills. Rather than the focus of gameplay being on uncovering one major narrative storyline, the environment is a network of narrative spaces (Jenkins, 2002) in which the player interacts and even in limited ways, helps shape.

Most MMORPGs have a very loose over-arching narrative and one central conflict (e.g., in *World of Warcraft*, two groups are fighting for control over a

kingdom and in *ToonTown*, the humorless enemies are taking over *ToonTown* and displacing its citizens). The player's character determines which type of role the player will have in this over-arching narrative. Typically in most game genres the player is often cast in the lead role of the protagonist who must save a town, kingdom, world, universe, or some other domain from some impending threat. In contrast, players in MMORPGs typically begin the game as low-level members of ''rank and file.'' During gameplay, one of the goals is to help advance the character through adding or enhancing skills and attributes (Rollings & Adams, 2003).

Although small quests are usually encountered by non-player characters (NPCs) requesting help, small quests may also be found in other ways such as encountering an object (a ''magic'' book or a strange bottle of liquid) and yet others may be offered through a wanted poster or during the process of completing another small quest. Some small quests may be accomplished by individual players while other quests require the organized efforts of several groups of players. Depending upon the extent of the narrative, these small quests may be a simple one stage quest (defeat five enemies) or they may be more complex and require the player to complete several small quests to completely uncover the narrative (e.g., collect several herbs, then find an herbalist to mix herbs and create a poltice to cure an illness). Both the selection of the small quests and the successful completion advances gameplay and reinforces the player's role in the overarching narrative and narrative space.

Because MMORPGs are persistent, networked narrative spaces, other players also contribute to a player's narrative. Typically a chat tool allows players to communicate during the gameplay experience. This allows players to request help, strategize on group quests, and socialize. Alliances with other players (clans, guilds, friends' lists) allow players to complete small quests which require assistance. Naturally friendships emerge, as do animosities. Stories of other players intrigue, assistance, or betrayals are part of this ongoing player narrative. Additionally, player created websites often emerge where players offer advice or recount the strategies they employed in completing a small quest. Narratives emerge which are parallel and embedded in the narrative landscape of the interactive gameplay environment, but are player contributions and not those of the game designers.

The narrative design of an MMORPG design is a design model which fosters exploration. Players continually explore various regions to find both quest givers and characters and objects related to completing a small quest. There is often no ''one way'' to complete a small quest, but rather players must balance the skills and attributes of their character against the demands of the quest and plan strategically to accomplish most quests. Additionally, players must make critical choices about whether the rewards are worth the investment required to complete a small quest. Because MMORPGs are narrative environments, the environments are often vast and it may take players a great deal of time to ''travel'' from region to region. Players often

make critical choices about the most economical way to complete a variety of small quests in the most travel-efficient way.

Although small quests are typically framed as small narratives, there are categories of small quests based upon the types of actions players must perform in completing the quests. Common types of small quests include: *bounty quests*, *Fed Ex quests*, *collection quests, escort quests, goodwill quests*, and *messenger quests*. Each quest type requires different actions from the player. The bounty quest requires players to defeat a character or number of characters. Often players must explore new regions to find the ''bounty'' characters. The benefit of this quest is that players may have to fully explore a region and in turn be exposed to new areas and resources. Additionally, bounty quests often require players to defeat a non-player character of a higher level and players may have to collaborate with other players to complete the quest. This fosters community as players build contact lists of other players providing mutual support during gameplay. This collaboration also allows players to look at how combining unique differences between player characters can be used to overcome an obstacle. For example in *World of Warcraft*, characters have unique combinations of strengths and weaknesses (see Fig. 1). One character may be able to heal other characters, but may not be able to use projectiles; whereas another character may be able to use projectiles (i.e., bow and arrows and guns), but cannot heal. A group of players often strategize on what each player will do during a bounty quest to ensure the success of the entire group.

Fig. 1 World of Warcraft: A *Paladin* healing another character

The Fed Ex quest is similar to a bounty quest, but requires players to collect a package or object from one character or place and deliver it to another. The purpose and benefit of this quest is to move the player into new regions and expose them to new areas of the gameplay environment. For example in *ToonTown*, players are often required to perform both bounty quests and Fed Ex quests by either defeating an NPC or collecting a packet from a store on a street in a particular neighborhood (see Fig. 2). *ToonTown* is divided into various neighborhoods, each of which have different resources and activities. If players were not prompted to move into different neighborhoods, many players would miss the various resources and activities. Fed Ex quests move players through different neighborhoods and expose them to a wider variety of resources. These resources are often necessary and relevant for problem-solving in later stages of the game.

The collection quest is a quest in which players must collect a variety of objects in order to progress in the game. In the example of *ToonTown*, players must often collect a number of designated items to help build experience points and to build resources. The purpose and benefit of the collection quest is to help the player progress in the game by requiring players to gain higher levels of skills by ''leveling up''. In turn, this scaffolds players in advancing to more difficult levels and performing more difficult tasks.

The escort quest is a quest which requires a player to escort an NPC from one area to another. This often involves strategic planning by coordinating

Fig. 2 ToonTown: A *Toon* encountering a *Cog* in ToonTown

timing, navigation, and even collaboration with other players. Often, key information about the game may be conveyed during this experience. For example, in *World of Warcraft*, there are several small quests in which a player may escort an NPC from one place to another. Typically, the player must protect the character, yet often intrigue or a twist in the storyline such as a traitor in the midst is relayed during that experience. This in turn fosters engagement as players may only receive incomplete pieces of information. Additionally, a player may be required to develop new skills in order to defeat a character.

Goodwill quests are quests which require a higher-level player to assist a lower-level player. For example, in *ToonTown*, more advanced players are sometimes required to assist lower-level players in completing a quest. This provides scaffolding to beginning players and helps initiate them into the gameplay environment. Finally, the messenger quest is a quest in which a player must find a NPC and talk with them. The benefit of the messenger quest is that the NPC may be offering some key advice, information, or directions which will help guide and mentor the player in problem-solving.

Intrinsic motivation and narrative environment

It may initially seem incongruent to look at MMORPG game design as a model for instructional design because the purpose of a MMORPG is to entertain, whereas the purpose of instructional design is to foster learning. However, it is important to note that interactive learning environments are often multi-modal environments requiring learners to access and integrate various forms of information and to formulate plans of action. MMORPGs are multi-modal environments which require players to access and integrate various forms of information and to act upon that knowledge. What is most noteworthy about the design of an MMORPG is that it is an open-ended environment. There is no one penultimate end to the game which players strive to achieve and there is no one way to the play the game. It is a flexible design which allows players choice, collaboration, challenge, and achievement, while at the same time it is a design which provides scaffolding for players to progress and learn.

The design of narrative environment small quests in MMORPGs may provide a model of how to design learning tasks within an interactive learning environment. Small quests within MMORPG promote gameplay by supporting three functions. First, participation in small quests exposes players to various resources thereby insuring that players have been exposed to key resources. Second, small quests provide experience to advance the player's character. Third, small quests foster collaboration and strategic planning by supplying quests, which require multiple players to complete. Not only do small quests advance gameplay, but they advance gameplay by fostering intrinsic motivation. Typically within MMORPGs, players are presented with a *choice* of many quests and they choose the quests they would like to complete. Successful completion of smaller quests allows player's characters to

gain points and attain advanced levels which, in turn, provide players with a choice of increasingly more difficult tasks. Malone and Lepper (1987) argue that choice is a significant variable in fostering motivation when learners are given a range of choice and provided with a sufficient structure with which to make choices. It is interesting to note that many MMORPGs limit the amount of quests players can work on at one time. Research conducted by Iyengar and Lepper (1999, 2000) examined not only the motivating aspects of choice, but also the demotivating aspects of choice when participants are presented with too wide of an array of choices. Although MMORPGs are a relatively recent model of game design, more recent games such as *World of Warcraft* and *ToonTown* seem to recognize the importance of fostering a balance of choice in order to maintain motivation among players while avoiding overwhelming or demotivating others. Within the small quest structure of MMORPGs, players typically have a choice of their selection of small quests, and also have *control* of how they plan to complete each small quest and the order in which they complete them. Malone and Lepper (1987) also argue that control is a key aspect for fostering intrinsic motivation. According to Malone and Lepper, control is dependent upon affordances and constraints of the environments and how players react to those affordances and constraints. Within the small quest structure of MMORPGs, players typically have control over which small quests to select and the order and strategies for completing small quests. Typically players are presented with small quests which match their gameplay level. In other words, an advanced-level small quest is not available to a beginning level player and beginning level quests offer relatively insignificant rewards for an advanced player. Within research of cognition and control, Cordova and Lepper (1996) found that providing students with control, within a personalized and contextualized environment led to increased motivation and learning.

The small quest structure of MMORPGs also fosters *collaboration* among players. Typically MMORPGs have some type of chat feature which allows players to communicate. Often more difficult quests require several players to collaborate to complete. The chat features allow players to chat with other players to request help and plan strategies. This fosters a sense of community as players develop a contact list of other players and use the chat feature to provide instructions, advice, and encouragement to one another. Studies of similar environments such as education multi-user domains object-oriented (MOOs) and 3D virtual worlds note the importance of collaboration in fostering motivation since collaboration allows for the emergence of peer role models and an appreciative audience (Bruckman, 1997; Dickey, 2003; Riner, 1996). Malone and Lepper (1987) also note that cooperation may foster interpersonal motivation.

In addition to collaboration, the small quest structure in MMORPGs also fosters a sense of *achievement* during ongoing gameplay. Because MMORPGs are ongoing experiences (much like the process of learning) there is need to mark progress. Within MMORPGs, small quests provide a type of accountability, as consequences for actions determine the success or failure at various

tasks. Both challenge and uncertainty are key elements in the MMORPG gameplay experience. Because players are provided with continually more difficult small quests as they progress through the gameplay experience, players must continually strive to complete each one. This challenge and uncertainty of outcome fosters a sense of achievement when small quests are completed. Both Malone (1981) and later Malone and Lepper (1987) note the importance of challenge and uncertainty in fostering motivation in gameplay.

MMORPGs provide a model for a flexible design which allows players choice, control, collaboration, challenge, and achievement. Yet, at the same time, there are elements within the design of a narrative environment which help scaffold players in the gameplay experience by providing a cognitive framework for problem-solving and by fostering metacognitive skills. The game setting (i.e. the environment and the backstory) establishes boundaries and provides a context for players to construct causal patterns which integrate what is known with that which is conjectural, yet plausible, within the context of the environment. In turn, the environment provides affordances or possibilities for action (Gibson, 1977). Players combine known information (setting, backstory, conflict, etc.) with affordances encountered in the environment and form conjectures about what combinations and processes might assist them in overcoming an obstacle and accomplishing a task. Players are put in a position of having to make conjectures about causal relationships based on the type of information they have encountered while exploring and participating in previous small quests. The various types of small quests expose players to the affordances of the environment. For example, during the process of completing a bounty quest, players are often required to travel into new areas of the gameplay environment. While traveling to their destination, players are exposed to new resources. These new resources may be necessary or helpful in completing subsequent small quests. Plausibility is established through the use of the narrative and supported with the affordances of the environment. As Winn and Snyder (1996) noted, research in situated learning reveals that cognition is more likely to be dependent upon context and affordances of a place and situation than to be determined by formal reasoning (Brown, Collins, & Duguid, 1989; Lave & Wenger, 1991; Suchman, 1987). The actions required through participating in small quests may foster a type of metacognition or perhaps more precisely a type of meta-inferencing (Collins, 1978) and possibly a type of meta-indexing by exposing players to resources and information in initial small quests and then later providing subsequent quests which rely on resources encountered previously.

In summary, the narrative environment of MMORPGs provides choice, control, collaboration, and achievement, yet also provides scaffolding for problem-solving. Table 1 summarizes elements of intrinsic motivation and MMORPG design. Malone's (1981) landmark research into the design and application of game design strategies for educational design identified three primary characteristics of computer games which fostered intrinsic motivation: challenge, fantasy, and curiosity. Malone and Lepper (1987) further expanded this framework to add the elements of choice and control to support intrinsic

Table 1 Summary of intrinsic motivation and MMORPG design

Intrinsic motivation	MMORPG design
Choice	Character design
	Traits, skills, attributes, and adornment
	Narrative environment
	Choice of small quests (with limits place on the amount of small quests a player can adopt
	Option to drop or delete small quest selected
Control	Narrative environment
	Quest selection
	Order of completion
	Strategies employed
Collaboration	Character design
	Social capital associated with player's character
	Narrative environment
	Chat and communication tools
	Collaborative quests
Challenge	Character design and narrative environment
	Quests equivalent to current level of skills combined with attributes
Achievement	Character design and narrative environment
	Marked progress indications
	Elevated status
	Advanced skills
	Enhanced attributes
	Bounty

motivation. Although Malone's (1981) and Malone and Lepper's (1987) studies are still relevant and informative, game design has evolved since the era in which these studies were conducted. Within contemporary games, *fantasy* has developed into complex narrative structures. Game environments such as MMORPGs are narrative spaces with opportunities for exploration, collaboration, and challenge. The narrative environment fosters motivation and serves as the organizational framework for the interactive environment. Within the MMORPG genre, Malone's (1981) element of fantasy in game design is now full-fledged narrative environment. The narrative of small quests provides a cognitive framework for problem-solving and fosters metacognitive skills while simultaneously supporting intrinsic motivation by providing opportunities for choice, control, collaboration, and achievement.

Small quests and knowledge domains

The elements of character design and the narrative environment of MMORPGs may prove useful for the design of interactive and game-based learning environments. MMORPG game design is a flexible structure in which players are afforded opportunities for choice, control, collaboration, challenge, and achievement, yet with scaffolding for problem-solving. The

question for instructional designers and educators is how they might annex those elements for learning. Certainly, there are innumerable studies which have looked at incorporating choice, control, collaboration, challenge, and achievement in a learning context, however, what the design of MMORPGs provides is a model for how all of these elements can be combined in a rich, interactive learning environment and ways to think about how to provide scaffolding in complex, interactive learning environments.

Goal-based Scenarios (Schank, Berman, & Macpherson, 1999), WebQuests (Dodge, 1995), and Case-based Learning (Eisner, 1998; Ertmer & Quinn, 1999; Julian, Larson, & Kinzie, 1999; Shulman, 1992) are some of the existing models of learning environments which, to varying degrees, incorporate elements such as role-playing, narrative, and tasks somewhat similar to small quests. Both the use of character development and use of small quests foster intrinsic motion. Character development allows players (and potential learners) opportunities to self define and refine personas in a learning environment. The benefit of integrating a narrative environment is to foster intrinsic motivation; however, it is important to note that each type of small quests within the MMORPG narrative environment serves a different purpose. In order for the small quest narratives to be used effectively in a learning environment, it would be beneficial to look at how the various small quests might support various types of knowledge and suggest how they might function in a learning environment by looking at how various types of knowledge might correspond with the various types of small quests.

Diverse researchers from cognitive psychology, knowledge management, learning theory, and instructional design have identified and characterized four types of knowledge: (a) declarative knowledge, (b) procedural knowledge, (c) strategic knowledge, and (d) metacognitive knowledge (Ackerman, 1986; Anderson, 1983; Bloom, 1956; Bransford, Brown, & Cocking, 2000; Brown, 1978; Gagne, 1985; Jonassen, 1996; Kraiger, Ford, & Salas, 1993; Smith & Ragan, 1993; Wagner, 1987). Declarative knowledge consists of facts, data, concepts, and principles. Procedural knowledge consists of knowledge of how to perform a task, action, or process. Strategic knowledge refers to the awareness of how to apply knowledge, principles, and experiences to various and new situations. It is the foundation of problem-solving. Metacognitive knowledge involves the reflection and regulation of one's thinking during an activity (Brown, 1978). The following taxonomy is an attempt to characterize how various quests might foster learning in various knowledge types (see Table 2). Because the natures of the quests are flexible and determined by the context of the narrative, different types of quests might be relevant for several knowledge-types. It is important to note that this conjectural analysis and taxonomy is far from comprehensive and not intended to serve as a formula, but rather is meant to suggest how the narrative structure of small quests might be used to foster different types of knowledge in interactive and game-based learning environments.

Table 2 Categorizing small quest-types by knowledge domains

Knowledge domains	Small quests
Declarative knowledge	• Collection quests • Goodwill quests
Procedural knowledge	• Fed Ex quests • Messenger quests
Strategic knowledge	• Bounty quests • Escort quests
Metacognitive knowledge	• Bounty quests • Escort quests • Goodwill quests

Declarative knowledge

A collection quest is a quest in which players must collect a variety of objects or perform an activity a certain number of times. The purpose and benefit of the collection quest is to help the player progress in the game by accumulating points. This type of quest might be useful for fostering and reinforcing declarative knowledge because declarative knowledge indicates knowledge of facts and data. For example, students might be required to complete a quest in which they must label, identify, or define something. They may have to complete the act several times in different combinations or ways to complete the task. Similarly goodwill quests are quests which require a player to help another lower-level player. Teaching or assisting a peer is a way to reinforce knowledge. This type of quest may be useful in fostering declarative knowledge by having one student peer mentor or assist another learner.

Procedural knowledge

The Fed Ex quests and messenger quests are quests which move players through the environment and expose them to new areas and resources. They are also procedural in nature. The Fed Ex quest is procedural in that it may involve going to various places to collect items and manipulate items and then finally deliver them. Procedural knowledge focuses on knowledge about how to perform a task. In a learning environment, this type of task might be useful in fostering procedural knowledge by simulating how something is done. The learner might be required to find various objects or to complete actions in a particular order with the goal of demonstrating a process. Similarly, the messenger quest is also often procedural in nature in which players often are required to pass information along from one source to another. In turn, this might be used by a learner to first simulate or learn a process then to recount that process to another learner or to a narrative character.

Strategic knowledge

The bounty quest requires players to defeat a character or number of characters, while the escort quest requires players escort a NPC from one location

to another. Both quests-types are often challenging and require players to plan and strategize. Strategic knowledge refers to knowledge of how to apply knowledge, principles, and experiences to various and new situations. Both bounty quests and escort quests require players to analyze their character's strengths and weaknesses and to balance those against the environmental factors they may encounter and the type of challenge. These types of small quests might be useful for assisting learners in integrating and fostering knowledge gained from exploration, interaction, and various procedures and applying that knowledge in a new or unique situation.

Metacognitive knowledge

Both bounty quests and escort quests also require players to explore, observe, speculate, and make conjectures. Players make conjectures by gauging the demands of the quests while reflecting on their past experiences. In goodwill quests, players may articulate their experiences while assisting lower-level players. In turn players may model, scaffold, and coach lower-level players. These types of quests might be helpful in helping learners foster and apply ''adaptive expertise'' in problem-solving (Bransford et al., 2000; Hatano & Inagaki, 1986) by exposing learners to resources and processes and then providing a challenge in which they must make conjectures about combining resources, processes, and skills.

Conclusion

The purpose of this paper is to discuss how the structure in MMORPGs might inform the design of interactive learning and game-based learning environments by looking at the elements that support intrinsic motivation. Specifically, the focus of this analysis is on intrinsic motivation of both the character development and role-playing and the small quest design in the narrative environment. It is important to acknowledge that games are designed primarily for entertainment, whereas the purpose of learning environments is to educate and foster learning. Despite these differences, there are elements within the design of MMORPGs which foster intrinsic motivation while requiring players to think, plan, and act critically and strategically. The elements of character development and the narrative environment are already present in varying degrees in various instructional design models, however, what the design of MMORPGs offer is a way to frame different types of learning domains within a compelling, individualized, collaborative environment.

Although popular game design has much to offer the field of instructional design, it should be acknowledged that there is content in many popular games, which is controversial on many levels. It is not the purpose of this analysis to suggest that all elements of MMORPGs be adopted for educational use. MMORPGs are combative in nature. Additionally, the aspect of character design and development is problematic in some MMORPGs. Issues

of race, gender, and culture should always be taken into consideration during the instructional design process. It is, however, the intent of this analysis to suggest that MMORPG design may provide a flexible model for creating engaging interactive learning environments which foster intrinsic motivation by providing choice, control, collaboration, challenge, and achievement. There is much in contemporary game design to be explored and annexed to support different types of learning. The design of MMORPGs is a potential flexible model that may be of use to instructional designers and educators looking at how to develop interactive and game-based learning environments which are engaging for all students.

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