



Social learning in MMOG: an activity theoretical perspective

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Abstract

Purpose – Recently, researchers have begun investigating the learning process that occurs within computer games (learning to play), as opposed to studying games that support explicit learning for educational purposes (playing to learn). With the increasing popularity of massively multiplayer online games (MMOGs), some research has begun to look beyond individual play and is now focusing on social play. By conducting a 30 day virtual participant observation in an MMOG, namely World of Warcraft (WoW) this paper aims to identify and provide a theoretical explanation of the process of learning that takes place in such an open-ended virtual world.

Design/methodology/approach – Through the lens of activity theory, the paper focuses its analysis on the tool, the goal, the activity of game playing and contradictions.

Findings – It was found that social learning could occur through intrinsic and extrinsic play. Intrinsic play is play oriented toward goal completion while extrinsic play is directed toward reflection and expansion of intrinsic play. WoW is designed with tools that facilitate these types of play, and therefore learning that emerges from them. Furthermore, learning involves not only the process of acquiring knowledge and skills to accomplish certain goals, but also the process of defining the goal, thus shaping the learning process.

Originality/value – The results could be used to inform game design either for social play or for social learning.

Keywords Learning, Learning process, Computer-based learning, Video games

Paper type Research paper

1. Introduction

Ever since the widespread popularity of computer games in the early 1980s, some educators believe that the “magic” of computer games could apply in the classroom to engage and motivate students, making learning more enjoyable (Squire, 2003). A few educators have undertaken this project, defining elements of game design that might be used to make learning environments more engaging (Bowman, 1982; Malone, 1980).

Earlier research in games and learning has been emphasising the educational potential of computer games being used either formally in the classroom or informally in an after-school context. Little has been done in examining the learning activity that takes place within the game. Newer studies have been conducted to identify the learning process within the game when players are playing a game designed specifically for entertainment purposes instead of educational purposes (Ang and Rao, 2003; Oliver and Pelletier, 2005).

Recently, with the increasing popularity of massively multiplayer online games (MMOG), there is an emergence of interest in studying the social dimension of learning in these social-oriented games (Ducheneaut and Moore, 2004). Since social interaction is the main focus on the game play, it is reasonable to assume that learning takes place not only through player-game interaction, but also player–player interaction.

In this study, we analysed players’ activities in a MMOG, namely World of Warcraft (WoW). The main aim of this study was to investigate the process of social learning



around WoW. More specifically, our aims were to use activity theory as a methodological lens to:

- identify different types of social play in WoW; and
- infer how learning could happen through social interaction.

This paper is presented in the following structure: section 2 presents briefly what MMOGs are and their relevant research, highlighting some work on MMOGs and learning. Section 3 is the methodology section in which we describe the data collection as well as our analytical perspective in conducting this study. In section 4, we explain in depth our findings on the types of social learning and the social interaction that could lead to learning. In section 5, we discuss the results and their implications. Section 6 concludes the paper and recommends future research directions.

2. Recent MMOG research

Computer games are becoming increasingly social and various types of social interaction and even virtual community arise around games (Ang *et al.*, 2005). Perhaps, the most prominent example of social games is MMOGs. Unlike conventional games, MMOGs feature a fictional setting where a large group of players interact with each other by forming communities of players. A MMOG enables thousands of players, represented through avatars, to simultaneously play in an evolving online virtual world (Yee, 2005). The game world is usually modelled with highly detailed 3D graphics, and allows individuals to interact not only with the gaming environment, but also with other players. Often, a MMOG, like a role playing game involves killing monsters, developing characters, etc. It however contains an extra aspect which is the internal sociability within the game. Unlike single-player games, which rely on other external modes of communication (such as mailing lists, discussion forums outside the game) to form the gaming culture, the culture is formed within the MMOG environment itself.

These MMOG virtual worlds represent the persistent social and material world, which is structured around narrative themes (usually fantasy), where players are engaged in various activities: slay monsters, attack castles, scavenge goods, trade merchandise, etc. On one hand, the game's virtual world represents the escapist fantasy, on another, it supports social realism (Kolbert, 2001).

The MMOG genre now boasts hundreds of thousands of users and accounts for millions of pounds in revenue each year. The number of people who play the games (and the time they invest in terms of activities within and around the game) is astounding. The MMOG, Lineage (NCsoft, 2005), for example, had more than three million subscribers in at one point (Lineage, 2007) and within a year Ultima Online (Electronic Art, 2005) attracted more than 160 million person-hours (Kolbert, 2001).

Therefore, there is no surprise that research about virtual worlds in general, and MMOG in particular, is growing substantially. This research involves areas as diverse as law, education, sociology, psychology and human computer interaction. Of specific interest for this study is the social aspect of gaming, namely sociability, in which scholars conduct in-depth studies to investigate social interaction between players and how MMOGs can be designed to facilitate such interaction.

One of the examples of sociability design in MMOGs is Star Wars Galaxies (Sony, 2003), which is organised so that players are steered towards certain game locations in the game world where social play is expected to take place. Ducheneaut *et al.* (2004) have conducted a study to identify how game locations can be designed to encourage

different styles of social interactions. They found that the game *Star Wars Galaxies* does attempt to maximise social interactions through the careful design of the game structure and mechanics. One major finding is the implementation of social spaces in the game. Some locations are designed in such a way that players have to wait there and socialise. Furthermore, some locations are tied to the provision of a particular service such as the healing of battle fatigue in a specific location. Another aspect that is crucial in designing sociability is the interdependency between game avatars. The game ensures that everyone has to rely on others to complete certain game missions. This encourages players to work together and join certain groups or communities as playing the game alone is less rewarding (i.e. slower progress).

Analysis by Ducheneaut *et al.* (2004) also revealed some other issues in the game design, one of which was awareness in social spaces. Awareness means “the knowledge of the presence of other people, including their interactions and other activities” (Nova, 2002). It is found that in some heavily populated spaces, players are not aware of the activities and presence of other players and this could result in breakdown in social interactions. Another sociability design issue is the lack of social play. Their result showed that the player–player interaction in the game is instrumental rather than social. This means most players have short and infrequent interactions in order to satisfy their needs to progress in the game. As soon as their needs are met, they leave the place to pursue other game goals. Although there are some players who interact genuinely with other players for the sake of socialising, such interactions are usually not rewarded directly by the game.

Although not many, some studies of MMOGs focus on the learning aspect within the game community. In structurally and socially complex games such as MMOGs, various skills are needed to play and succeed in the game and the development of these skills highly depends on the social interaction with other players in the virtual space.

In a study conducted by Papargyris and Poullymenakou (2005) player interactions in two MMOGs, *Earth and Beyond* (*Earth and Beyond*, 5 June 2007) and *EVE: The second Genesis* (CCP Games, 2003), were observed. It was found that in such multicultural and anonymous environments, many learning processes are evolving that affect players’ understanding of the game’s state, their social and communication skills.

The study revealed that skills in MMOGs can be grouped into two categories:

- (1) in-game skills (skills you need within the game to make progress and enjoy the game, such as the game stories, collaboration skills, game control, etc); and
- (2) emergent skills (implicit skills that emerge from the game play, such as decision-making and strategy planning and assessment skills).

Ducheneaut and Moore (2004) also analysed social learning in a MMOG and identified three types of learning: small group self organisation, instrumental coordination and sociability. According to them, players have to acquire social skills in managing group creation, maintenance and disbanding since forming groups with others is essential in accomplishing the game quests. After a team has been formed, the need of social skills shifts from group organisation to instrumental coordination in which players work together as a team towards achieving the game objective through role division. Apart from instrumental play, players also engage in social play such as humour and small talks. A different dimension of social skills is needed in order to appear friendly and thus be accepted by the game community.

Another study on the MMOG *Ultima Online* (Electronic Art, 2005) showed that what Ducheneaut *et al.* (2004) described as instrumental play and social play do exist in

the game virtual space. As a matter of fact, it is claimed that not only do they exist within the game, they often spill beyond the demarcated boundary of the rule-based system, and propagate into the players' physical life through various means, such as e-mail, online forum and chatting tools. This finding was supported by Kolo and Baur (2004) who conducted a virtual ethnography and observed that most players seek more than merely strategic considerations (instrumental play) when interacting with other players. They also searched for communication and persistent social relations (social play).

3. Activity theoretical perspective in game studies

We adopted the perspective of activity theory in our analysis. Activity theory is a theoretical framework that explains human social activity. Due to the limitation of space, we will not discuss activity theory in this paper. For an in depth discussion on activity theory, refer elsewhere (Bannon, 1997; Engeström, 2000; Kuutti, 1995; Leontiev, 1978; Nardi, 1995; Vygotsky, 1930).

Although still uncommon, some researchers have attempted to study computer games with activity theory. A study has been carried out by Squire (2004) to examine game-based learning, one of the most studied areas in computer game research, in which he explained how activity theory could be an analytical lens to examine learning through computer games. Based on this theory, which argues that knowledge cannot be treated as isolated entities extracted from the contexts from which they form, he analysed computer games as a tool in the learning activity system.

He used activity theory to examine the implications of applying *Civilisation III* (Firaxis Games, 2001), a history simulation game, in history learning by treating the game as a mediating tool in the learning activity system. Activity theory also gives an insight to the contradiction of using games as a tool in learning to help participants (students, teachers, instructional technologists) react to the change of the learning environment from the traditional classroom to game-based learning.

Another study, known as *The Fifth Dimension* has been conducted to design an educational activity system for school aged children (Kaptelinin and Cole, 1995). They implemented after-school systems based on activity theory in order to study individual and collective activities in educational games. In addition to tasks written within the game itself, the project team designed out-of-game tasks to help participants adapt themselves to the game culture of practice, to form goals, and to trace progress towards becoming an expert.

In another study, Oliver and Pelletier (2005) developed a methodology based on activity theory to analyse the detailed learning activity from some instances of game play. The methodology framework has drawn most of the theoretical constructs from activity theory, most prominently the hierarchy of activity and the concept of learning through contradictions and development.

Using this methodological framework, they analysed observation data (video transcripts of the game screen and the players) from the game *Deus Ex* (Ion Storm Inc., 2000) by identifying contradictions that arose. They found that most contradictions in the game involve the contradictions between the player and the game tool (e.g. the game controller and the in-game virtual artefacts) and the contradictions between the player and the rules (how the tool should be used). Through the use of activity theory, they managed to derive play strategies and more importantly the evolution of the strategies through time as players developed.

4. Methodology

The aim of this paper is to understand how social interaction could lead to social learning. To achieve this, a participant observation was conducted in a typical MMOG, known as WoW for 30 days. We selected WoW largely due to its popularity and its large number of users. This provided a platform to collect a massive amount of data covering various types of user activities.

We dwelt in the game for 30 days (about 5-6 h a day) to familiarise ourselves with the virtual fantasy world, while from time to time stepping back from the game avatar to our real identity as a game researcher to observe and reflect on the activity we observed in the game. We also kept a game journal of our own account of the adventure in the game. Using the in-game chat-log function, we managed to keep a record of other players' activities throughout the study.

In order to obtain a deeper understanding on the interaction between players, we tried to interact with other users and observed their ways of interaction through conversations and actions. This was achieved by joining a party/group of players to do quests. By joining the group, we gained access to the chat log of the group chat which gave us insights into the nature of social interactions in such a relatively short-term and goal-oriented game sessions. We also joined a guild which gave us access to the guild chat channel. Sociability in a guild is relatively long term and it provides mutual support among the guild members. Another form of long-term relationship is the friend function, which is essentially players added into the friend list, players who are playing together frequently and giving support to each other.

We also observed public chat and public interaction. We visited several different areas (towns, wilds, dungeons, etc.) in which different nature of social interactions took place. All the data was loaded into a qualitative data analysis software package for analysis.

The data analysis was based on the four main concepts of activity theory: tool, objective, activity and contradiction. Activity refers to sequence of purposeful actions which are oriented toward a clear objective. These actions are mediated by tools. For instance, a player might be carrying out some actions to collect certain items to accomplish a game quest. These actions are mediated by a collection of tools. Tools can be individual or collective. Individual tools might be the map, the quest description, the in-game help file etc. Collective tools are division of roles and social rules that define the interaction between players. Contradictions refer to "breakdown" that occurs when the player is unable to achieve the objective. This would usually result in the player shifting his/her focus from trying to achieve the objective to reflecting on the tools until the contradictions have been resolved.

First of all, we studied the observation data carefully to identify types of social interaction. Through this exercise, a list of themes of social interaction was produced. Some examples of the actions were goal construction and negotiations; collective contradiction and so on.

Then, the themes were examined in detail in light of social learning. For each theme, we analysed different aspects of interaction based on the four concepts of activity theory. We analysed types of goals that direct these actions, tools that mediate them, etc. Through this, we generated a rich explanation for the particular themes.

5. Results and findings

Before we report our findings on social learning in WoW, it is important to elucidate two types of play we identified: intrinsic and extrinsic play. Intrinsic play is play

activity within the structure of game defined by the game developer. It is usually directed toward achieving the game goal; whether it is developer-defined or player-defined. This type of play is self explanatory. For instance, in WoW, intrinsic play involves killing monsters, collecting items, etc.

Extrinsic play refers to play which goes beyond the original boundary of intrinsic play. We identified two types of extrinsic play – reflective and expansive play – which deserve an in-depth explanation.

According on activity theory (Leontiev, 1978), when a contradiction occurs, the subject stops working towards the goal in order to reflect on the tools to resolve the contradiction. This will eventually result in the development of the activity so that the subject can focus on the goal again. Taking this claim further, reflection can be analysed like other forms of activities particularly, when the subject is reflecting on the contradiction socially within the community. In the game context, we call this activity reflective play.

Even though most computer games have a strict structure that defines the basic pattern of play, when observing players play the game in a broader context, it is found that play activities tend to go beyond the original context of the game. We would like to call such play expansive play. Expansive play generally means play activities that go beyond the original game structure. Players are testing and stretching the boundary of the game, especially in multi player games, since it is common to negotiate and modify the original game rules.

Analysing social interaction that happens in intrinsic and extrinsic play not only reveals a new dimension of the learning process in the game through peer-teaching and peer-learning. By social learning, we mean the process of learning to play the game and become more skilled, by collaborating with other players.

Social learning is essential in learning the collective tools, namely rules and division of roles, since they are usually not stated in the game manual or the in-game hints/help system. In order to play with others and to be accepted by the player community at large, a player has to learn and abide by the rules. Some rules are global within the game across groups while others (which are negotiated and agreed spontaneously) only apply locally to a specific group. The player has to learn to play her role to coordinate the actions in a group in order to maximise the chance of success.

Apart from learning the tools, interacting with others also enables the player to act more strategically, as the player needs to be aware of the actions and the conditions of her group members. In the next sections, we examine the process of social learning in WoW and present a theoretical explanation on this issue through activity theory.

We describe the observed social interaction which indicates the possibility of social learning. Note that there are no evidences that prove that learning has indeed occurred. Our intention is to describe interaction that will potentially lead to learning. We explain it through the following aspects:

- learning mediated by the community;
- emergence of norms that mediate social learning;
- collective knowledge construction;
- collective-reflective-play and social learning;
- collective contradictions between players;
- individual goal construction;

- shared game tools (information sharing); and
- homogeneity and heterogeneity in social learning.

Each of these aspects are described and supported with data in the remaining of this section (sections 5.1–5.8)

5.1 Learning mediated by the community

Analysing activities and actions is a fundamental way of understanding learning in games from the perspective of activity theory. However, the analysis should not be limited to examining how players learn through interacting with the game software (the tool), i.e. how skills and knowledge are transferred from the tool to the player (behaviourist) or how knowledge is constructed (constructivist) by the player on her own. We must not neglect the analysis of objective-oriented and tool mediated activities in the social context. Analysing the social context allows us to understand collective knowledge construction, which could eventually lead to the internalisation of knowledge either within an individual or the whole community.

A study by Oliver and Pelletier (2005) on learning in single-player games using the activity theoretical constructs serves as a good starting point in this direction (see section 3). Their work focused on the learning process of an individual player acquiring identifiable skills which are stable and well defined. In single-player games, it is often assumed that there is a “complete” game tool that can mediate the player’s learning. The play actions are pre-defined and are “out there” to be learned. In MMOGs however, some types of learning are not stable or defined ahead of time. Players must learn new information or new forms of actions which are not yet “there”. These actions or information are learned as they are being constructed. There is no complete tool as it keeps evolving and expanding through player–player interaction.

Therefore, in the WoW context, learning is not only mediated by the game tool but also mediated by other players (through rules and division of roles that arise). To start with, the game consists of a massive virtual world and is content heavy, featuring a huge variety of locations, items, monsters, etc. In addition, quests and dungeons are designed to impose challenges, requiring players to devise strategies and learn to collaborate with others. The following are some forms of collective actions which could result in social learning:

- One of the most common types of social learning is by observing others’ actions and the outcomes of these actions. Players learn to perform some actions and other strategies through observation.
- Contextual teaching also occurs in the game, in which a more experienced player walks a less experienced player through many tasks and provides *in situ* information to the player.
- Players participate in group discussion to collectively reflect on certain issues of the game. The reflection is always contextual, drawing from the play actions that happened recently. This results in the sharing of information and knowledge within the community.

These findings might appear banal but upon a closer analysis from the perspective of activity theory, they reveal a deeper meaning. According to activity theory, there are three level of tools (Wartofsky, 1979): primary, secondary and tertiary. Primary tools are tools used directly to mediate the relationship between the subject and the object;

secondary tools are representational tools used to preserve and transmit skills in the mediation of the primary tools; tertiary tools are imaginative tools that give “identity and overarching perspective to collective activity systems”.

In a single-player game, the secondary game tools (tools used to mediate the understanding of the primary tool) are created and maintained by the game developer to facilitate the learning process. These secondary tools might include in-game tools such as textual tutorials/hints, videos/cut-scenes that show how certain tasks should be carried out correctly, artificial intelligent (AI) agents that offer *in situ* teaching to the players when they are baffled by some tasks, and other interactive tutorials at the beginning of the game. The design of such in-game secondary tools is essential to ensure a smooth learning curve. They might also be external secondary tools such as user manuals, official/unofficial guide books and other supplementary materials. Assuming that the player is playing the game individually, the game tools have to provide structured guidance to the player. In this case, the learning process is exclusively mediated by the game tool.

However, such situations rarely exist in reality even in a single-player game, let alone in MMOGs such as WoW which are designed deliberately to include other players as part of the learning process. In WoW, there is little need to implement sophisticated AI agents as these agents are in fact “played” by the players. Only basic tutorials are included in the game and the rest is up to the communication between players. Instead of implementing a complete and structured help system, a platform is provided for the player to “play” the role of the help system.

In other words, the term “secondary tool” carries a significantly different connotation in WoW. We argue that the conventional computer-mediated communication (CMC) tools such as chatting functions, online forums, Wikis and blogs associated with the game become the secondary tools in the game, facilitating communication among players and thus leading to social learning via community mediation. Secondary tools in WoW also comprise construction tools such as video and screen capture functions, video/image/text editing tools, etc. which enable the players to construct user manuals and video tutorials.

Clearly, the players are not simply using the game tools to achieve the game goals; instead they become tool creators and the mediators of social learning for each other. In other words, the player community mediates the learning process. In the following sections, we will look more closely into such mediation in social learning.

5.2 Emergence of norms that mediate social learning

In collective-progressive-play, players collaborate to achieve goals to progress in the game. This requires players to communicate and coordinate. This social interaction results in the emergence of social norms and division of roles. Often, these norms can only be learned through the means of social learning as most of them are not stated in the official game manual or the in-game help system.

Let us demonstrate this with an example. Player_J was a warrior with low attack and high defence while Player_J2 was a *Mage* (a class of characters that casts mainly destructive magic spells) with low defence but high attack. In the following observation, Player_JF initiated an attack and she became the attack target of the monsters. Due to her low defence, she was nearly “killed”. Through this, a division of role was formed between them, where Player_J was responsible to initiate the attack while Player_JF supported the attack through a long-ranged magic spell. In this way, the monster would focus the attack on Player_J with higher defence:

Player_J says: save [saved Player_J2 from being killed]
Player_JF says: th[anks]
Player_J says: [you should not] attack first
Player_JF says: [I] know, sorry
[a while later]
Player_JF says: you [attack] first

The emergence of division of roles is dependent greatly on the design of the game tool. In WoW, players can choose from different classes (e.g. warriors, hunters) with different abilities which are well balanced in a way that the class is dependent on each other in order to succeed. This design enforces social learning as players need to learn from each other especially to coordinate their actions in a group.

In some situations, rules and division of roles are not transferred from one player to another as these rules are constructed through negotiations and agreements. This type of social learning is known as expansive learning (Engeström, 2001) by activity theorists, in which the learning not only causes the development within an individual player but also the development of the entire activity system. In other words, the learning process is not simply referred to as the improvement of the players' abilities or skills to operate the tool and act on the goal. Rather it is the expansion of the activity system, e.g. new tools and new rules are constructed.

5.3 Collective knowledge construction

By means of group discussion, exploration and experimentation, new information/knowledge is constructed. The outcome of reflective play could be knowledge construction, which would not be possible (or would take much longer) when an individual player interacts only with the game tool. This motivates the players to interact with each other. Let us illustrate this with an example:

Player_J says: hi
Player_J says: [please] tell me where guard thomas is
Player_Y says: read in your quest log
Player_J says: it says eastern Elwym bridge
Player_J says: no idea where it is
Player_Y says: [don't you] just [have] to follow the road to the east?
Player_R says: guard thomas is after easrvale
Player_J says: is it? from here all the way to the east
Player_J says: ok [I] will try
Player_J says: thanks
Player_Y says: [I haven't] been there yet but [that's] my suggestion

The above example shows a process of social learning through collective construction. Evidently, knowledge was not transferred from one person to another. Instead, it was constructed through player–player interaction. Upon inspecting the context of the observation, it was found that the goal of this series of actions was to complete the “Guard Thomas” quest. However Player_J did not know where Elwynn Bridge was located. She attempted to use the game tool (the map) to achieve the goal, but the bridge was not marked on the map and it was not explained explicitly on the quest log (another game tool) either.

Note that this observation shows a typical individual contradiction and therefore a shift of goal. The goal was transformed into “to find Elwynn bridge”. Her action was no longer motivated by an intrinsic-play-motive (to make progress in the game); instead it was motivated towards a reflective-play-motive (to learn more about intrinsic play).

She could have engaged in individual reflection by, for instance, reading the game guide book (a secondary tool) to resolve the contradiction. However, she decided to mediate her reflective action with the player community. Player_J was co-reflecting the goal with Player_Y and Player_R through the tools (quest log, chatting windows) and language (symbolic tool) (refer to section 5.4 for more details on collective reflection).

However, we must be informed that such social learning only makes sense if the players are within the zone of proximal development (ZPD), the definition of which is stated as follow:

... the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peer (Vygotsky, 1930).

A learner's actual developmental level is the higher level of mental development at a particular time. It indicates the functions that have already matured. A learner's ZPD is those functions that have not matured yet, but that are in the process of developing.

We can look at an example of two learners who can both under normal circumstances answer questions that other average learners at their age can also answer. Their mental ages might be said to correspond to their chronological ages. But if when aided by others, one of these learners could successfully answer questions corresponding to a higher mental age the other could not, it could be said that the first learner's ZPD growth is greater than the other's.

Hence, if one of the players was not within the ZPD, she would not have been able to interact with other players in a meaningful way. To take a very simple example, if Player_J had not yet learned where "Easrvale" was located, she would not have made the construction of the knowledge about the quest.

5.4 Collective reflective play and social learning

The process of reflection is a core component in learning. Reflective play is usually characterised as the process of resolving the contradiction that stops the individual from working towards the original goal. For instance, when trying to save the princess (the goal) in a game, the player might come across some aspects of the game items (the tool) she is not familiar with (a contradiction). When this happens, she has to pause and reflect on the tool and her actions of using the tool so as to resolve the contradiction.

Since WoW is inherently a social medium, reflection happens collectively, in which players externalise their internal reflection and resolve their contradictions interpersonally. Hence, it can be said that reflective play occurs collectively, drawing from multiple sources and multiple perspectives (from other players). When a player reflects, we witness a shift of goals. What is more, in game play activity, reflection usually means that the player steps back from the game world into reality and think about the play. In other words, it is a meta-play activity and it often implies the occurrence of contradictions.

Reflective play can arise from various occasions. In this section, we would like to focus the discussion on the reflection that is due to contradictions in intrinsic play. We identified three situations where reflection is triggered by contradictions:

- (1) contradictions arising from the player's own intrinsic play;
- (2) contradictions arising from other players in the community; and
- (3) contradictions that might potentially occur.

5.4.1 Contradictions arising from the player's own intrinsic play. Contradictions could arise from all aspects of intrinsic play, forcing the player to step back from intrinsic play and shift to reflective play. For instance, players can reflect on the goal (e.g. is the goal appropriate to the player level, should the player change the goal), the action (e.g. how can the player improve the strategy to achieve the goal), the tool (e.g. how can the tool be used to perform certain actions), etc.

In a social context, players often externalise their reflection through language and signs to collectively reflect on the contradiction with other players. From the point of view of social learning, this leads to what is called guided reflection (Johns, 1994). Through guided reflection, a player is able to increase its potential level of development via collaboration with peers. This kind of learning is known as ZPD, which has been discussed earlier (refer to section 5.3).

Social learning can be seen as collective-reflective-play mediated by various mental tools (e.g. words, signs, symbols, etc.) with the player community, generating knowledge, which is then internalised within an individual player. The following observation shows how reflection was externalised verbally and how two players guided Player_J in reflection:

Player_J says: where we can find this thing [hops]?
Player_A says: [hmm. . .]
Player_JB says: 5 hops.. [a quest that requires the player to collect five hops]
Player_JB says: [never] seen
Player_J says: me [neither]
Player_A says: they are a plant?
Player_J says: sorry my english is not too good
Player_J says: they must be [near by]
Player_J says: keep search[ing]
Player_J says: hey i already have 1 hops
Player_JB says: where did [you] find it, did you get them from [Westfall]?
Player_J says: %^&* i don't remember
1/25 13:45:52.280 Player_J says: harvest machine [the hop is from the harvest machine]

It is clear in this example that Player_J was externalising her reflection and it triggered collective-reflective-play mediated by Player_JB and Player_A, who offered suggestions and information (as tools).

5.4.2 Contradictions arising from other players in the community. It should be noted that in the social context of play, reflection occurs not only as a result of the contradiction of the player's own actions as players also reflect on the contradiction that arises from other player's actions. Drawing from the previous example, analysing from the perspective of Player_JB and Player_A, it was found that they were in fact engaged in collective reflection triggered by a contradiction of Player_J.

In addition, contradictions not only arise from the limitation of the tool or the lack of skills/knowledge of the players, but also from the limitation posed by other players (refer to section 5.5 for a more detailed description). This should not be seen as something that deters the game play experience, but a motivation for social learning, as according to activity theory contradictions are a main source of development.

5.4.3 Contradictions that might potentially occur. An interesting phenomenon regarding the shift from intrinsic play to reflective play is that such shift is sometimes triggered by a potential contradiction, which has not yet happened, but might possibly happen.

Through interacting with other players, intrinsic play can switch to reflective play without being triggered by an “actual contradiction” that has happened. Social learning could occur through a player pointing out a potential contradiction to another player, engendering reflection among the players such as the following example:

Player_J says: [do we have] to wait?

Player_JF says: but [the] south is full of it [the monster they need to kill to accomplish the quest]

Player_JF says: yes

Player_J says: shall we go?

Player_J says: [to the] south

Player_JF says: [in the] south [the monsters] are stronger

Player_JF says: too much for us

Player_J says: any other better ideas

In this observation, Player_JF informed Player_J that there would be a potential contradiction in the south. As a conclusion, the community of players acts as an mediator that provides not only information needed to succeed in the game, but also contradictions which might result in learning.

5.4.4 How game tools support collective reflection. In synchronous CMC, particularly WoW with fast-paced actions especially when players are engaged in a battle, there is a challenge to facilitate reflection which is essential to social learning. The challenge lies on the overwhelming player–player interaction (on top of player-game interaction) especially with the chat session. Owing to the large number of simultaneous players, communication could be chaotic, especially, if the player has to juggle with multiple chat channels (guild chat, public, group, etc). In addition to chatting, communication manifests in forms of actions as well. Interpreting the results of the study, we found that there are some aspects of WoW tools that facilitate reflection. For instance, the text colours of the chat are different for each channel so that players can effectively ignore texts from irrelevant channels.

Although the game can be extremely fast paced at time, players can switch to the non-battle play mode without much difficulty. By this, we mean the non-hostile locations in the game which are designed to encourage socialising activities and reflective play. Whilst in the majority of offline games, a player can pause the game to reflect on a challenging situation, players of WoW are unable to do so, as the game world is real time and persistent. This problem can be solved through the design of non-hostile locations within or in the vicinity of battle areas. Players can usually move to these “safe zones” to reflect on a contradiction. Furthermore, in the case when players are “killed” and their “spirits” are transferred to the nearest graveyard, they have but to walk back to their “corpses” to resurrect in order to resume the game. During this travel the players are invincible. Unsurprisingly, it was noticed that some players utilised this travel time to co-reflect on their previous unsuccessful actions to improve their strategy.

To sum up, compared to individual reflection, reflection guided by peers evokes feedback from different perspectives. It also engenders a sense of closeness as players share similar experiences with others. Therefore, collective reflection is not only a key factor for community building, but also for social learning.

5.5 Collective contradiction between players

Interestingly, community mediation generates not only resources such as knowledge and skills for the players, but also contradictions, a main source that could lead to learning.

In a single-player game setting, contradictions occur only between the player and the game system. The game is designed to provide challenges and trigger contradictions, urging the player to develop. In a social setting however, contradictions might come from the interaction with other players; and this could provide an opportunity for individual and collective development. Consider the following:

Player_J says: invite me into [your] group
Player_X says: I [don't know] how

This simple example demonstrates that Player_J “imposed” a contradiction on Player_X by asking her to perform an action she has yet to learn. The following observation shows another example:

Player_A: wait for respawn [the re-generation of the monsters]
Player_A: this is where we came in, we need to wait for the respawn
Player_A: wont be long
Player_M: just get first hit

The players were hindering each other in a quest, causing contradictions in this example. Player_A and Player_M were doing a group quest in which they needed to kill a certain number of “Vile Fang” and “Tainted One” (two different types of monsters) in a mine. The mine was crowded with other players doing the same quest and the number of monsters was limited. Thus, players who were not in the group became an obstacle and created a contradiction for Player_A and Player_M, posing difficulties for them in completing the quest. A strategy was formed from this contradiction, which was to “*get the first hit*”. In the game, a monster “belongs” to the player (and her group) who initiates the first hit, meaning that the player (and her group) gets all experience points and “drops” (items from the monster) even if other players join in and kill the monster after the first hit. The strategy they developed was not to attack monsters which “belonged” to other groups and to get the “first hit”.

The following is another interesting example of a contradiction between two players and how such contradiction could serve as an opportunity to learn the collective rule in a group:

Player_D: roll for it [the treasure chest]
Player_J: ? [and Player_J took everything in the chest]
Player_D: [swearing]
Player_D: [you] roll for chests when in groups!!!
Player_J: sorry!!!! i [didn't] know
Player_D: in future when in a group – type /roll and it will roll for u!!

In the observation, the players found a treasure chest and both of them wanted the chest. Not knowing the rule, Player_J took the treasure and it resulted in a contradiction with Player_D.

As a summary, the emergence of collective contradictions is an opportunity for social learning. In the WoW setting, contradictions as a result of interacting with other players might urge the player to learn.

5.6 Individual goal construction

The player community not only mediates learning through collective reflection and knowledge construction, but also through co-constructing individual goals which shape the direction of individual actions. WoW has a semi-open goal structure, denoting that instead of imposing a series of goals that pre-shapes the player's actions, it provides a space consisting of a variety of unstructured goals and the possibility of constructing new goals not anticipated by the game developer.

That is to say, the structure of the goal in WoW is determined by three factors: the developer, the player and the player community. In an offline game, the design of the goal structure is decisive for ensuring natural learning. Ideally, goals are designed to pose gradually increasing challenges to the players. In games such as WoW, the player community plays an important role in structuring personal goals and, therefore, the learning direction. Due to the openness and the massiveness of the game world, it is expected that most average players need guidance with the direction of their actions. Therefore, social learning exists not only in forms of peer-teaching or knowledge construction to achieve a goal, but also collaboration to construct the goals.

In this game excerpt, we can observe the construction of an individual goal by Player_X, mediated by other players:

Player_X says: I need to up my level and gain more money
Player_E says: says: how can [you] get money in this game?
Player_X says: fight wolfs
Player_X says: you will [gain] things or money
Player_X says: if you want [to] come with me [I] will show you wolfs
Player_K says: skin them as well
Player_X says: how do [I] skin them

The initial goal of Player_X was to gain level and earn game-money by “fighting wolves”. However, player_K mentioned “skin them as well” and she became interested and tried to figure out what it was about. Here, we witness a construction of new individual goal caused by the interaction with other players.

Occasionally, goal construction is motivated by the player's observation on other players without interacting with them directly. One recurring example of this phenomenon is the acquisition of “small pets”. It was observed that the player was often intrigued by the small pet of another player and shifted her current individual goal to “get a small pet”.

The construction of goal is important for social learning in an open virtual space such as WoW as players especially, novices are unaware of the immense possibility of the game. Although in-game hints give some basic help about the game (mainly the basic control), to become a proficient player, one must learn not only the skills/knowledge to achieve game goals, but also what goals are possible. In some cases, this information can only be learn through social interactions with other players.

5.7 Shared game tools (information sharing)

It was observed that revealing players' real identities is a common practice in the game and it could be regarded as a form of social play that connects players together, enhancing community belongingness in the game. However, it is also found that revealing real identities can be a form of coordination. Under some circumstances, it is important to reveal the situation of the player in “real life” as it affects the coordination within a group. Let us consider the following:

Player_A says: al my army is on red hehe
Player_J says: maybe we kill wolves
Player_A says: okey
Player_J says: folow me
Player_A says: [I] was talking in the [telephone] the same [time]

In this example, we noticed that Player_A revealed information about her avatar status (her armours are red – breaking) which was not available to Player_J, and also her situation in real life (that she was on phone) in order to coordinate collective actions.

In another example, Player_B asked Player_G if she had completed the quest they were working on together:

Player_B says: [how] many more [Watchers do you need to kill to complete your quest]?

Player_B was helping Player_G with her quest and wanted to find out if Player_G had achieved her individual goal so that Player_B could adjust her actions to coordinate in the group accordingly.

Learning and being aware of other class abilities is crucial to coordinate actions. In the following instance, Player_J cast a magic that turned a monster in a harmless sheep because the number of the monsters was too many for the group to handle. But if another player hit the sheep, it would transform into a monster again:

Player_J says: [I]’ll use sheep spell
Player_J says: don’t hit [the] sheep

5.8 Homogeneity and heterogeneity in social learning

Playing in a massive virtual world with a large number of players engenders an enormous possibility of grouping with different players for various reasons (goals). It is found that social learning can occur in two types of groups, homogeneous and heterogeneous, each contributing to different aspects of learning. Let us consider this matter a little more closely.

5.8.1 Homogeneously motivated actions and homogeneously mediated actions. In a homogenous group, the players’ actions are either motivated towards the same goals or mediated by the same tools (usually implying that they are of the same class with the same set of abilities). Social learning can take place homogeneously, as the players sharing similar traits help each other in the game. Although homogeneously mediated actions are unusual, homogeneously motivated actions prevail in the game.

Homogeneously motivated actions (by the same goals) are probably the most common collective play in WoW. In fact, in most situations, players prefer playing towards the same goal. This was clearly observed in the process of group formation:

Player_G says: [do you want to] help me kill some watchers?
Player_D says: [what] quest is it?
Player_D says: then i do it to [to do the same quest as Player_G]
Player_G says: accept? [she shared the quest with Player_D]
Player_D says: ok yes

Generally, negotiations and agreements on a share goal are common, or perhaps essential, especially in quest-driven group formation. To facilitate this, the game is designed with appropriate tools, such as the quest sharing function. This is crucial in social learning because a shared goal allows players to learn from each other about the particular goal as well as skills/information/strategy involved in achieving the goal.

On the other hand, homogeneously mediated actions (by the same tools) in WoW in essence refer to the collective actions of players of the same class (e.g. warriors or mages), sharing similar tools like battle functions, weapons and armours, etc. With this similarity, players are more likely to improve their skills of using individual tools since they can learn about their class from each other. It is essential for the players to learn and master their individual tools before coordinating with players from different classes as group coordination depends very much on how skilled the player is in her own class ability.

Lastly, the homogeneity of players is not merely determined by the fantasy attributes of players in the virtual setting. Rather it spreads across the real world, for instance the establishment of nationality-oriented or language-oriented guilds.

5.8.2 Heterogeneously motivated actions. Whilst the significance of homogeneity of a group is not to be trivialised, social learning that happens in a heterogeneous group is equally important. In a heterogeneous group, players with different traits or motivations help each other; the most obvious example being a group consisting of players from different classes (warriors and mage), operating different tools in their play. Other examples include players with different goals or quests, players from different guilds, and even players of different nationalities. Although heterogeneously motivated actions are unusual, heterogeneously mediated actions prevail in the game.

It is more common to observe heterogeneously mediated actions, in which a group of players from different classes (thus different tools) are playing collectively. In a group with different classes of players, players learn about other players, the tools and different skills of other players. Furthermore, collective actions tend to be more coordinated in heterogeneous groups as players learn to adjust their individual tool in accordance to other players to improve coordination.

Heterogeneity in social learning also applies to the goal of the group, signifying that each player in the group works on different individual goals, instead of a same shared goal. Take a look in the following game excerpt:

```
Player_J says: I have finished all westfall quest  
Player_J says: gain exp [by helping other with quests]  
Player_A: cool  
Player_J2 says: we do defias and gnoll back and forth [doing two quests at the same time,  
since defies needs respawn, while waiting they can do another quest ]
```

In this observation, the three players had their own individual goals as Player_J had already finished all the quests while Player_J2 and Player_A were doing different quests.

Having reviewed the findings, we claim that often it is not desirable to form an entirely homogeneous or heterogeneous group. Like communities in other medium (CMC or face to face), users in a community are likely to share some similar characteristics but possess different features at the same time. Our findings have led me to conclude that the players generally form a group, which is motivated homogeneously towards the same goal, but with actions mediated heterogeneously with different tools.

Apart from these, the homogeneity aspects of a group, such as the pre-existing shared social norms and object (e.g. to create a supportive and friendly environment) are important. In this way, homogeneity creates a shared background and a common goal, bringing players closer. However, a community does not merely consist of homogenous people as sharing different skills and knowledge benefits the whole community.

6. Discussion and conclusion

Based on the findings, it is obvious that different forms of social learning can take place in WoW. The learning process is not only mediated by the game tool but also by other players in the community. To play successfully, players have to learn to deal with the game situations and also other players' situations so as to coordinate collective actions. The interaction between the players with each other results in the expansion of the players' ZPD. This occurs not only through the transfer of knowledge from one to another but also the collective construction of new knowledge within the group of players.

It is also clear from the argument in section 5.4 that reflective play is a key factor that binds players together, thus initiating the formation of player communities. Reflective play is also crucial in the learning process in which players externalise their individual reflection and share it within the community.

As aforementioned, contradictions are the main source of learning. In the context of social play, contradictions are both the result of challenges or obstacles imposed by the game tools and of those imposed by other players. In other words, the player community contributes to social learning by constructing or transferring knowledge as well as by providing sources of contradictions.

Incidentally, research in the area of learning in games has been centred on strategy development, skill improvements and in the case of collective play, player coordination. Our investigation revealed that analysing goal construction is indispensable since there is a need for players to learn about possible goals, negotiate and agree on shared goals in the group. Last but not least, it was found that community building is oriented towards achieving homogeneity in player backgrounds and goals but heterogeneity in individual tools in order to optimise social learning.

What do these findings mean in terms of game design for social learning through sociability? First of all, we have learned that computer games are not simply a primary tool that mediates the actions of achieving game objective (or in the case of learning, learning objectives). A substantial of game-based learning work has emphasised solely what learners can learn from the game contents. We believe that considering games as a secondary tool (a tool for reflection) as well as tertiary tool (a tool for expansion) will benefit game-based learning. Secondly, we have also discussed the importance of goal construction in social learning. Social interaction with other players not only improves the chance of accomplishing the game objectives, but also provides an opportunity to shape the objectives. In other words, the games give players flexibility to structure their own actions instead of prescribing a fixed path as to how the game should be played. This allows the players to learn according to their own pace, at the same time gives a sense of control to their own learning. Thirdly, designing games for learning involve more than just the development of the game tools. Although rules and division of roles cannot always be defined clearly prior to the start of the play activity, care should be taken to develop tools that would afford the negotiation and agreement of these collective tools.

Analysing WoW has given us some insights into social learning in a technological context, namely MMOGs. In this paper, we explained, through the lens of activity theory, how learning could occur through social interaction. Through intrinsic and extrinsic play, the players acquire various skills needed to accomplish the game objectives. Furthermore, the players also learn to structure their objectives through negotiation and agreement. The community of players not only mediate social learning through information transfer and knowledge co-construction, but also provides a source of contradictions, which is essential for development. These results could be used to inform game design either for social play or for social learning.

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