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# CALL Theory Applications for Online TESOL Education

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## Chapter 13

# L2 Gamers' Use of Learning and Communication Strategies in Massively Multiplayer Online Games (MMOs): An Analysis of L2 Interaction in Virtual Online Environments

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### **ABSTRACT**

*The purpose of this chapter is twofold: (1) to review the benefits of digital game-based language learning (DGBLL), specifically massively multiplayer online games (MMOs), and (2) to present research investigating the design elements of MMOs that can be beneficial for second language acquisition (SLA). Data were gathered from volunteer ESL learners playing the MMO Guild Wars 2 over the course of four weeks. The findings from the research indicate that MMOs with design elements like Guild Wars 2 are beneficial to SLA primarily because they provide opportunities for interaction in the target language through participation in collaborative problem-solving gaming tasks. The results of the research presented in this chapter show (1) that the requirements of input and output for successful gaming allow for a type of interaction in which the focus on language form leads to modified-output, (2) that players have opportunities to negotiate input as a means of completing in-game tasks, and (3) that in-game tasks resemble well-designed classroom instructional tasks believed to be beneficial for SLA.*

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## INTRODUCTION

Digital game-based language learning (DGBLL) has continued to receive much attention in the field of computer-assisted language learning (CALL) over the past several years. This attention appears to correlate with the immense growth of the digital game industry. In 2019 alone, two billion gamers spent over 150 billion USD (Wijman, 2019), and in order to reach a global audience, game developers often release games in several languages. The option for games to be played in multiple languages has provided opportunities for meaningful target-language interaction and access to rich sources of second language (L2) input for learners who choose to play games (see Reinhardt, 2019). In this chapter, the term *L2* is meant to indicate any language other than a learner's first language and includes foreign language contexts as well. The term *L2 gamers* (Reinhardt, 2019) has been used to refer to individuals who engage in gaming specifically to develop an L2, and *L2 gaming* refers to the process itself. In addition to online games that connect L2 learners to native speaker communities around the world, there are offline single player games that can provide meaningful L2 interaction. Games like *Fallout 4* and *Skyrim*, both of which can be played in nine different languages, offer vast virtual worlds with hundreds of realistic automated characters that are voiced by real-world professional actors and actresses.

Support for second language acquisition (SLA) through L2 gaming has been found to be generally favorable in the current DGBLL literature. In a meta-analysis of DGBLL, Dixon, Dixon, and Jordan (in review) aggregated the effects reported in both published (e.g., journal articles) and unpublished (e.g., theses and dissertations) research. They found that, for between-group designs, DGBLL had a small to medium effect (Cohen's  $d = 0.50$ ) and a medium effect for within-group designs ( $d = 0.95$ ). These effect sizes were interpreted based on Plonsky and Oswald's (2014) effect size benchmarks in L2 research. Dixon et al. also found that games designed for education and those designed for entertainment both had positive effects on SLA. Further, Dixon et al. found that educational games were less effective than entertainment games. That is, entertainment games had larger effect sizes than games designed specifically for education. Researchers have hypothesized that entertainment games are likely more conducive for L2 development because educational games can lack authenticity and meaningful L2 engagement (Thorne, Fischer, & Lu, 2012; Reinhardt, 2019). Given these findings, DGBLL research can gain insight and direction through investigations into the L2 learning potential of massively multiplayer online games (MMOs) designed for entertainment, which was the aim of the research presented in this chapter.

MMOs are played online with hundreds of gamers around the world participating in massive shared virtual spaces. In a scoping review of L2 research on MMOs, Jabbari and Eslami (2019) reported that this genre of games can provide L2 learners with lower anxiety, higher motivation, increased willingness to communicate and risk taking in an L2, among other benefits. In an earlier qualitative synthesis of MMO L2 research, Peterson (2016) reported that DGBLL researchers often frame their studies around cognitive and sociocultural theories and that MMOs can allow L2 learners to collaborate, socialize, and co-construct meaning in an L2, framing L2 development and use around the sociocultural interpretation of Vygotsky's (1978) zones of proximal development (p. 1184). While such findings do appear to have created some warranted excitement for L2 learning through MMOs, issues around the current literature's generalizability have been raised. To this point, Reinhardt (2020) warns of the limited generalizability that the current DGBLL research may be facing:

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*Many L2TL (second and foreign language teaching and learning) professionals, educators, administrators, and researchers alike, may not have adequate knowledge about how games are designed – in particular, how game mechanics, titles, and genres differ and relate to one another ... especially if they have little situated experience playing games themselves. The claim may therefore be taken at face value, and the danger of an unqualified claim is that it does not explain exactly what it is about MMOs that makes them effective, and therefore what might be replicated in educational games or the design of gameful L2 learning environments (p. 1).*

Reinhardt argues convincingly that not all MMOs are created equal in terms of their affordances to SLA as games and their associated genres are constantly changing and evolving. He suggests that rather than taking a genre approach to DGBLL, researchers should evaluate the individual design elements or “game mechanics” (p. 5) that make up gameplay in a particular game. Reinhardt notes that game mechanics are more universal than a genre and include the many components that ultimately decide what players can or cannot do in a game. Mechanics determine how a game is played and even the degree and manner in which language interaction occurs in a game. For example, Dixon (in review) quantitatively measured the linguistic environments of language in three different game mechanics employed in two different games: *Fallout 4* and *Skyrim*. Using corpus linguistics tools and methods, he found that individual game mechanics formed distinct linguistic environments across games, while the games themselves were not linguistically distinct from one another. For example, the linguistic environment of the language from quest objectives was distinct from the environment of the character dialogue. However, the two games taken as a whole were found to have indistinguishable linguistic environments when measured on the frequency of five linguistic feature measures. These features consisted of two lexical complexity measures—richness and sophistication—and three other linguistic ratio measures: the frequency of pronouns, mental verbs, and activity verbs (see Biber, 2006) to the total lemma tokens in each text. Dixon’s work provides empirical support for Reinhardt’s call for a design-informed approach to DGBLL.

Although research measuring the effects of individual mechanics on SLA is beginning to gain interest in DGBLL, MMOs are more often associated with the high degree of L2 interaction that can take place during gameplay. The research reviewed in this chapter suggests that the benefits cannot be attributed to interaction alone but are the result of opportunities to engage in cooperative problem-solving tasks, and these tasks share many characteristics with effective L2 learning tasks that can provide opportunities for negotiation of meaning (Pica, 1994). Furthermore, the MMO used in this study, *Guild Wars 2*, provided opportunities for L2 gamers to produce large amounts of output as they work cooperatively and communicate to complete in-game tasks. Output produced by one player is a meaningful source of contextual L2 input for other players, thereby, eliciting connected interaction between players. Participants’ implicit focus on form to achieve understanding and effective communication leads to modified-output (Swain, 2000; Swain & Lapkin, 1995; Varonis & Gass, 1985). Furthermore, players have opportunities to negotiate two types of input: (1) player-produced input and (2) environmental input (i.e., input that comes from interacting in the game environment rather than with another player) as a means to progress and strengthen the players’ in-game characters. Managing these two types of input allows L2 gamers to take on more powerful challenges, much like a well-scaffolded L2 classroom. Findings suggest that the virtual world of MMOs can be a contextually rich social environment for L2 gamers.

## **BACKGROUND**

Over the past several years, researchers have been investigating the benefits that online gaming offers L2 learners. Findings suggest that online gaming provides opportunities for language learners to use the L2 in meaningful (i.e., important and useful for the learner) and collaborative ways. Sylvén and Sundqvist (2012) argue that MMOs share many instructional features with methodologies that promote content and language integrations, for example, Content and Language Integrated Learning (CLIL) (e.g., Coyle, Hood, & Marsch, 2010) and Content-based Instruction (CBI) (e.g., Snow & Brinton, 2017) by immersing players in a content-rich environment that fosters authentic language use especially in terms of “input, output, and interaction” (p. 308). Thorne (2008) also found support for the claim that MMOs share similarities to features of an L2 classroom and observed that the in-game tasks allow for “negotiation of meaning, repair sequences, explicit corrective feedback, and requests for assistance” (p. 322).

Quantitative studies measuring MMOs' effects on L2 learning outcomes have shown to have a small to medium positive effect with an aggregated Cohen's *d* value of 0.59 (Dixon et al., in review). The aggregated data from the studies generally measured vocabulary gains from participants playing an MMO. Results indicated a range of benefits for improving L2 vocabulary, and include a statistically significant effect on incidental vocabulary learning (Yamazaki, 2018) and that vocabulary retention can be better than L2 learners using other multimedia learning tools (Hung, 2011). However, there is a need for more quantitative studies measuring L2 learning outcomes using MMOs as much of the research tends to be qualitative, focusing on learner perceptions and researcher observations. To this point, Plonsky and Ziegler (2016) note that DGBLL in general would benefit from “more primary research. . . to better understand the potential contributions of game-based interaction on L2 development” (p. 25).

Qualitative studies have also suggested that MMOs hold much potential for SLA. For example, Scholz and Schulze (2017) analyzed data from L2 learners playing *World of Warcraft*. The study sought to understand how participants' progression in the game interacted with SLA. The researchers argue that SLA occurred when they “detected evidence of a language learner having observed an unfamiliar linguistic construction while playing the game and then being able to produce it in a non-gaming context” (p. 106). They posit that there is ample evidence to demonstrate that these new linguistic constructions stem from gameplay; however, they also caution that these data are not definitive. Nevertheless, they are confident that the language to which participants were exposed in the game is “indeed transferable to non-gaming contexts” (p. 112). However, more research is needed before any conclusive claims can be made.

Other research in DGBLL that focuses on the use of MMOs has found that the social nature of these games offers opportunities not only for experimenting with an L2 but also for improving long-term retention of L2 vocabulary (Franciosi, Yagi, Tomoshige, & Ye, 2016) and developing communicative competence (Jabbari & Eslami, 2019). Peterson (2011) argued that benefits of in-game interaction “include access to an engaging social context, enjoyment, exposure to new vocabulary, reduced anxiety, and valuable opportunities to practice using a foreign language” (p. 56). Peterson points out that these types of interaction and communication strategies observed in MMO gameplay are similar to features of productive and engaging language tasks often found in well-designed L2 classrooms.

MMOs can also benefit L2 learners because they allow for anonymity and real-time interaction with large native speaker populations, which would typically not be possible in traditional L2 classrooms. L2 speakers can be intimidated by interaction with native speakers as the complexity of face-to-face social relationships and interactions can hinder learners' willingness to engage in the target language in a context in which they feel comfortable (Peirce, 1995). The anonymity in online gaming has shown

to increase significantly learners' willingness to communicate (Reinders & Wattana, 2011), which may be a result of a low affective filter (Krashen, 1982), thereby, providing a more relaxed environment for language experimentation. Furthermore, players are able to complete in-game tasks in real time with well-defined rules and goals, which provide important scaffolding for learners. This scaffolding is important for learners as they construct meaning and solve problems (Blake, 2011). As problems are solved, self-confidence increases, as well as the motivation to learn (Gardner, 1985). This type of learning environment is often unavailable in traditional L2 classrooms or in traditional computer language learning software applications.

## **MAIN FOCUS OF THE CHAPTER**

### **Research Questions**

A number of studies have investigated the potential of MMOs as language learning tools and have found positive results as evidenced by the literature reviewed in the previous section. Researchers laud participation in MMOs as a low-stress activity that L2 learners can use to engage in the target language in an input-rich and authentic language use environment. Additional research is still needed on exactly how and why MMOs are beneficial (or are not beneficial) and what the game mechanics and design elements are that foster SLA. Although many researchers cite authentic language use as a major benefit for L2 learners playing MMOs, Scholz and Schulze (2017) point out that in most studies the participants are in the same location as, and being watched by, the researchers. They argue that this constant surveillance “potentially detracts from the authentic and common experience of gameplay at the player’s leisure and at a preferred location, while at the same time limits the amount of time a player could potentially want to play” (p. 101), a limitation also noted by Peterson (2012). The study in this chapter seeks to address this limitation by allowing participants to play the game at their desired location, time, and duration. As part of the University’s requirements for the protection of human subjects, the study was reviewed and approved by the IRB and identified as a minimal risk study with a waiver of documentation of informed consent.

The purpose of the current study was to investigate the degree to which MMOs can benefit SLA by identifying the types of learning strategies that L2 gamers used while engaged in gameplay and calculating the frequency of their occurrence. To this end, the current study sought to answer the following research questions (RQs):

- RQ 1. What types of learning strategies are used by learners of English as they play *Guild Wars 2*?
- RQ 2. How many different types of learning strategies are used?
- RQ 3. Does *Guild Wars 2* provide opportunities for English learners to negotiate input?
- RQ 4. What specific strategies do English learners employ in negotiating input?

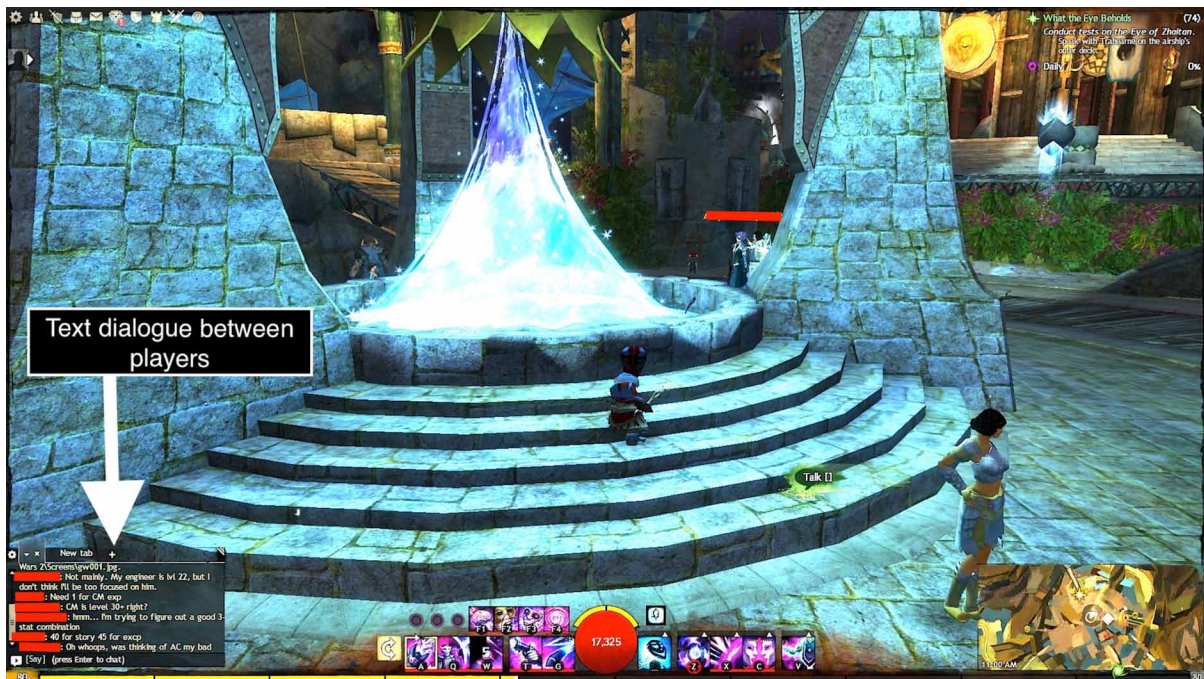
### **Guild Wars 2**

*Guild Wars 2*, the MMO used in this study, shares many of the mechanics and design elements found in many modern MMOs. For example, players create a character by choosing from many customizable options that determine the character’s appearance, abilities, and profession, among other features. These

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choices affect how players progress through the game and what roles they will play when interacting with others in the online game world. In the game world, all players are visually represented by their created character or avatar. The player can see and interact with others who are also playing the game at the same time. All interaction occurs in real time rather than, for example, sending a message like an email and waiting for a response. At any given time, there can be hundreds of real players with whom players can interact and communicate. Although communication occurred through in-game text messaging in the current study, voice chat is becoming much more common in recent developments of MMOs. The written text messages in *Guild Wars 2* can be sent to a specific player, a group of players, or anyone in close proximity in the game world (see Figure 1). Players often form groups and cooperate to accomplish tasks. These tasks grant rewards and provide experience points that make players characters stronger, allowing them to progress further in the game. Players are able to progress quicker in collaborative groups because their strength is greater together than it would be playing alone. Stronger groups of players can take on more difficult and rewarding tasks. Thus, there is a design incentive that is built into the game which encourages socialization and community building.

Figure 1. Text dialogue between players



## METHODOLOGY

### Participants

The three participants in the current study were all undergraduate students in their first or second year of study at a university in the western United States. They were all L2 speakers of English and were

enrolled in academic English as a second language (ESL) classes during the term in which data were collected. They were all native Mandarin speakers in their early 20s. A copy of the game *Guild Wars 2* was given to each participant at no cost. Participants were also told that they could keep the game after the study, and they could drop out of the study at any time for any reason. These steps were taken to increase the likelihood that participation in the study would be motivated solely by interest in the game. The participants were a sample of opportunity. The three participants who volunteered for the study had indicated that they regularly played MMOs and had extensive experience with digital games in general. In fact, their extensive prior experience with games may have made them unique among the population of ESL learners.

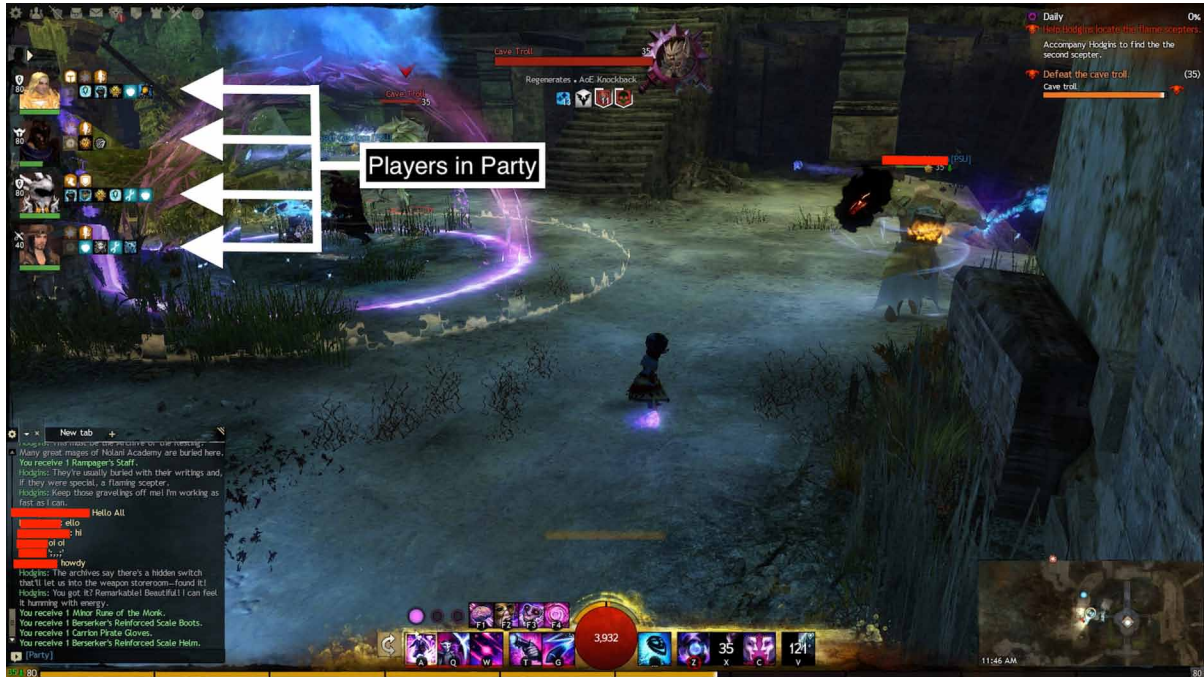
## **Data Collection**

The three English learners agreed to play *Guild Wars 2* together at the same time and record their computer screens while doing so. All three students said they had experience playing games in the MMO genre, but none had ever played *Guild Wars 2*. They were asked not to play the game unless all other players were able to do so, and they should play the game in separate real-world locations. Physical distance required the use of the in-game text messaging system so that language interactions could be recorded. Participants chose to play the game in their campus dorms or apartments. None of the participants lived in the same dorm or apartment.

Gaming sessions were scheduled in advance to ensure that all participants could commit to the schedule. There was no set time limit on how long a single gaming session could last; however, they were told that they must stop playing if any one player could no longer continue to play. They were required to form an in-game party so that they could always see all other party members on their in-game map (see Figure 2). The in-game map shows where other players are located and allows players to easily use the in-game chat function to communicate with one another. The participants were told that they should only use English, which was an L2 for all three participants, while playing the game and communicating with one another. They were asked to complete the in-game tasks together as a group and stay in close proximity to one another in the game world. There was a total of five recorded gaming sessions over the course of about a month. The sessions ranged from about 1.5 to 2.5 hours, totaling 12.5 hours over the five sessions. The participants themselves determined the length of each individual session.

Data from the gaming sessions were gathered using a screen-recording desktop application. Participants recorded their own screens, and it was their responsibility to run the recording program before each gaming session. By recording the participants' gaming sessions, each participant's chat messages could be analyzed in the context in which they were written. Audio was not recorded, only video. After each session, data were transferred to a hard drive for analysis. A training session took place before the recorded sessions began in order to familiarize participants with the basic features and mechanics of the game. Data were not collected during the training session. At times, some participants forgot to record their computer screens; however, at least one participant remembered to record for each of the sessions. As long as one participant remembered to record, all text messages sent to and from all participants could be seen because all texts were displayed on all players' screens. Therefore, there was no loss of data even when someone forgot to record.

Figure 2. Players in a party



## Data Analysis

Participants' in-game interactions during *Guild Wars 2* were analyzed and placed into categories associated with two types of strategies—learning and communication. The categories used for analyzing the learning strategies were based on Chamot and O'Malley (1992) and their framework of metacognitive, cognitive, and socio-affective learning strategies. For analyzing the communication strategies, a framework proposed by Lee (2001) was used, which included categories of interaction such as requesting information, checking information, use of the first language (L1), self-correction, and peer correction. Both types of strategies were adapted to fit a gaming context. Additionally, participants' in-game texts that were produced as a response to a previous text were tallied so that the degree of connected interaction that occurred could be measured. The quantitative data were used to understand the players' interactions and the potential influence the interactions may have had on SLA.

To answer RQs 1 and 2 (i.e., What types of learning strategies are used while learners of English play *Guild Wars 2*? How many different types of learning strategies are used?), it was necessary to identify the specific learning strategies that participants used. Chamot and O'Malley's (1992) framework for conceptualizing learning strategies included three different types of learning strategies: metacognitive, cognitive, and socio-affective. In the current research, the focus was on socio-affective learning strategies because they could easily be observed through the recorded videos of the participants' gameplay. Cognitive strategies were ultimately eliminated because "the learner interacts with the material to be learned by manipulating it mentally" (p. 51), and thus, is unobservable.

Socio-affective strategies were also adapted to fit an online gaming context. In order to allow for more in-depth analysis of interaction and to understand better what the participants were doing in terms

of language use and interaction, subcategories were created. For example, in the framework proposed by Chamot and O'Malley (1992), the category of "cooperation" is defined as "working together with peers to solve a problem, pool information, check a learning task, model a language activity, or get feedback on oral or written performance" (p. 56). Most of the interaction in *Guild Wars 2* could easily fit into this broad category of cooperation because the main purpose of the game is to work cooperatively with other players to complete tasks. To better understand the nature of the cooperation that took place in the game and the way in which the strategies that were being used might further SLA; therefore, the concept of cooperation was broken down into five subcategories: (1) pooling information, (2) modeling, (3) giving commands, (4) making statements to others, and (5) making suggestions. To keep data analysis consistent in the study, each individual text was only placed in a single category. For example, a single text such as "look at the map" was only counted as an instance of pooling information and not as a command. Each time one of the strategies occurred in the data, the researchers placed a tally in the appropriate category and the time code was recorded.

**Pooling information:** Whenever a participant produced a text that supplied information directed toward the completion of a game task, the text was tallied as an instance of pooling information. In *Guild Wars 2*, players are incentivized to share task information because cooperation allows a group to move more quickly through tasks and thus receive the task's rewards. Unlike other popular online games, many MMOs focus on cooperation rather than competition.

In the interaction shown in Example 1, the three participants are trying to determine which task they should try next. This conversation occurred during the first gaming session. The bolded texts were tallied as instances of pooling information. The names are pseudonyms for the participants' in-game avatars. The texts in the examples are shown exactly as the participants themselves wrote them. For this reason, there are spelling, grammar, and punctuation errors that occur in the examples. It should be noted that the name Mary is a pseudonym chosen by one of the male participants who chooses to refer to himself with the pronoun *he* throughout the game.

### **Example 1**

Pine: Where should we go now

Thief: Let me think

Pine: **Look at the map** (Pine circles an area on the game's map.)

Thief: I saw ok go

Mary: **We need find the bear trop** (misspelled "troop")

Pine: **Look at the blue point**

In this interaction Pine asks where they should go and then answers his own question by telling the others to look at their maps. Players can circle areas on the map by holding down a button and using their mouse. These actions are necessary so that the circles can be seen by all other players in the party. Thus, the text "look at the map," followed by the visual of Pine drawing on the map, was counted as an instance of pooling information. This reason for this categorization is because Pine is giving information related to completing, or in this case, starting a new task. Thief then confirms that he saw the drawing. Both Mary's text and Pine's texts were also counted as instances of pooling information because they were attempts to share information related to the next task.

**Command:** A text was counted as an instance of command when a player directly told another player to take an action. Commands were often used to tell players to go to a specific location or tell a player

to wait. In the text above, “look at the map” was not counted as a command because the purpose of the text was to share information with the others by circling something on the map. Therefore, a command is telling another party member to take an action that is not clearly related to the task at hand. Example 2 provides an instance of a command.

**Example 2**

Thief: Follow me

Pine: Got it

Mary: Look map (Mary circles an area on the game’s map)

Thief: **Come here**

Mary: **Wait**

Mary: We need finish the work

In the conversation above, two of the six texts were counted as instances of a command, “Come here” and “wait.” Thief is telling Mary to come to his location, to which Mary responds with another command, “wait.” Both texts are telling the players to take, or not take, some sort of action. Again, “look map” was not counted as a command because the purpose of that text was to pool information by asking other players to see the task information he had marked on the map. “Follow me” was not counted because this was counted as an instance of modeling as described below. Observing the text along with the video of the screen recording, it was clear that “come here” and “wait” were not related to the current task and, therefore, counted as a command rather than an instance of pooling information.

**Statement:** A text was counted as a statement when a player’s text was very general or unrelated to a specific task or even the game at all. A few examples from the study are when a player said, “This city is big,” “I am so hunger,” or “My connection is not good.” Although statements are not necessarily a form of cooperation, it was included so that texts that were not exactly game-related could be quantified.

**Suggestion:** When a player suggests a course of action or implies that another player do something, it was counted as a suggestion. Commands and suggestions are similar, but a suggestion is less direct and includes words such as “should,” “maybe,” or “I think we need to.”

**Modeling:** Texts were counted in the category of modeling when the purpose of the text appeared to tell other players to follow the text writer’s example. Often players would ask one another what they should do next by texting “follow me” or “talk to this person here.” In this sense, they were modeling or showing the other players exactly what they should do in order to progress. The other players did not always follow the example of the writer, but it was still counted as an instance of modeling. Modeling is similar to pooling information, but it had an additional “watch me do this” element to it that can be observed in the context that the text was produced. The recorded screen data provided the additional contextual information that was needed to differentiate pooling information from modeling.

Although modeling indicates that a participant is demonstrating a solution to a problem through action and not necessarily through language, it may seem questionable for it to be deemed a language learning strategy. However, the fact that modeling is initiated through language (e.g., “follow me”) makes it both strategically and linguistically interesting because language is being used as a tool for solving a problem.

To answer RQs 3 and 4 (i.e., Does *Guild Wars 2* provide opportunities for English learners to negotiate input? What specific strategies do English learners employ in negotiating input?), the ways in which learners negotiated meaning during gaming sessions were analyzed by tallying the number and type of communication strategies that were employed. The tally of communication strategies, similar to

the learning strategies tally discussed previously, was based on the participant-produced texts and the context in which they were written.

In the context of *Guild Wars 2*, there are two types of input that can lead to negotiation. The first type is the text messages and visual cues that are received as players communicate during gameplay with one another or other players not in their party. The other source of input is the environment of the game. This type of input can be a task, a player's inventory and abilities, non-player characters (NPCs), enemies, the map, or anything else the players interact with while playing the game. Environmental input is the game's world, and it can be visual, aural, and textual. For the purposes of this study, the communication strategies for both environmental input and player input were analyzed; however, they are not separated in reporting the data because negotiation can only occur between and among humans, although it can originate from either human/player input or from the game environment.

The framework used for analyzing the communication strategies was adapted from Lee (2001): requesting information, checking information, using the L1, self-correction, and peer-correction. Checking information was further broken down into three subcategories, which are clarification checks, confirmation checks, and comprehension checks.

**Requesting Information:** Texts were placed into the communication strategy category of requesting information when a participant asked another player for information. This could be a request for information about a player, such as their location or inventory, as well as a request about the game environment, such as how to complete a task or where they should go next.

**Checking information:** Checking information occurred when a player indicated that he did not fully understand a previous text from another player or a writer of a text wanted to confirm that an earlier text was understood. A player's text was counted as a clarification check when a player wrote a text and another player responded with a question asking for more information. Clarification checks were initiated by the receiver of a text and directed to the player who wrote the first message. Thus, players were negotiating meaning as they worked out what the writers of the initial messages were trying to communicate to the other players. A text was counted as a comprehension check when a player wrote two texts, the second of which was to make sure that the receiver of the text understood the initial text. Confirmation checks occurred when a player wrote a text and another player responded to that text by producing a text showing that he understood the initial message.

**Using the L1:** When a player typed a message in Chinese (Note: all three were native speakers of Mandarin), the text was categorized as using the L1. The participants were asked to only use English when playing the game, and they followed this request almost perfectly. During the five gaming sessions, only seven of 886 texts showed evidence of L1 use.

**Self-correction:** If a participant typed a message that he felt contained a spelling or grammar error, and, in a subsequent message, corrected himself, this interaction was categorized as a self-correction; for example, when one of the players told the other two players that he was going to take a break and go outside and smoke a cigarette. He first typed, "I am somke." Seconds later he typed another message and wrote "smoke" to correct his earlier message and then added another correction typing, "smoking." These messages would count as two self-corrections.

**Peer-correction:** If one participant typed a message correcting the grammar or spelling of another participant's earlier text, this was categorized as a peer-correction.

To better understand the use of learning and communication strategies in the interaction that took place among participants, the number of times that a text was part of a connected interaction was also

calculated. In other words, each time a player responded, answered, or reacted to another player's message the interaction was recorded and categorized as an instance of connected interaction.

## **RESULTS AND DISCUSSION**

An analysis of the language used by the three participants during the 12 hours of gaming provided support for SLA in three general areas: (1) output, input, and connected interaction, (2) form-focused feedback and modified output, and (3) negotiation of meaning.

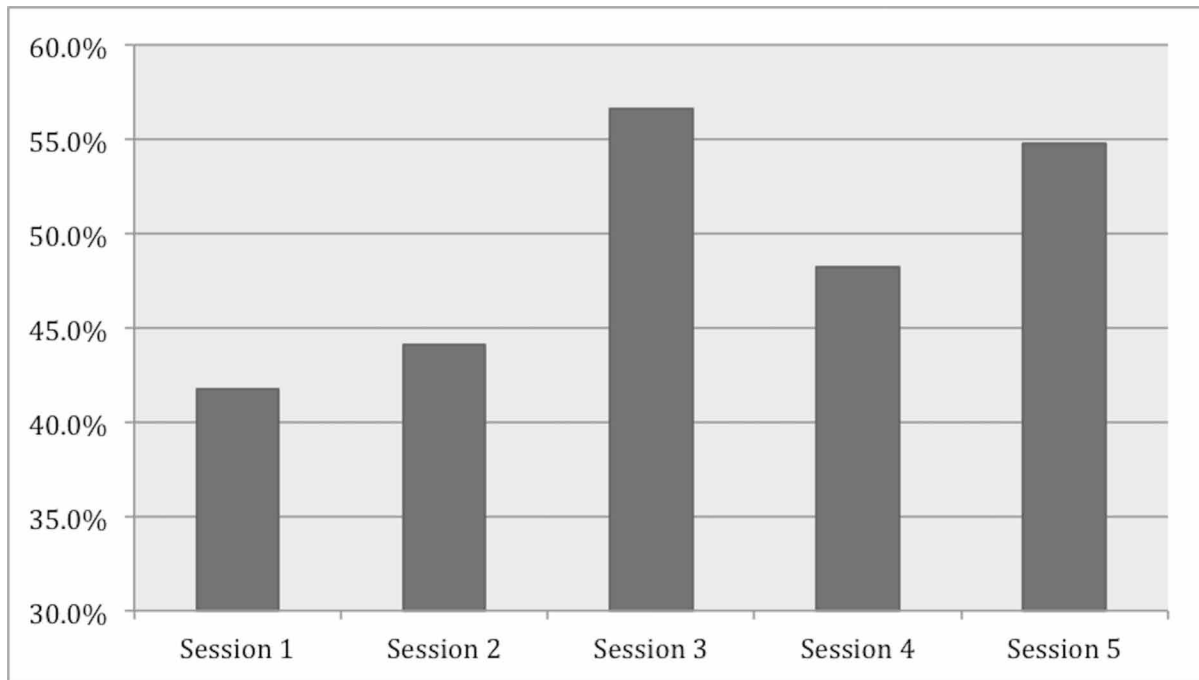
### **Output, Input, and Connected Interaction**

As early as the 1980s, researchers argued that output is essential to the process of SLA (see Swain, 1985). Given the importance of L2 output, the massive amount of texts produced by the participants is a strong indicator that MMOs with mechanics similar to *Guild Wars 2* have great potential as effective tools for SLA. Output production in the form of text messages while playing *Guild Wars 2* was much higher than what might be typically expected in a traditional language classroom. For example, for every ninety minutes of gameplay, participants produced on average around 150 text messages over the course of the study. It is difficult to imagine a 90-minute ESL class in which students would produce as much target language output. It was interesting that, even though all three participants shared the same native language, 879 of the 886 texts produced were written in English. In an L2 classroom, it is not unusual to see students resort to their first language (L1) if a majority of students shares the same native language even when learners are asked to use the target language. It is important to note that participation in MMOs is meant to supplement, not replace, classroom language learning, so L2 gamers can also benefit from interaction that occurs in the context of the classroom.

The data that were collected in this study provide empirical evidence that the participants were not only producing large amounts of output in English, but they were also reading and reacting to one another's texts. Input from fellow participants often elicited additional output from other participants. Half of all texts written during the study were related to a previous message written by another player. Interestingly, the number of connected interactions increased over time, and Sessions 3, 4, and 5 all saw higher rates of connected interaction than the first two sessions (see Figure 3). Session 3 had the highest rate. This result is discussed in the interpretations and implications sections in this chapter.

Output in the form of sharing task information, knowledge, or ideas during game sessions was categorized as the learning strategy pooling information. Pooling information had the highest percentage of total texts at 23.4%, as compared to the next highest learning strategy, giving a command, at 9%. Chamot and O'Malley (1992) argue that cooperation or pooling information has positive effects on learners' attitudes. The participants in this study seemed very interested in working cooperatively as they often pooled information to complete in-game tasks. They likely saw their combined knowledge as the best path for achieving success, which likely had a positive effect on their learning. Experiences with in-game tasks reinforced the idea that they could accomplish more by working together than they could alone as individuals. Not only are enemies in the game defeated more easily through a group effort, but one player may notice something key to completing a task that the others did not notice, thereby contributing to the groups' potential for successful task completion. This cooperation required the participants

Figure 3. Connected interaction



to produce output in real time as in-game challenges were presented to them. The participants appeared to be pushed in terms of their current L2 abilities because coordination and cooperation required that players use language with which they did not have much experience before playing *Guild Wars 2*. In terms of SLA, the participants' potential for learning as a group was greater because they needed to give attention to one another's output, which likely included grammar and vocabulary that was previously unfamiliar to one or more of them.

An example from the data demonstrates the production of output through the pooling of information. In *Guild Wars 2*, the tasks that players complete can appear in several different forms. The tasks are marked on a player's map either by a heart-shaped icon or a green star icon. The heart-shaped icons indicate tasks that are specific to an area. Green star icons are quests that are particular to the story of a specific player's character, often based on the race of the character that players choose at the beginning of the game (see Figure 4). The participants' avatars were all the same race and, thus, had the same green star tasks for the first two sessions. This means that they could work together on their green star tasks as a group. The heart-shaped tasks could also be done as a group as long as the players were in the same general area.

The conversation in Example 3, which occurred during Session 2, provides an example of pooling information. One of the participants, Thief, had just finished one of the heart-shaped tasks and wanted to know if his fellow players had finished as well. Another player, Pine, did not know how to check if he had successfully completed the task. Therefore, Thief explained to Pine where he could find the information. Later, Pine told the others where they should go next and why. Italicized texts were categorized as instances of pooling information.

**Example 3**

1. Thief: Do you guys finish that?
2. Thief: Finish?
3. Pine: May be
4. Pine: No sure
5. Thief: *You can check heart-shaped is full?*
6. Thief: *Look map* (Thief circles the heart on the map)
7. Pine: Yes
8. Pine: So let's go another palce. (Pine misspelled *place*.)

(Some texts omitted.)

9. Pine: See the green point?
10. Pine: *That is the main task*
11. Pine: We should complete that on
12. Pine: One
13. Thief: We should come here
14. Thief: Finish different work

In Lines 5 and 6, Thief explains that Pine is able to see if he had already completed a task by looking at the heart icon on the map. Thief's output becomes input for Pine, to which he responds by producing additional output, suggesting that they go to a different location as seen in Line 8. Later, Pine shares information he has that is important to making progress in the game. He explains to his companions the meaning of the green icon and suggests they go to the icon's location. Thief responds to Pine's text

Figure 4. *Quest objectives*



by suggesting that they should instead attempt a completely different task. Participants appear to be negotiating the environmental input from the game as they pool information together, requiring connected interaction and a high degree of L2 output as they collaboratively debate the best way forward in accomplishing their next goal.

### **Form-Focused Feedback and Modified Output**

Pica et al. (1996) argue that L2 learning through social interaction has three requirements: (1) comprehensible input, (2) feedback that is focused on form, and (3) modification of output. For interaction to lead to acquisition, the L2 learners in this study needed to receive feedback from their interlocutors (i.e., the other participants) and produce modified output. This type of L2 interaction “provides a forum for learners to readily detect a discrepancy between their learner language and the target language and that an awareness of the mismatch serves the function of triggering a modification of existing second language knowledge” (Gass & Varonis, 1994, p. 299). The participants in this study appeared to notice such discrepancies based on the input received during gameplay. This input, whether from other players or the environment of the game, worked as instances of form-focused feedback. This feedback led participants to make modifications to their output, correcting previous errors made in their L2. In other words, the connected social interaction acted as a type of form-focused feedback that could model correct L2 usage. If the participants noticed discrepancies from their own interlanguage, they could modify future output based on what they previously noticed from either another player or language encountered in the environment of the game.

Social interaction that facilitates feedback and modified output does not require a native speaker (Pica et al., 1996). Pica et al. found that L2 learners interacting with other L2 learners could meet the three needs discussed above. The study demonstrated that, despite the absence of a native speaker, L2 learners still modified their L2 output based on feedback from other L2 learners. In this study, participants gave form-focused feedback, albeit often implicitly, to one another, and this feedback appears to have led participants to modify their output. An example of participants modifying their output is seen in Example 4 and is discussed below.

In Session 3, the green-star task of one of the participants was different than the other two participants' green-star tasks. At first, they seemed not to realize that one of their peer's tasks was not the same as their own. By asking questions and pooling information, they eventually realized this discrepancy in tasks. In Example 4, the words *main* and *mainly* are italicized to highlight the discussion of modified input and form-focused feedback.

#### **Example 4**

1. Mary: We need to do the *mainly* work
2. Mary: Follow the green line
3. Thief: I don't know how to do this

(Some texts omitted.)

4. Mary: Wait
5. Mary: What is your *mainly* task?
6. Thief: Did you see daily task?
7. Pine: The green one is the *main* task

(Some texts omitted)

8. Mary: U need finish the *mainly* task  
(Some texts omitted.)  
9. Thief: I found my *mainly* task.  
10. Thief: But you guys cannot help me... maybe  
(Some texts omitted.)  
11. Mary: I think we have different *main* task  
12. Thief: I know  
(Several minutes later)  
13. Pine: So we have to figure what to do later  
14. Thief: finish  
15. Mary: I think our *main* task is different  
16. Thief: Yes  
17. Thief: Agree  
(The following text occurred at the beginning of Session 4.)  
18. Thief: What's the *main* task?

In Example 4, both Mary and Thief refer to the green star task as the *mainly* task as seen in Lines 1, 5, 8, and 9. Pine is the only one who uses the correct form of the word in Line 7, using *main* instead of *mainly*. Perhaps Pine knew that *mainly* was not the correct form in this situation and in Line 15 Pine writes, "The green one is the main task." Mary must have noticed that Pine used *main* instead of *mainly* because later, in Lines 11 and 15 he corrects his previous L2 errors writing that "I think our main task is different." Not only does Mary correct himself, but Thief does as well. In Session 4, Thief also modifies previous errors and wrote "What's the main task?" In fact, in all the following game sessions all three participants used *main task* instead of *mainly task* when referring to the green star tasks. This is one of several instances in which participants modified output based on implicit form-focused feedback. Although it is impossible to know for certain, it is likely that the reason for the erroneous use of *mainly* stemmed from the so-called *daily tasks* that are presented to players in *Guild Wars 2*. Perhaps Mary and Thief saw the *-ly* ending in *daily tasks* and assumed that it would apply to the adjective *main* in the phrase *main task*.

Based on the results of this study, it is argued that MMOs with mechanics similar to *Guild Wars 2* can allow for implicit form-focused feedback that can result in modified-output. An analysis of participants' interaction while playing *Guild Wars 2* met the three needs to make interaction beneficial to language acquisition: The participants received comprehensible input, they received implicit form-focused feedback on their output, and they then modified their output according to the feedback received. This finding aligns with other studies that suggest environmental input and player input can act as forms of implicit feedback for L2 gamers (see Cornillie, 2017).

## **Negotiation of Meaning**

The results from the data collected in this study indicate that the two most common communication strategies employed by participants were requesting information and checking information, which accounted for 17.2% and 7.1% of the total texts produced, respectively. The other communication strategies, using the L1, self-correction, and peer-correction, made up less than 2% of the total texts produced during the 12 hours of recorded data. Participants rarely used their native language (i.e., Mandarin) as a strategy

although this may be attributable to the fact that they were asked to use only English while playing the game. As for self- and peer corrections, participants were simply told to play the game together and to use English. Therefore, the low occurrence of peer-correction may be because they did not notice the errors made, saw no reason to comment on the errors they did notice, avoided peer-correction as it was perceived as face-threatening (Firth & Wagner, 2007). Although players did modify the form of their output as discussed above, the modifications were not counted as corrections because they were implicit and embedded in the communication. Texts were counted as corrections only when one of the players immediately self-corrected or explicitly corrected a peer.

Requesting information and checking information are two communication strategies that the participants used to negotiate both environmental input and player-produced input. Researchers have stressed the importance of negotiation of meaning as an important aspect of SLA (Long, 1996; Swain, 1985; Varonis & Gass, 1985). The L2 learners in this study were exposed to environmental input that seemed above their level of English proficiency, but it is impossible to know from the recorded data exactly what they did and did not understand. At the same time, it was clear that they were putting in a very strong effort to make sense of the virtual world. At times, participants would have difficulties in understanding exactly what another player was asking or trying to tell them. From these instances, players would engage in negotiation of meaning in order to reach an understanding of the intended messages.

Negotiation of this sort is referred to as human input in this study. If negotiation is key to language acquisition, then MMOs like *Guild Wars 2* can be beneficial in that they provide many opportunities for L2 gamers to negotiate meaning. It was common to observe participants come to an understanding of the environmental input through their communication to one another as a group. The negotiation of environmental input is arguably a process that is very similar to the negotiation that takes place in face-to-face conversations. Obviously, the participants could not negotiate with the source of the environmental input because it is a computer program, so they would negotiate meaning from language presented from in-game tasks by communicating with each other instead. This negotiation of environmental input most often took place via requests for information. For example, during one of the sessions, a participant indicated that he did not know how they were supposed to proceed in completing a task and messaged the group writing, "I have no idea about this task." Later he requested information from the other players by writing, "How to finish this?" The players then worked out the details of the task by pooling information until they eventually formed a plan and tried it out. Of course, there were times when the tasks were too difficult, causing the players to give up and move on to a different task.

An example of negotiation of environmental input is illustrated in the conversation between participants in Example 5. At this point in the game, the participants were struggling to complete tasks because enemies were killing their characters much more quickly than previous sessions, and they could not understand why their characters were suddenly so weak. What they did not realize was that they needed to "repair" their characters' equipment to return their characters to their full strength. This maintenance of in-game equipment is a common mechanic in many digital games. As players engage in combat, their characters' equipment suffers and eventually breaks. Once broken, players need to go to one of the game's towns to have equipment repaired, thereby returning their characters to full strength. At this point in the game, the participants' equipment had become completely destroyed because they had never had it repaired. When equipment breaks, the broken equipment is automatically removed, leaving the players' characters appearing shirtless (see Figure 5). This visual cue coupled with much negotiation among participants eventually led to the discovery of this game mechanic, and the players realized that they had to have their equipment repaired. This instance of negotiation of environmental input is illustrated in Example 5.

Figure 5. Participants' broken equipment



The interaction in Example 5 takes place as the participants negotiate the actions needed to remedy the weakened state of their characters. Italicized texts were categorized as instances of clarification checks and underlined texts were categorized as requesting information. Often checks came in the form of a request for specific information, which is why some texts are both italicized and underlined.

### Example 5

1. Pine: What's wrong about our clothes?

(Some texts omitted)

2. Thief: We should fix our equipment
3. Mary: We need find somewhere
4. Mary: To fix

(Some texts omitted.)

5. Thief: Find me

(Some texts omitted.)

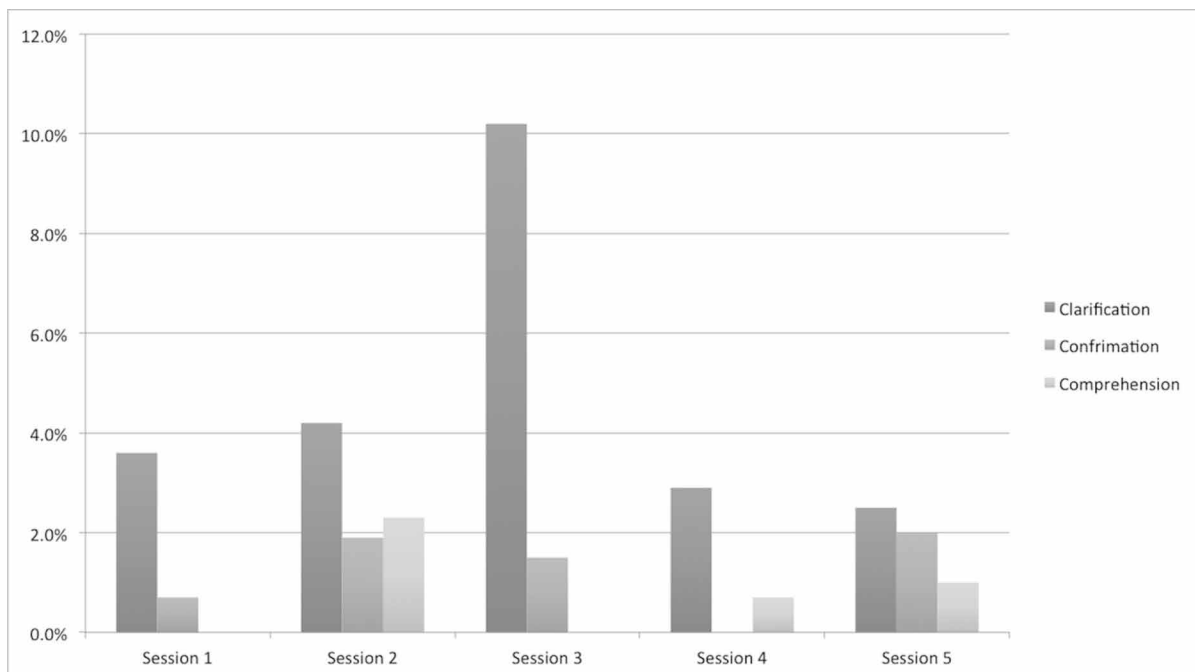
6. Thief: You should go somewhere to fix your equipment
7. Pine: How to fix equipment?
8. Pine: How
9. Thief: Just talking with NPC
10. Pine: Where?
11. Mary: See map
12. Thief: Look map

- 13. Pine: Ok
- 14. Thief: Follow me

Pine did not understand why his character suddenly appeared shirtless. He indicated his misunderstanding by requesting information from the other two participants as seen in Line 1 above. The other two responded to Pine by telling him that they needed to fix their equipment and that they needed to go “somewhere” to do that, as seen in Lines 2 and 3. Pine still did not seem to understand and asked for clarification as seen in Line 7. Thief clarified, telling Pine that he needed to speak with a nonplayer character (NPC: the games automated characters). Pine then asked for further clarification by asking where he would find the referenced NPC. Eventually, they found the location of where they needed to go and successfully fixed their equipment. In this example, the input that triggered the negotiation of meaning was from the environment of the game (i.e., the loss of clothing to their characters). From that point on, the players knew that they needed to check their equipment and have it repaired on occasion. In essence, they modified their future actions based on what they had learned from negotiating environmental input.

The number of times participants’ negotiated input was quantified by placing texts into communication strategy categories. During Session 3 checking information accounted for more of the total texts produced than in the other four sessions. Checking information accounted for 11.7% of the total texts produced in Session 3, most of which came in the form of clarification checks. Clarification checks made up 10.2% of the texts, more than double that of any other session (see Figure 6). It is also worth noting that the rate of connected interaction reached 54% in Session 3, the highest rate of the five sessions. Session 2 had a connected interaction rate of 44% and the rate in Session 4 was 48%. This means that 54% of the

*Figure 6. Checking information percentages per game session*



texts produced in Session 3 were in response to texts produced by other participants, indicating that the participants paid more attention to one another's texts in Session 3 than in the other sessions.

Since negotiation of input is beneficial for SLA, understanding more about the interaction in Session 3 can lead to a better understanding of the SLA benefits of MMOs like *Guild Wars 2*. The higher rate of interaction and negotiation in Session 3 can be attributed to the main tasks that each individual player needed to complete. Until Session 3, the three participants had been given the same main tasks. Through a series of clarification checks and requests for information, the participants discovered that they had different main tasks in Session 3, as illustrated in Example 6 below. Italicized texts were categorized as instances of clarification checks and underlined texts were requesting information.

**Example 6**

1. Pine: Do you get the task?
2. Thief: *Which?*
3. Pine: Twilight of the wolf
4. Mary: Follow the green line
5. Thief: No
6. (Some texts omitted.)
7. Thief: Can we just finish daily task?
8. Mary: What do u need to do?
9. (Some texts omitted.)
10. Thief: I found my mainly task.
11. Thief: But you guys cannot help me...maybe
12. Pine: What is that?
13. Thief: A Pup's illness
14. Pine: Where is that?

Thief decides that he will do his task alone. When he tries to accomplish the task by himself, he fails because the task is too difficult for him alone. He then requests help from the other two players, and they come to help him. However, because the other two players do not have the same task as Thief, they cannot see the information related to the quest Thief is referencing. This situation elicits a series of requests and checks in order to share task-related information and determine how to complete Thief's task. Once Thief's task is finished, the group engages in another conversation and discovers that Thief's next main task is still different from Pine and Mary's current main task. They decide that, as a group, they will try to complete Mary's and Pine's task first and, then, later go back and try to complete Thief's task. This process requires another series of requests and checks. Thief cannot see the details of the other members' task just like the other two could not see Thief's task. When in-game tasks were not identical for the entire group, there were more instances of requesting and checking information. These in-game tasks are similar to information gap activities used in instructional settings because they require that players request information from others in order to successfully complete tasks. From this finding, it might be inferred that game mechanics that allow for a more open-ended progression scheme may afford a higher degree of negotiation of meaning than mechanics that involve a more linear progression scheme. For example, if *Guild Wars 2* had instead had all characters completing the same main task, the

participants would not have had the need to negotiate meaning as often as they did, potentially missing useful L2 development opportunities.

To summarize, the results and discussion above aim to provide insight into the ways in which MMOs like *Guild Wars 2* support SLA. The three general areas discussed were (1) output, input, and connected interaction, (2) form-focused feedback and modified output, and (3) negotiation of meaning. These three areas of SLA are prominent throughout the 12 hours of gameplay analyzed in this study. The analysis quantified the type and number of learning and communication strategies used by the participants in order to better understand the interaction that took place in these three areas of SLA. The findings provide insight into the interaction that occurs during gameplay and ways the interaction can contribute to SLA.

## **DIRECTION FOR FUTURE RESEARCH**

While it seems clear based on the data presented in this study that MMOs can provide opportunities for L2 learners to interact and negotiate meaning in the target language, there are still gaps in the research and avenues for future inquiry on MMOs that have not been specifically addressed to date. Although the data from the current study show that *Guild Wars 2* provides opportunities for interaction and negotiation of input among English learners, it is important to remember that there were only three participants; consequently, it is not possible to generalize findings from the current study to other contexts or to other L2 learners more broadly. Studies with larger numbers of participants are needed before any definitive generalizations can be made. At the same time, it is important to remember that analyzing data for only three participants was a time-consuming and labor-intensive process, requiring hundreds of hours of data analysis. To engage in similar research with a larger participant pool would require a level of support that is likely beyond the capabilities of a researcher-funded study.

The way that the current study was configured did not ask participants to engage with native speakers of English. In other words, the participants were not asked to communicate with players outside of their group. There were other players around them in the same virtual space throughout all game sessions, so it would be possible to create a research design in which data could be collected from interactions that involved native speakers and non-native speakers. It is unknown whether or not the participants in this study paid attention to anyone else's conversations because they did not have a strong need to talk to anyone outside of their own group. As a group of three players, they were strong enough to complete many of the lower level tasks without much difficulty. A research study designed around a nonnative speaker of English in a group of native speakers of English playing an MMO could produce interesting results in terms of opportunities for negotiation of meaning.

In the current study, all three participants shared the same native language. If participants from different native language backgrounds could be found, it could be determined whether the types of strategies employed by the participants were culturally motivated or not. The culturally insular characteristic of the group in the current study likely contributed to the lack of attention they paid to conversations and interactions outside of the participant group. However, it is important to note that even though the participants shared a common L1, 99.2% of all the texts they produced were done so in English. A study that included participants who do not share an L1 would give greater insight into the role of form-focused feedback and modified output. It seems that modified output was produced from implicit form-focused feedback. Learners would be more likely to notice one another's grammar mistakes if they did not share an L1. The inclusion of learners from different L1s might lead to opportunities for more explicit feed-

back and perhaps a higher degree of modified output. The limitation of a shared L1 among participants is common among studies involving MMOs and SLA. To this point, Peterson (2016) argued that such research “would be of particular value if it involved diverse learner groups of varying L1 backgrounds and proficiency levels” (p. 1192).

Another avenue for future research would be a qualitative examination of the participants' perceptions of MMOs as a vehicle for English use (if not explicit learning). In addition to the qualitative data that were collected as part of the text analysis during game play in the current study, qualitative data were also collected using an initial written survey and follow-up face-to-face interviews. A reporting on the results of these data is beyond the scope of this chapter; however, three general observations from the qualitative perceptual data from the current study can be noted. First, it is very clear from a summary of the qualitative data that the participants enjoyed playing the game. Although this fact may not seem surprising because they all indicated they enjoyed such games before the study began, what is interesting about this perception is that even though they were required to communicate in their L2, they did not seem frustrated by this requirement. All of the participants perceived the game to be fun and looked forward to their game sessions together. Second, all three of the participants indicated that their favorite part of playing the game was working as a team to complete tasks. The social and collaborative nature of MMOs is one reason why they enjoyed the game as much as they did and why it was perceived as being fun, despite playing in their L2. Third, the participants indicated how much they enjoyed the process of leveling up their characters, acquiring new abilities and skills, and then testing out the new skills during the game. These data support the idea that learners enjoy participating in problem-solving tasks, and tasks that require the use of higher-order thinking skills, such as analyzing, synthesizing, and evaluating.

Finally, researchers interested in MMOs are strongly encouraged to consider taking a design-informed approach to DGBLL as recommended by Reinhardt (2020). DGBLL could benefit from a better understanding of individual game mechanics and their effects on SLA. This was touched upon in the discussion of results presented earlier in this chapter. That is, certain aspects or mechanics in *Guild Wars 2*, such as the open-ended progression scheme, appeared to elicit an increased need for negotiation of meaning among participants. Such insights into game mechanics can greatly inform the application of digital games in L2 learning contexts and the development of L2 learning software in broader field of CALL.

## **CONCLUSION**

In this study, the texts that participants used while playing the MMO *Guild Wars 2* were categorized based on the use of learning and communication strategies. An analysis of the data found that the most common type of learning strategy employed was pooling information, which outnumbered the other learning strategies of commands, statements, suggestions, and modeling. Furthermore, the study found that MMOs do support opportunities for language learners to negotiate meaning in the form of player-produced input and environmental input. The most common types of communication strategies used while negotiating meaning were requesting and checking information.

The quantitative data from categorized texts was used to analyze participant interaction in terms SLA. This study provides evidence for the fact that MMOs are beneficial to SLA because they provide opportunities for L2 learners to receive large amounts of input and produce large amounts of output as players are required to pool information by responding to one another's requests for information and working cooperatively to complete tasks. Output produced by one player is a meaningful source of

contextual input for other players, which creates connected interaction between players. Participants' implicit focus on form can also lead to modified-output. Furthermore, players have the opportunity to negotiate both player-produced input and environmental input as a means to complete in-game tasks in a contextually rich social environment. Finally, players engage in cooperative problem solving that shares many characteristics with language instructional activities that are deemed beneficial for SLA.

The benefits that video games, and specifically MMOs, have for language learners show great potential. Learners can acquire both vocabulary and language forms through interaction with other players and through completing the in-game tasks. Anonymity can promote positive affect and lower the affective filter, thereby providing learners with a language-learning environment that is conducive to language experimentation. Interaction is especially advantageous for language learners who do not have access to face-to-face interactions with native speakers because of the social nature built into MMOs.

Digital games that are designed specifically to improve SLA have been around for some time, as have MMOs that aim to create massive social communities. It is unknown what the future will bring in terms of advances in technology, particularly as these advances relate to the use of online technologies in L2 learning. In the future, applied linguists and game developers might collaborate to create Massive Multi-learner Online Language Spaces (MMOLSs) that are just as engaging as MMOs but are designed specifically for SLA. What is known is that the development and uses of online technologies will continue to expand, making the language classrooms of tomorrow and the opportunities for L2 learning quite different from what they are today. Educators need to be open to the possibilities that online technologies afford us, especially in terms of creating optional learning environments for L2 learners.

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## **KEY TERMS AND DEFINITIONS**

**Digital Game-Based Language Learning (DGBLL):** The application and use of digital games for the purpose of developing a second language (L2).

**Form-Focused Feedback:** Feedback from which learners are readily able to detect discrepancies between their own language and target language norms. This awareness allows learners to modify their existing second language knowledge.

**Game Mechanic:** An individual design element of a digital game that, together with other game mechanics, make up the overall player experience. Game mechanics can determine the actions that are possible for the player to take and can also determine the degree of language interaction required for completing game objectives and engaging in a game's narrative (see Reinhardt, 2019).

**L2 Gamers:** Language learners who choose to play digital games in an L2 with the specific aim of improving their L2.

**Massively Multiplayer Online Games (MMOs):** A term often used to refer to a genre of digital games. Games in this genre are typically played online with a large number of other players in real-time in a shared virtual environment. These games often include options to play competitively or cooperatively with other online players. Communication among players can occur through text messages or voice chat with voice chat being more popular in recent game developments.

**Negotiation of Input:** A process wherein learners come to an understanding through face-to-face interactions. In L2 gaming this process occurs when L2 gamers use environmental input to come to an understanding within the group.

**Socio-Affective Strategies:** Learning strategies that assist learners in working together cooperatively to solve problems, check learning, model language, obtain feedback, or offer suggestions.