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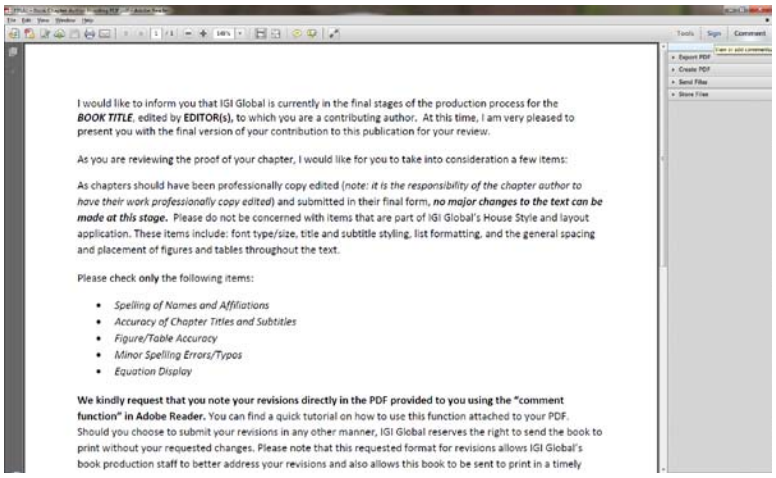

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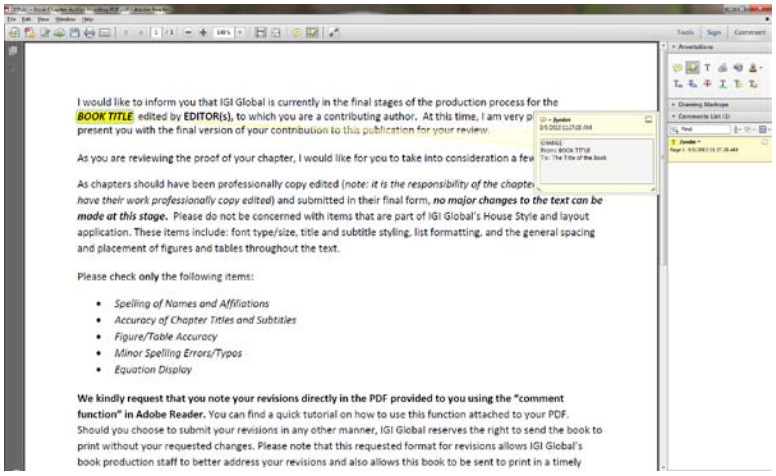

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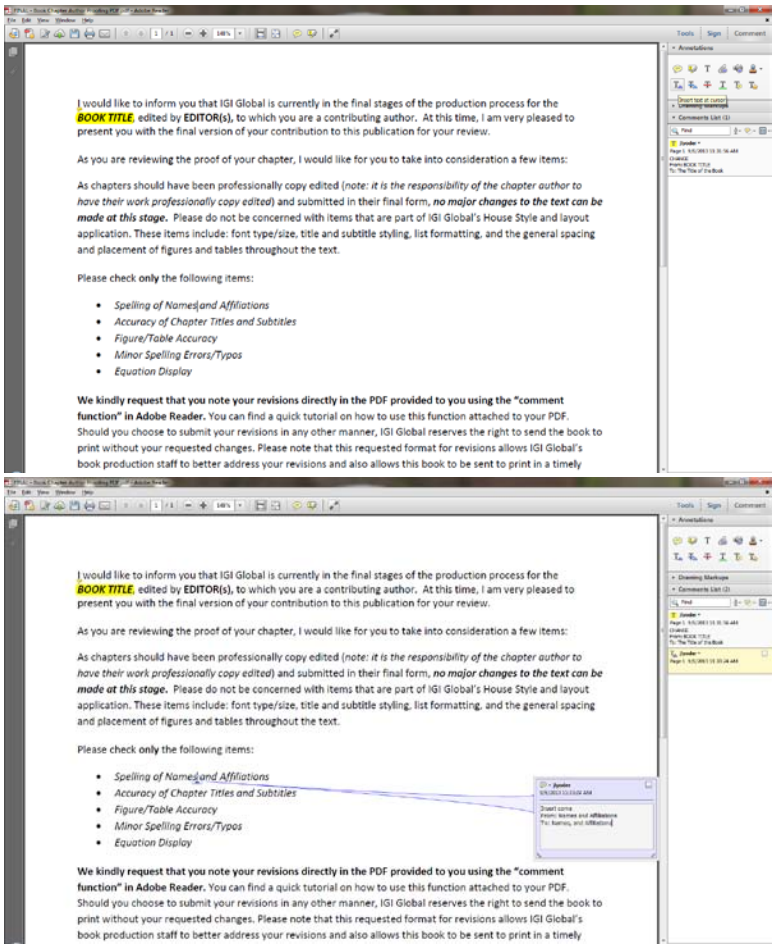

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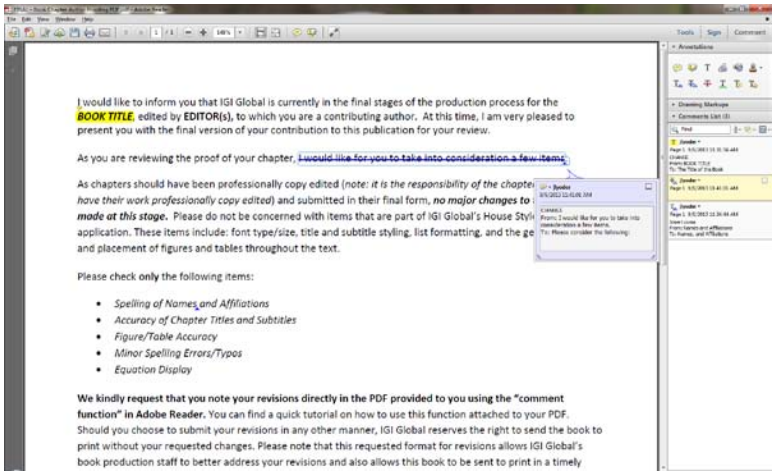

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The Effects of Digital Game Play on Second Language Interaction

Hayo Reinders, Unitec Institute of Technology, Auckland, New Zealand

Sorada Wattana, Dhurakij Pundit University, Bangkok, Thailand

ABSTRACT

This paper reports on a study into the effects of digital game play on learners' interaction in English as a foreign language. 30 Thai learners of English enrolled in a 15-week University language course completed 18 face-to-face classroom lessons, as well as six sessions playing Ragnarok Online, a popular online role-playing game. The game had been altered to include a number of quests for learners to complete. To gauge the effects of playing the games, participants' language use in both text and voice chats was recorded and analysed. Game play resulted in a large and significant increase in English interaction that used a wider range of discourse functions, and also resulted in significantly more frequent contributions compared with English interaction in class. We discuss some of the theoretical and pedagogical implications of these findings.

Keywords: *Digital Game-Based Learning, Interaction, MMORPGs, Second Language Acquisition, Willingness to Communicate*

INTRODUCTION

Digital games have been shown to be able to make contributions to learning in various domains (for a review, see Hainey, Connolly, Stansfield, & Boyle, 2011; Kirriemuir & McFarlane, 2004; Mitchell & Savill-Smith, 2004; Randel, Morris, Wetzel, & Whitehill, 1992). Also in the area of language learning and teaching, the potential of games is starting to be explored. Games have been shown to motivate students (Anyaegbu, Ting, & Li, 2012; Liu & Chu, 2010), to encourage greater time-on-task (Gee, 2007) and to increase learners' Willingness to Communicate (WTC) (Reinders & Wattana, 2012, 2014b). What has not been established conclusively, however, is if playing games leads to more interaction in the target language. Interaction has been argued to play a crucial role in second language acquisition (SLA) (Long, 1981) and it is therefore important to identify environments conducive to L2 (second language) production. Below, we will briefly discuss the role of interaction in L2 acquisition before looking at previous research into the use of digital games for language learning purposes.

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LITERATURE REVIEW

The Role of Interaction in L2 Learning

Since the late 1970s it has been recognised that language interaction (i.e. communicating with

others) plays an important role in the SLA process (Hatch, 1978a, 1978b). Some researchers see its role as mainly providing learners with "comprehensible input" (i.e. input that is attuned to their developmental level), which will help them to build up working hypotheses about the meaning and grammatical rules of the language, i.e. will help them develop their "interlanguage". For others, interaction directly contributes to learning. Long's interaction hypothesis (1981, 1983, 1996), for example, emphasises the importance of negotiation for learning, or the "modification and restructuring of interaction that occurs when learners and their interlocutors anticipate, perceive, or experience difficulties in message comprehensibility" (Pica, 1994, p. 493). Interaction and negotiation help to improve understanding, and this in turn results in more comprehensible input, which is of further help to the learner. Another advantage of interaction is that learners play an active part in it; they have some degree of control over the semantic content of the exchange and derive some support from the context in which the interaction takes place and can thus pay more attention to form rather than to meaning only. Learners are more likely to be alert, as interaction requires active participation, and they are more likely to get help from their interlocutors, who may repeat or rephrase content.

However, it has been pointed out that although interaction can have beneficial effects, conversational success in itself does not necessarily result in learning (Faerch & Kasper, 1980). It is, for example, possible to "manage" a conversation by extensive use of contextual information, without paying attention to grammatical features that might be helpful in the further development of one's interlanguage.

Nonetheless, many researchers have argued for the important role of learner language production in learning, with perhaps the most widely cited being Swain's "output hypothesis" (1985). This hypothesis was developed as a result of observations of Canadian immersion students who, despite years of receiving exposure to the second language, did not fully develop certain grammatical aspects of French. Swain found that the immersion classes were characterised by a lack of opportunities for language production and afforded few opportunities for "pushed output", i.e. output that required them to "stretch their interlanguage". Many students were able to use communication strategies to get their meaning across and were never challenged to further develop their language. Swain suggested that by requiring learners to produce comprehensible output, they would be pushed to be more accurate and to pay attention to both form (e.g. grammar) and meaning, and in so doing move from semantic only, to both semantic and syntactic processing. In addition, Swain (1998) suggested that output would 1) induce noticing of features in the target language, 2) allow for hypothesis formation and testing (see also Ellis & He, 1999; Pica, 1988), and 3) give opportunities for meta-talk (i.e. talking about the language and its meaning and form). Subsequent studies have further investigated these and other potential benefits and it is now widely acknowledged that output and interaction play an important part in learners' eventual success in acquiring a second language (Ellis, 2008).

Encouraging Interaction in the L2 Classroom

Encouraging learners' interaction inside the foreign (in contexts where the target language is not naturally spoken, e.g. in a Spanish class in Holland) or second (in contexts where it is, e.g. an English course in New Zealand) language classrooms is one of the greatest challenges for language teachers. In English as a foreign language (EFL) learning settings such as Thailand (the setting for this study), learners typically only find opportunities for practice within the classroom, and little or no language use takes place outside in everyday life. Unfortunately, in Thailand the quality and amount of target language interaction in classes is disappointing. The language of instruction is usually Thai (Khamkhien, 2010) and even when English is used, learners in Thailand are particularly reluctant to use the target language (Bennui, 2008). Previous research

has characterised typical Thai language learners, in all levels of education, as notoriously reticent when it comes to communicating in English (Kamprasertwong, 2010), unwilling to communicate in English, overly concerned about accuracy in their language use and rote memorization (Mackenzie, 2002), too shy to use English to interact with their classmates (Wiriyachitra, 2001), and uncooperative and unmotivated to participate in class activities in English (Maneekhao & Tepsuriwong, 2009). Another important factor is the large average class size. With over 40 students in each class being fairly common, opportunities for interaction are limited, with most discussions and interaction being teacher-led and drills being common. Learners typically memorize and recite from what they have rehearsed but are unable to talk without preparation and formulate new sentences or use new words required for real-life situations (Wongsothorn, Hiranburana, & Chinnawongs, 2002).

In recent years new (to Thailand) methods of language instruction have started to be used, such as communicative language teaching, in order to improve the quality of language teaching. However, their implementation has often been incomplete or inaccurate, with many teachers not being sufficiently experienced in using the methodology, and this has not led to an increase in authentic interaction (Tantayanusorn as cited in Mackenzie, 2002). The use of games may overcome some of these challenges by offering authentic environments and opportunities for target language interaction.

Games and Interaction

The role and the potential effectiveness of digital gameplay in learning and teaching have in recent years started to be examined. It has been argued that digital game-based learning has the potential to motivate students in ways that are difficult to achieve in traditional instruction. It has been suggested to be engaging, to have the potential to be more learner-centred, foster competition, lower affective barriers, and offer contexts which stimulate learners' interest (Anyaegbu et al., 2012; Baltra, 1990; Gee, 2007; Hubbard, 1991; Li & Topolewski, 2002; Prensky, 2001). Because of these characteristics, digital game-based learning has the potential to lead to greater student engagement and in this way greater use of the target language. In particular massively multiplayer online role-playing games (MMORPGs) have been shown to reduce anxiety and increase self-confidence through the relative anonymity of using personal avatars. Moreover, MMORPGs have been shown to promote various forms of interaction (such as negotiation of meaning) that are beneficial for L2 acquisition (Peterson, 2010) and to encourage the use and the practice of target language in a fun and non-threatening environment (Bryant, 2006). As collaboration, communication, and enjoyment are the main features of MMORPGs, language learners are likely to benefit from these aspects by taking risks and increasing their target language output during play and engaging in various forms of interaction that may facilitate L2 learning and acquisition.

In a study of online gaming and open Internet environments as informal settings for L2 use and development, Thorne (2008) explored multilingual interaction between an English speaker living in the United States and a Russian speaker living in Ukraine within the MMORPG "World of Warcraft." Participants' feedback was very positive, with claims that participation in the game had enhanced their enjoyment and motivation for language learning. In addition, the analysis of the chat logs indicated that conversation in the game offered participants authentic interaction in the L2 and opportunities for providing expert knowledge in terms of language use and language-specific explicit corrections, requests for assistance, and collaboratively constructing repair sequences. Roy (2007) also investigated the potential in World of Warcraft by playing the game in Spanish. Although the author reported that he did not have much interaction with native speakers, he found that real-time chatting during gameplay exposed him to natural L2 production, and that the interaction in which he engaged was a

meaningful way to become comfortable with using the language. Furthermore, Bryant (Bryant, 2006) examined the interaction between himself and one German language student in World of Warcraft, and found that the student appeared to focus on the activity itself rather than the grammar and used a range of verb forms to express herself. Although improvement in German during gameplay was not clearly demonstrated, the authentic language use and the amount of communication essential to progress through the game were highlighted as beneficial to language learning. The author concluded that participation in MMORPGs like World of Warcraft can be a meaningful learning experience for language learners as they can be immersed in an authentic situation that requires the use of the L2.

Zheng, Wagner, Young, and Brewer (2009) focused on how the educational multiuser virtual environment "Quest Atlantis" supported English language acquisition. The authors examined the interaction and collaborative construction of cultural and discourse practices between two native speakers and two non-native speakers of English. They were paired and requested to work collaboratively over a 10-week period. Data was collected through participant observation, post-quest interviews, and an analysis of chat logs and emails. It was found that participation in the game allowed learners to engage in authentic and meaningful interaction with the native speakers while closely cooperating with each other to complete the quests, enabling them to gain knowledge from a more knowledgeable/experienced game player through action. That is, native speakers were able to share their linguistic knowledge with language learners and language learners were able to share cultural information regarding the quests while chatting with the native speakers in the game. This interaction was conceptualized as negotiation for action and perceived as an extension of the concept of negotiation for meaning. The findings suggested that negotiation for action could contribute to the potential for greater cultural awareness as well as increased mutual collaboration and cultural identity as a means to successful quest completion. The learners who participated in this study recognized that negotiation of action was a type of interaction that was unavailable in their learning experiences in the language classroom.

Most recent studies by Peterson (2012a, 2012b) focused specifically on learner interaction in MMORPGs. Peterson (2012a) examined the use of the MMORPG "NineReift" and engaged six Japanese EFL university students in two gaming sessions, lasting approximately 90 minutes each, which were held one week apart, and obtained data from a variety of sources (i.e. learners' chat collected during gameplay, researcher observations, filed notes, learner responses to pre- and post-study questionnaires, and interviews). The findings indicated that learners actively participated in the game, utilized different types of strategies to manage their interaction, undertook collaborative dialogues exclusively in the L2, and had positive attitudes, claiming that interaction in MMORPGs was engaging, motivating, and enjoyable, and improved their fluency and discourse management practice. Peterson's (2012b) later study investigated linguistic and social interaction and attitudes of four intermediate Japanese EFL university students in the MMORPG "Wonderland." Participants were engaged in four sessions, lasting approximately 70 minutes each and were held once a week over a period of one month. Similar to the findings previously reported (Peterson, 2012a), it was found that participants used a range of strategies, and conducted their interaction exclusively in English. In addition, participants provided largely positive feedback, claiming that interaction in MMORPGs, in combination with the anonymity provided by the use of pseudonyms and avatars, helped to reduce anxiety levels and encourage opportunities for taking risks in using English. This feedback thus mirrored findings reported in the literature on learner interaction in MMORPGs (e.g. Peterson, 2011) and in our pilot study (Reinders & Wattana, 2011, 2012) which also revealed a significant increase in authentic L2 interaction among Thai EFL university learners and their increased confidence, reduced anxiety,

and improved willingness to communicate in English, after playing MMROPG "Ragnarok Online" for three gaming sessions.

Games have thus been shown to play a potential role in encouraging learners to engage in the language learning process. What has not been clearly demonstrated is if this indeed does lead to more L2 interaction, which is the focus of our study. The purpose of the study was to investigate the effects of participating in an online game on learners' interaction in English. Our research questions were:

1. How much target language interaction do Thai learners of English as a foreign language produce while playing an online game?
2. What differences are there between interaction in class and in the game?

We were also interested to see if the different modalities used in the game (writing text chats versus speaking in voice chats) had an impact on participants' interaction. We therefore asked:

3. What differences in learners' interaction are there between text and voice-based chat while playing an online game?

We will now describe the methodology of our study.

METHODOLOGY

Participants

The study was conducted with 30 Thai EFL learners from one intact class at a university in Thailand. Students' participation was voluntary and their results were anonymised and in no way affected their course grades. Participants had different English language proficiency levels (i.e. 13 elementary students, 8 lower intermediate students, 7 upper intermediate students, and 2 advanced students), as shown by their scores on two university tests of English proficiency. The reason for this range of proficiency levels was that the course was only offered once per academic year. Participants had fairly homogeneous language backgrounds; all of them being native Thai speakers without experience of living or working in an English-speaking country. The participants were also similar with regard to game-related habits and experiences. All of the participants had previous experience playing computer games, particularly MMORPGs, meaning they did not require special training in using games. All the participants were also found to be sufficiently proficient in synchronous communication and typing skills to be able to readily engage in interaction during game play. Nonetheless, training and technical support were provided to the participants. It is therefore reasonable to expect minimal novelty and training effects.

The study was carried out during a 15-week course of English for Information Technology for third year undergraduate students from the school of Information Technology. It was designed and taught by one of the researchers. The focus of the course was all-round English skills development and practical English communication skills practice, based on the textbook "Oxford English for Information Technology," featuring specialist content in IT and activities designed for pair and group work such as role-plays and discussions. The classes met for two sessions of 90 minutes per week and were taught entirely in English.

The intervention, the playing of the commercial game 'Ragnarok Online', was integrated as part of the course as a lesson review session delivered after participants finished each unit. We applied a game-based learning (GBL) approach to supplement traditional language learning. The interest in the use of computer games was influenced by sociocultural theory (SCT) rooted in Vygotsky's (1978) work, which emphasises the importance of social interaction among learners, allowing them to work together, exchange information, and support each other, a significant perspective in SCT, known as collaborative learning. The sociocultural perspective in SLA (Lantolf, 1994,

2006, 2000) makes a strong argument for the role of social interaction during task completion in providing learners with opportunities to practise the language and learn from each other as more expert learners help less expert ones to acquire the target language, or scaffolding which is part of learning. This phenomenon is viewed as acting within the zone of proximal development (ZPD), a concept in SCT that creates the conditions for language learning and production to take place.

The course covered six units and there were therefore six review sessions, lasting 90 minutes each. Overall, there were two pedagogical objectives to the game sessions: firstly, the activities were intended to give the participants opportunities to review the course material through "plearn", or a combination of "play" and "learn", and also the Thai word for "enjoy". It is one of the most important concepts in Thai education, emphasising the need for learning to be an enjoyable activity and for students to gain knowledge through play (Samudavanija, 1999). As part of playing a number of quests in Ragnarok Online, the participants had opportunities to learn and practise the vocabulary and language skills they studied in class in a fun way. By lowering the affective barrier, the intention was to encourage the participants to relax and learn in a more natural way (Aoki, 1999). The second objective of the sessions was to encourage more participation. Thai students are notoriously reticent and generally avoid interaction in English classes (Kamprasertwong, 2010). By encouraging the participants to work together in a non-threatening environment, the aim was to encourage them to become more actively involved in the learning process.

With permission from the game's local distributor, we were able to host the game on a private server in the lab of the university, thereby giving us control over who could access the game. We also obtained permission to modify the game in order to ensure its appropriateness to the L2 learning context, as well as its alignment with the course's learning activities and objectives. In other words, the modification in this study meant creating new quests (i.e. the missions that players are assigned to accomplish within the game) relevant to the participants' course. The previously learnt material was endogenously integrated into the narrative of Ragnarok Online (Habgood, Ainsworth, & Benford, 2005), in order to provide the participants with learning opportunities while engaged in the process of playing. In particular, the six new quests covered scenarios which were related to the courses' learning content and objectives. Figure 1 shows a screenshot of one of the quests used for this study.

Face-to-Face Communicative Activities

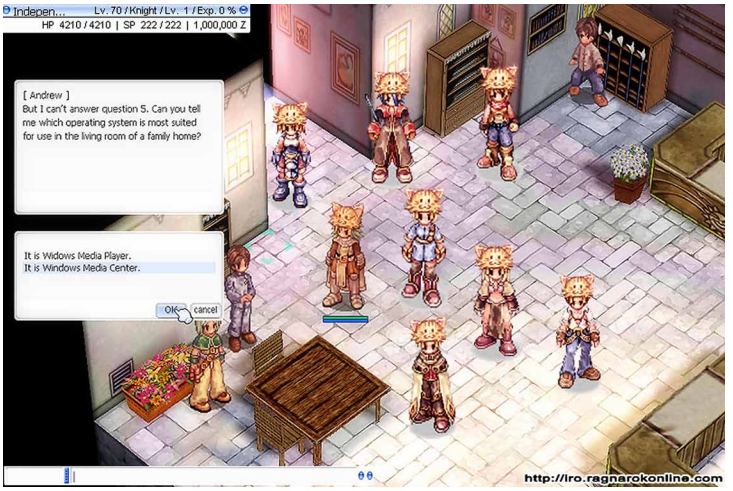
During the second and third sessions of the course, participants were requested to participate in traditional, face-to-face communicative activities, namely discussion (which took about 15 minutes to complete) and interview role play (which took about 30 minutes to complete) in which the participants performed together in small groups and in a whole-class context. These took, altogether, approximately 45 minutes to complete. These two activities were chosen because they gave everyone a chance to participate and become actively involved. They are also very common classroom activities. Participants' interaction during these two face-to-face activities was recorded using high quality digital recording equipment, providing baseline data for the participants' English interaction in the classroom.

Computer Game Activities

After completing all face-to-face sessions of each unit, the participants completed a computer game session. Each game session took 15 minutes for briefing, 45 minutes for game task completion, and 15 minutes for debriefing.

A 15-minute briefing was given to allow participants planning time to discuss with each other any relevant grammar and vocabulary points that they might need to complete the quest and to familiarise themselves with the quest. The participants were told the objectives of the computer game session and were

Figure 1. A Screenshot of Quest 4: How much do you know about operating systems?



reminded that their interaction in the game was not graded. They were simply encouraged, but not required, to use the target language for communication in the game when they felt that they were willing to do so.

During game play activities, there were six computer game sessions, involving both text-based interaction and voice-based interaction allowing us to investigate interaction in both modalities. The participants were then asked to log in the game "Ragnarok Online," the chat program "Skype," and the recording program "Pamela for Skype." It should be noted that Skype was used instead of the in-game communication tool for the convenience of recording and analysing the chat history. In the first three computer game sessions, the interaction was carried out through the medium of typed text in which the participants could interact with anybody in the game. The participants were asked to add all the participants in the contact list of their Skype account to a conversation group so that all of them could communicate simultaneously. Although pairing participants might have led to more communication, group chat was used to promote natural and real communication in the game in which players were free to talk to anybody. In addition, if inexperienced, unconfident participants were paired together, they might not (be able to) complete the quests. In the final three computer game session, the participants were required to communicate with each other by voice chat. They were randomly paired and asked to use Skype to call each other. This time the participants were paired due to the fact that in the current version of Skype only two people were able to communicate simultaneously. The pairs remained the same throughout the last three computer game sessions. While the participants were playing the game, the researchers did not participate in any of the tasks, but were present in the lab to assist with technical problems.

After each game session, participants were asked to export their chat history from the recording software and save it on their desktop. After that, a 15-minute collaborative debriefing took place during which the participants were asked to discuss in small groups their experience, success, and failure in the game and how they had communicated with each other. The participants were also asked to make a connection between the game content and the learning objectives, and to connect their communication that took place during the game to some real-life situations.

Table 1. Participants' frequency of English use in the classroom

Communication tasks	Mean	SD	Interpretation
I use English to communicate with friends in class.	2.50	.82	Sometimes
I speak in English when called upon by the teacher to ask questions and comment.	2.76	.97	Sometimes
I ask or answer questions voluntarily in class.	1.93	.91	Rarely
I explain task instructions to my friends in English during class time.	1.86	.94	Rarely
I use English only when I participate in class activities.	2.46	.82	Rarely
Overall Mean	**2.30**	**.39**	**Rarely**

Measuring L2 Interaction

Learners' interaction was operationalised as L2 production. In our study, interaction concerned itself mainly with interpersonal interaction between non-native speakers (NNPs) of English and it was measured both quantitatively and qualitatively.

The quantitative analysis looked at the number of words produced in English. The number of words per participant was counted during two face-to-face class sessions and during each of the six computer game sessions. Words were counted regardless of their accuracy in spelling, pronunciation, grammar, or usage. In addition to the recordings of L2 production, another source of data came from a questionnaire that the participants completed after they finished the recorded face-to-face communicative activities and that elicited participants' perceived use of English *in the classroom*. The items on the questionnaire drew on previous studies on Willingness to Communicate (Yashima, Zenuk-Nishide, & Shimizu, 2004) to refer to classroom contexts only. The scale was shown to be reliable, with an alpha coefficient of .92. A detailed description of the questionnaire can be obtained from our previous study (Reinders & Wattana, 2014b). The qualitative analysis addressed specific concerns for L2 use by looking at the functional characteristics of the communication in which participants were engaged during class and gameplay time. We first present classroom interaction results, then game interaction results, and then differences between the two.

RESULTS

Quantity of Interaction in the Classroom: Self-Reported L2 Use

Data collected from the questionnaires was computed using SPSS to obtain descriptive statistics to reveal to what extent participants accepted each Likert Scale item. The results show that participants report low frequency of target language use in the classroom in general ($M = 2.30$, $SD = .39$), and even when participating in class activities ($M = 2.46$, $SD = .82$). Table 1 shows participants' self-reported language use in class.

Quantity of Interaction in the Classroom: Real L2 Use

We calculated the total number of words produced and the average number of words per participant. Descriptive statistics obtained included mean scores (M), standard deviations (SD), minimum (min), and maximum (max) for the amount of interaction. Cohen's (1988) d was subsequently calculated to indicate the effect size. Following Cohen's (1992) standard criteria, this study's analysis interpreted sizes of 0.2 as a "small" effect, around 0.5 a "medium" effect, and 0.8 a "large" effect.

Analysis of the transcripts of classroom interaction (see Table 2) showed only a small

Table 2. Number of words produced in face-to-face communicative activities

		Activity 1 Discussion (15 minutes)			Activity 2 Interview Role Play (30 minutes)			Total
		Group work	Whole class work	Total	Group work	Whole class work	Total	
Total number of words		497	92	589	605	63	668	1,257
By each participant (N=30)	Min	0	0	0	0	0	0	0
	Max	79	35	114	84	14	98	212
	M	16.57	3.07	19.63	20.17	2.10	22.27	41.90
	SD	18.40	8.61	26.15	21.48	3.85	24.95	50.92

amount of target language production while the participants were engaged in traditional, face-to-face activities. The participants used their native language frequently and one participant did not talk in English at all during the two recorded activities. The participants did not produce many words (a total of 1,257 with an average of 42 words per participant) during the 45-minute activities. One difference we found was between small group communication and whole class communication; as was to be expected, in the discussion activity the participants produced significantly more English than during whole class work ($t(29) = 6.21$, $p < 0.001$), with a large effect size ($d = 0.93$). Also in the interview role play this difference was significant, ($t(29) = 5.44$, $p < 0.001$), again with a large effect size ($d = 1.17$).

Quantity of Interaction in the Game: Text and Voice Chat

When looking at the results for target language production during game play, it was found that the number of words was considerably higher in the final gaming session than in the first (increasing from 57.83 per participant to 79.83 per participant (see Table 3)). In addition, in text chat, the number of words produced went up from the first to the third text chat, from 57.83 words per participant to 114.13. This increase was found to be significant ($t(29) = 11.27$, $p < 0.001$) with a large effect size ($d = 0.87$). The same applied to the voice chat sessions where the number of words increased from 45.57 to 79.83, again a significant difference ($t(29) = 18.51$, $p < 0.001$) with a large effect size ($d = 1.96$). Participants produced more English in text chat ($M = 250.43$, $SD = 100.13$) than in voice chat ($M = 182.97$, $SD = 45.67$). Also this difference was significant ($t(29) = 5.66$, $p < 0.001$), with a large effect size ($d = 0.86$).

Comparing the Quantity of Interaction in Class and in the Game

To determine if participants produced more language during game play than in face-to-face activities, we compared the number of words produced in both conditions. The number of words produced in the communicative activities in the *classroom* was compared with the number of words produced during the last session of the *computer game* activities in which participants were by then a) confident in using a synchronous communication tool to interact with each other orally, and b) familiar with interaction in English in a computer game context. The face-to-face communicative activities and the last computer game session were deemed to be comparable. This is because they both took the same length of activity completion (i.e. 45 minutes) and both involved oral communication. We used a paired-samples t-test with alpha set at .05 to compare if there were any significant differences between the quantity of interaction in the classroom and the computer game. Students produced an

Table 3. Number of words produced during the six computer game sessions

		Text-based chat session[1]			Total	Voice-based chat session[1]				Total
		1	2	3		4	5	6	Total	
Total number of words		1,735	2,354	3,424	7,513	1,367	1,727	2,395	5,489	18,491
By each participant (N=30)	Min	17	28	51	101	22	33	51	106	313
	Max	115	154	235	487	79	86	140	305	1,073
	M	57.83	78.47	114.13	250.43	45.57	57.57	79.83	182.97	616.37
	SD	22.69	30.92	47.98	100.13	13.75	12.93	20.48	45.67	184.64

Note 1. Each computer game session lasted approximately 45 minutes.

average of $M = 41.90$ ($SD = 50.92$) during face-to-face interaction and during game play $M = 79.83$ ($SD = 20.48$). This difference was found to be statistically significant ($t(29) = 5.49$, $p < 0.001$), with a very large effect (see Table 4).

Quality of Interaction in the Classroom

When the language data was examined for evidence of discourse functions used during the 45-minute class activities, it was found that participants' interaction, in general, was marked by numerous short turns. As expected, participants were found to use their L1 very frequently, and their interaction included the use of 'Tinglish' (a form of English produced by native Thai speakers, characterised by such features as the adoption of Thai utterance particles at the end of a phrase or sentence, and word-for-word translation from Thai to English). Participants were also found to frequently revert to Thai, especially when they wanted to say something complicated, when they needed to solve communication problems, and when they wanted to convey emotions and feelings and to reflect the hierarchical and class structure of Thai society (for example by the use of status-indicating particles). In terms of the functional characteristics of the L2 production, participants produced several types of discourse functions, especially during group work, in order to complete the assigned tasks and maintain the interaction. However, their frequency was low (see Table 5).

Excerpt 1, which is unedited, provides examples of the categories and exhibits the nature of face-to-face oral interaction between participants while working collaboratively during a 15-minute group work as a preparation stage before performing a role-play. Individual participants are referred to by their game characters' names to preserve anonymity. Italicized utterances indicate where participants' L1 is used.

Table 4. Paired samples t-test for average number of words produced in class and in the game (N = 30)

Pair	Mean (SD)	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)	Effect size
		Lower	Upper				
Computer game **Class**	79.83 (20.48) 41.90 (50.92)	23.81	52.05	5.49	29	.000	$d = 0.97$

Table 5. Discourse functions of clauses in class activities (N =30)

	Activity 1 Discussion (15 minutes)		Activity 2 Interview Role Play (30 minutes)		Total
	Group	Class	Group	Class	
Greetings	0	0	0	0	**0**
Directives	5	0	9	0	**14**
Self/Peer corrections	0	0	6	0	**6**
Questions/Requests					
- Asking for opinions	6	0	8	0	**14**
- Request for information	3	0	5	0	**8**
- Questions on language/vocabulary	6	0	10	0	**16**
- Asking for explanations	2	0	0	0	**2**
- Confirmation checks	0	0	0	0	**0**
- Comprehension checks	0	0	0	0	**0**
- Clarification requests	8	1	10	0	**19**
- Requests for help	5	0	6	0	**11**
- General questions	5	0	8	0	**13**
- General requests	4	0	5	0	**9**
Responses					
- Giving opinions	7	0	8	5	**20**
- Explanations	4	0	4	0	**8**
- Clarification	6	0	6	0	**12**
- Feedback	8	1	9	0	**18**
- Trouble or non-understanding	6	1	6	0	**12**
- General responses	48	13	59	13	**133**
Humour	0	0	0	0	**0**

The Quality of Interaction in Computer Game Activities

The interaction during gameplay commonly featured a) extensive use of authentic language which was appropriate for the context, b) minimal use of the L1 (yet with the use of 'Tinglish'), c) misspellings (particularly, in text-based chat), and d) a number of simplified or reduced registers (especially in text-based chat), a unique style of interaction within the game which can be regarded as a form of online chat. Simplified or reduced registers here included a) the use of numbers, special characters, and symbols (i.e. emoticons to exhibit facial expressions, exclamation marks to represent tone of voice) to replace words, b) omission of articles and use of contractions (to make message delivery easier and faster), and c) abbreviations and acronyms (which were frequently posted in text-based chat). Use of simplified or reduced registers could be considered inappropriate for language learning, but it seemed to help participants to interact with each other quickly so that they

Excerpt 1. Preparing for the role-play

BB: Ok. We should start now.
Bingo: Not ready. Give me time to understand teacher request *kon*[1].
BB: Sure
Equal: We need how many character?
BB: Five. doctor, teacher, architect, musician, businessperson
Doraemon: *Took kon tong pood mai*?[2]
Static: Yes.
BB: We must to choose job and prepare dialogue.
Bingo: Explain please.
-The explanation and questions for more information reverted to Thai until each participant understood their roles-
BB: Time to speak English now.
Equal: OK. I need 2 minutes prepare.
BB: 2 minutes ok. What you think?

Note. [1] '*kon*' means 'first' in English.
[2] [Does everybody have to participate?]

could complete the game quest within the time allotted. Analysis of chat transcripts showed that participants generated a wide variety of discourse functions when playing and working collaboratively in computer game activities. Table 6 summarises the frequencies of the occurrence and types of discourse functions which were present while participants engaged in computer game activities.

Excerpt 2 exhibits the nature of text-based interaction during computer game session 2 when participants were helping each other to find a starting NPC.

When comparing L2 interaction in text-based chat and voice-based chat, it was found that participants generally produced a greater number and variety of discourse functions in voice-based chat than they did in text-based chat. Nevertheless, it is important to note here that, in addition to different modes of communication, the different number of participants in each modality (i.e. group work during text-based chat and pair work in voice-based chat) would probably partly explain this.

Many language functions identified in this study are considered beneficial for language development through social, collaborative interaction during gameplay. Greetings, asking questions and the use of requests, for example, were present frequently in both text-based chat and voice-based chat, when participants worked together, either to complete game tasks or to produce the language, thus creating a collaborative environment. Moreover, the finding revealed that, during greetings and small talk in most computer game sessions, humour was often found in participants' discourse as a means to facilitate social interaction. Analysis also revealed that participants requested information and help relating to gameplay, task completion, language issues, and technical matters during computer game activities. These requests increased from the first session to the last session of each communication mode. Moreover, the responses to these requests, which were quite promptly provided, were found to be appropriate, helpful, and supportive, offering strong evidence of participants' desire to help each other. A typical interaction can be observed in the following excerpt when participants requested and provided assistance regarding quest completion while interacting via voice-based chat during gameplay session 4.

Table 6. Discourse functions of clauses in computer game activities by all participants across all six sessions (N =30)

	Text-based chat			Total	Voice-based chat			Total
	Session[1]				Session[1]			
	1	**2**	**3**		**4**	**5**	**6**	
Greetings	5	3	3	**11**	15	16	22	**53**
Directives	16	20	29	**65**	18	21	28	**67**
Self/Peer corrections	15	17	19	**51**	7	15	24	**46**
Questions/Requests								
- Asking for opinions	11	18	27	**56**	9	14	17	**40**
- Request for information	17	25	30	**72**	25	30	32	**87**
- Question on language/ vocabulary	9	16	18	**43**	16	15	22	**53**
- Asking for explanations	7	12	15	**34**	10	12	14	**36**
- Confirmation checks	4	5	5	**14**	8	16	17	**41**
- Comprehension checks	2	4	5	**11**	7	15	16	**38**
- Clarification requests	10	16	19	**45**	18	24	26	**68**
- Requests for help	8	15	22	**45**	16	18	24	**58**
- General questions	12	25	27	**64**	17	20	22	**59**
- General requests	10	14	16	**40**	15	24	27	**66**
Responses								
- Giving opinions	11	19	28	**58**	11	14	21	**46**
- Explanations	8	13	15	**36**	10	15	16	**41**
- Clarification	10	17	20	**47**	18	25	26	**69**
- Feedback	12	15	17	**44**	14	15	24	**53**
- Trouble or non-understanding	5	6	7	**18**	17	19	23	**59**
- General response	180	245	332	**757**	59	75	160	**294**
Humour	5	7	10	**22**	4	5	6	**15**

Note. [1]Each computer game session lasted approximately 45 minutes.

Comparing the Quality of Interaction in Class and in the Game

To investigate the effects of playing computer games on the quality of L2 interaction, participants' discourse functions produced during the *two recorded class activities* and *the last computer game session,* were compared. The most interesting finding was the reduced use of participants' L1 during *gameplay* than in *class activities*. However, the primary purpose of L1 use was found to be similar in both settings - to successfully maintain their conversations in English. For example, the L1 was used together with the TL when participants wanted to express unknown vocabulary in English, to say something complicated, or to solve communication breakdowns. Furthermore, analysis of participants' interaction during *computer game activities* generally evidenced a wider variety

Excerpt 2. Help with finding a starting NPC in text-based chat in computer game session 2

Alphabeat: Hey friends!!!! We need to find npc shop manager to start quest.
Absolute: Um… where we can find manager *la*[1]?
Equal: quest say manager is in Izlude.
Absolute: yes, i know but where? and how we go?
KILLUA: We must read map teacher gave.
Farminggo: Yes!!!! Agree!!!!
Please wait. I reading map now.
Independent: read read read
DoTaeHee: I think i know place we can fine manager. Why not follow me?
KimTaeYeon: good idea ^^
BE: I can follow u anywhere but don't take me to hell.
DoTaeHee: 555[2]
Alphabeat: we should go to south and then to the rite. *right[3]
DoTaeHee: Yes
Follow me: I want 2 walk fast. do you know how 2 set?
KUMMONG: Sorry you can not. you are not gm. gm can do everything.

Note. [1] 'la' is an informal particle which does not add the meaning of a sentence and is used in spoken Thai
[2] '555' is the Thai version of 'lol' used in a text chat. The number '5' in Thai is pronounced as 'ha' so '555' would be 'ha-haha'
[3] * was used by this participant as a signal for self-correction

and a greater number of discourse functions than did the *class activities* (see Table 7).

Although no statistical tests were carried out to determine if there were any statistically significant differences in the quality of interaction between *class* and *computer game activities*, there were indications in the transcripts that *computer games* might be effective in encouraging Thai EFL learners to produce more discourse functions.

Excerpt 3. Request for and provision of assistance regarding quest completion via voice-based chat during computer game session 4

Shadow: I lost quest sheet so I not read it for today. Please explain me.
Alphabeat: Yes, sure. Quest is test knowledge about OS. We need to find 'Tutor' to accept the quest. 'Tutor' will ask we advise other NPCs about OS. When finish, we can upgrade to 'Novice High.' Understand?
Shadow: Yes, I understand. Let's do it now!
.....10 turns of dialogues.....
Shadow: Good job, buddy. What we should do next?

Table 7. Discourse functions used by all participants in class and computer game (N = 30)

	Class Activities	Computer game Activities
Greetings	0	22
Directives	14	28
Self/Peer corrections	6	24
Questions/Requests		
- Asking for opinions	14	17
- Request for information	8	32
- Questions on language/ vocabulary	16	22
- Asking for explanations	2	14
- Confirmation checks	0	17
- Comprehension checks	0	16
- Clarification requests	19	26
- Requests for help	11	24
- General questions	13	22
- General requests	9	27
Responses		
- Giving opinions	20	21
- Explanations	8	16
- Clarification	12	26
- Feedback	18	24
- Trouble or non-understanding	12	23
- General responses	133	160
Humour	0	6

DISCUSSION

The results from our study allow us to draw a number of conclusions. Firstly, students in this institution (and on the basis of findings from previous studies, most likely most tertiary students in Thailand) report using English very little in class, even when engaged in supposedly communicative activities. Perhaps not surprisingly, they feel they use English more often in class when talking with friends than by responding to the teacher. Analysis of in-class recordings of L2 interaction revealed that participants only spoke an average of 42 words per session. The use of the Thai language was common, even during communicative activities such as discussions and interviews. Due to the small amount of L2 production, it was not surprising to observe little use of the different discourse functions in the recorded class activities.

During the game sessions the quantity and quality of L2 use was quite different. Participants produced significantly more language during gameplay than in the class sessions, with a very large effect size. Participants also produced significantly more English over time from the first to the last recorded game session, and they produced more English during text chat than during voice chat. Finally, participants produced

a wider variety of discourse functions in computer game activities than in class activities.

These finding are particularly supportive of a) the SCT perspective in that gameplay could be conceptualised as a sociocultural activity, including game tasks that generally enable learners to produce more language, and b) the constructivist approach in that for these participants it was important to interact in the target language even though they knew they made mistakes, which is an important part of the learning process.

All of these results point to a number of factors that appear to strongly impact Thai learners' experience of learning and using English. One of these is related to the issue of anxiety. Participants indicated associating speaking English with feeling anxious and incompetent. Willingness to Communicate has been proposed as a term to capture a range of different factors that contribute to learners engaging, or choosing not to engage, in L2 communication (MacIntyre, Dörnyei, Clément, & Noels, 1998). Issues such as motivation, individual differences (overt versus extravert learners), risk-taking, and others play a role in determining whether a particular learner, or indeed groups of learners, is more or less likely to speak. In the classroom setting, the participants in this study reported a number of affective barriers to their engagement, at least in situations where they had to communicate 'publicly'.

Activities that provide a degree of security, on the other hand, encouraged learners to participate more. An example of this is the activities learners complete together with friends, even in class (which they rated as more likely to lead them to speak English). However, it was the game environment and characteristics that led to a significant, and remarkably large, increase in the use of English. Zhao and Lai (2009) explain that through anonymity during gameplay, players are less inhibited in L2 interaction and more freely experiment with the language to accomplish game quests. In addition, activities that are conducted in a safe, fun, engaging, and non-threatening setting, like quest completion, may encourage participants to interact in the L2 more. This possibility was identified in the questionnaire and interview findings of our further study (Reinders & Wattana, 2014a) conducted to identify how the participants experienced communication in the game sessions, but early indications and observations made during the study itself showed that participants felt much more comfortable while playing games and more confident in using the target language. According to the interview, one participant, who did not talk much in class but appeared to show increased participation in the game, felt that computer games contributed to her increase in L2 production. She also explained how she experienced emotional security during gameplay: *"I used English a lot because I could say anything and do everything I could to accomplish a game task."* Additionally, another student supported the idea that the low-anxiety atmosphere in the game allowed him freedom to interact in the L2. Interestingly, he said that he felt uninhibited to talk even though he did not know much about things to say in the game, and that he talked more and freely in the game, especially, when his partners were very funny, friendly, and supportive. This is also evident in other studies which found learners' positive attitudes towards the security aspect in computer games (Peterson, 2011, 2012; Reinders & Wattana, 2011; Zheng, Young, Brewer, & Wagner, 2009).

This is in line with research that has shown the affordances of gaming environments for the development of alternative or additional personae, related to but also in a way distinct from the person who creates them (Turkle, 1997). Pearce (2009) has argued that online spaces, and in particular those found in online role playing games, allow for a process of 'disembodiment' and subsequent 're-embodiment', where players create new identities that are subsequently integrated into their own lives. Although a further discussion of this subject is beyond the scope of this article, it is clear that such studies have shown the affective impact of participating in such online environments. In our study one of the results was clearly a reduction in some of the barriers that learners perceived

in traditional classroom communication, and an increased willingness to communicate online.

Another result from our study supports this possibility; our observations showed that target language production was significantly higher during text chat than during voice chat. One of the reasons is most likely that speaking for these learners is more difficult than writing, but speaking is also more personal. Through the voice it is directly related to the person and as such may be seen as more threatening than text chat. This finding is in line with previous research (see Abrams, 2003; Kern, 1995). However, language use during voice chat was still significantly higher than during classroom communication, showing that participants felt more comfortable in the game environment.

Another reason for our findings may be that in games the focus is, or at least is perceived to be, less about accuracy than about fluency. Many tasks require immediate decision-making and quick collaboration and therefore communicative engagement is a requirement. As reported above, Mackenzie (2002) and others have shown many Thai learners to be extremely concerned about producing accurate language and avoiding mistakes at all costs. This often leads to limited communication. In the context of games, however, learners may not feel so much pressure and are more likely to take risks in their L2 production.

These results have a number of implications. Firstly, the results corroborate earlier observations about the very small amount of language use by English learners in classroom-based learning. Kaplan and Baldauf (1997), for example, have shown that the amount of language production in foreign language classes is far smaller than generally assumed, and also far smaller than is needed for the development of conversational skills. In Thailand in particular, this is a common and well-documented problem (see Khamkhien, 2010, 2011). Unfortunately, our study lends further support to these observations; on average participants only produced 42 words in class. Considering that for most learners their English classes offer the only opportunity for target language interaction, this is likely to be insufficient.

At a practical level, this implies the need for teachers to be aware of the stated purposes of their lessons and in particular communicative activities such as discussions and interviews, and learners' actual engagement with these. The use of measures of engagement such as recordings, observations, and also students' own records, may be helpful to determine if all learners are indeed getting the intended amount of practice. Where this is not the case, teachers can take remedial action.

For classroom-based communicative activities our results also point to the need for teachers to create an atmosphere that is supportive and non-threatening. Participants in our study indicated they used English more with friends in class than in other groupings; perhaps teachers could allow students to self-select their pairs and groups, at least initially.

Another implication of this study is that games, or at least the digital games used in this study, do appear to lead participants to be more willing to communicate in English. The difference between language production in the classroom activities and in the game sessions in our study was considerable, and as students became more familiar with the game environment, their language production went up. This shows the potential for games to draw even learners who are known to be reluctant to use the target language to speaking in English. In particular in contexts such as Thailand where many learners are perceived to lack in motivation to learn English (Maneekhao & Tepsuriwong 2009), games may offer a degree of much-needed excitement. At a very practical level, games may also afford teachers in Thailand and other countries opportunities to encourage interaction that would otherwise be difficult to achieve schools with commonly large average class sizes.

The use of a digital games may not be feasible for all teachers, but the principles underlying game play can be emulated in other ways, either through non-digital games or by creating environments perceived by learners to

be 'safe' and that are intrinsically motivating, perhaps by being entertaining. The game environment in this study also encouraged learners to collaborate. Various tools are available for players to find others, to share information with them and to complete tasks together. We encouraged this further by developing simple quests that required students to find information, exchange it, work with other students, and generally to communicate. These are attributes of classroom activities that can be incorporated in other, non-game, settings too. This may be particularly important in contexts where the use of games is not commonplace, or may raise concerns among, for example, parents about the perceived potentially detrimental effects of game play.

CONCLUSION AND LIMITATIONS

Finally, we would like to acknowledge a number of limitations of our study. Firstly, the first two sessions of the course were recorded and as face-to-face sessions were compared with later game sessions. It is possible that participants were more reluctant to communicate in English in the very first session than in later sessions and that this may explain the higher incidence of English communication in the game. Although we do not entirely reject this possibility, it is worth pointing out that all the students knew each other as they were enrolled in the same courses for their major. All students were also very familiar with the discussion activities used, as they were commonly used in preceding courses. We therefore feel the first session did not present a novel environment. Observations made by the teacher-researcher showed similar patterns of communication in later face-to-face sessions. Ideally, however, these would have been recorded to be able to complete a more direct comparison. Also, as one of the reviewers pointed out, future studies could look at ways of pairing students with native speakers.

Another limitation was that students were paired during the voice chat in game sessions but worked in small groups in class. Clearly, pair work activities have a number of characteristics that make them different from small group of class activities; students are likely to feel less anxious when interacting with only one person. The reason why we chose this pairing was that at the time of the study it was technically not possible to allow voice communication within the game between more than two players at a time. Although learners worked together in pairs, other players were present in the game and the experience was not exclusively focused on the two players only.

Furthermore, the researcher was also the teacher. Her interest in the use of games may have impacted on her delivery style of the classroom sessions. We guarded against in several ways; firstly, the co-author of this paper observed classroom communication and transcripts of the recordings and did not find evidence of this. The classroom sessions were delivered with enthusiasm and apparent dedication. It is worth pointing out that the researcher-teacher has extensive experience in teaching face-to-face classes and we therefore do not feel that the students received a very different kind of teaching in the two environments. Having said that, the possibility exists that the students experienced such a difference, and this may have impacted the results to some extent.

Finally, it could be argued that we are comparing spoken interaction in class with written interaction in the game, at least in those sessions where participants were asked to communicate through text chat. In our opinion, however, text chat of the nature reported here is much more similar to spoken interaction than writing (see Hamano-Bunce, 2011) and we therefore feel the results can be compared.

In conclusion, we hope with this study to bring attention to the need for improvement in the teaching of oral skills and the potential of games for this. Digital games are now such a large part of our students' lives, that finding pedagogically sound ways of incorporating them into the classroom may be a much needed challenge for the language teaching profession to tackle. Just as music and movies are no longer

absent from most classrooms, games too may have a role to play. There are many relatively easy tasks that can be built around existing games (cf. Reinders, 2009 for examples related to the teaching of writing) without the need for extensive technical knowledge or investments and we studies such as this one will encourage teachers to look more closely at the possibilities of bringing games into the curriculum.

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