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Abstract

This paper reports on the task-based interaction of English as a Foreign Language (EFL) learners in the 3D multiuser virtual environment (MUVE) Second Life. The discussion first explores research on the precursors of MUVEs, text-based 2D virtual worlds known as MOOs. This is followed by an examination of studies on the use of MUVEs in Computer Assisted Language Learning (CALL). The discussion then focuses on an investigation of the Second Life-based text chat of learners located at a university in Japan. Data analysis reveals that the environment, and tasks, elicited types of collaborative interaction hypothesized as beneficial in the sociocultural account of language development. Collaborative interaction identified in the data involved peer-scaffolding focusing on lexis, and correction. The data further showed that the participants actively maintained a supportive atmosphere through the provision of utterances designed to signal interest, and the extensive use of positive politeness. These factors facilitated social cohesion, intersubjectivity, and the consistent production of coherent target language output focused on the tasks. Participant feedback was broadly positive, and indicates that specific features of Second Life such as individual avatars, coupled to the computer-based nature of the interaction, appeared to enhance discourse management, engagement, and participation. The findings suggest that Second Life provides an arena for learner centered social interaction that offers valuable opportunities for target language practice, and the development of autonomy. Areas of potential for future research are identified.

Keywords: Second Life, MUVE, MOO, interaction, computer mediated communication (CMC), CALL

1 Introduction

Developments in computer technology have increasingly influenced contemporary language education. The use of computers in language programs has become mainstream, and this has been accompanied by a major expansion of research on CALL (Garrett, 2009). The emergence of a wide range of network-based communication tools, which enable learners to engage in learning activities in institutional environments, and informal settings that operate outside the boundaries of traditional language classrooms, has attracted increasing attention from CALL researchers (Thorne, Black & Sykes, 2009). In this context, an expanding area of research has focused on

investigating the use of computer-mediated communication (CMC) tools that facilitate various types of synchronous (real time) interaction. Of these, communication environments that utilize text chat have been the subject of extensive research.

1.1 Research on the use of text chat tools

To date, the majority of learner-based studies reported in the literature have focused on the use of various text chat tools such as chat rooms. (Beauvois, 1997; Blake, 2000; Chun, 1994; Hudson & Bruckman, 2002; Kelm, 1992; Smith 2003; Tudini, 2003; Warschauer, Turbee, & Roberts, 1996). This research has been motivated by claims that the computer-based nature of interaction in CMC environments that utilize typed text promotes more equitable participation patterns, and learner centered interaction (Warschauer, Turbee, & Roberts, 1996). The anonymity provided by typed text has been perceived as supporting language development by facilitating risk-taking (Chun, 1994). This feature of CMC can also reduce barriers to learning such as inhibition, and status concerns (Hudson & Bruckman, 2002). Moreover, network-based communication tools that utilize text chat offer the advantages of enhanced monitoring through the availability of scrolling, and provide learners with additional time (Swaffar, 1998). This body of research has consistently confirmed a number of positive findings. These include increased participation, motivation, and production of target language (henceforth TL) output incorporating a wide variety of discourse structures (Beauvois, 1997; Chun, 1994; Hudson & Bruckman, 2002; Kelm, 1992; Warschauer, Turbee, & Roberts, 1996). Additional advantages noted in the literature are the enhanced opportunities to engage in beneficial types of collaborative TL interaction involving repair strategies that are claimed to facilitate the cognitive restructuring that occurs during the negotiation of meaning and form (Blake, 2000; Lee, 2008; Smith, 2003; Tudini, 2003). Although the use of text chat tools remains a major focus of research on network-based CALL, the use of 2D virtual worlds has also been the subject of investigation.

1.2 Research on the use of MOOs in CALL

Among 2D virtual worlds, multiuser domains object orientated, popularly known as MOOs, have generated a considerable literature as, unlike chat rooms, they provide access to persistent theme-based virtual worlds that are frequently user created. Although like chat rooms MOOs incorporate text chat, they enable users to construct unique online personae through anonymous character-based communication. These virtual worlds further provide access to complex virtual geographies where users can create and manipulate content (Shield, 2003; Peterson, 2001).

The opportunities for TL interaction involving negotiation, risk-taking, role play, and social communication created by MOOs have been the focus of learner-based studies (Kötter, 2003; Schwienhorst, 2002; Warner, 2004). Research reported by Schwienhorst (2002) found evidence that negotiation of meaning occurred. The interaction was further characterized by the operation of a high degree of learner autonomy. A study on learner interaction in a MOO designed for language learning, conducted by Kötter (2003), indicates that the participation in MOO-based interaction produces frequent instances

of meaning negotiation. The data showed that this was heavily influenced by the computer-based nature of the interaction producing an emphasis on direct rather than indirect repair strategies. Warner (2004), found that interaction in a MOO created valuable opportunities for beneficial behaviors including language play, and risk-taking. This research highlighted the low-stress environment created by the reduction in social context cues, which led to the formation of collaborative social relationships based on the exchange of interpersonal information in the TL.

Advances in computer technology have resulted in the creation of real time communication environments that combine established tools with more recent innovations. Of these, MUVEs have become a focus of attention in the literature. The discussion will now examine the key features of these environments. This will be followed by an overview of the current limited research on the use of text chat in MUVEs.

1.3 Research on the use of MUVEs in CALL

MUVEs share a number of features with other types of real time CMC tool. These include access to persistent theme-based virtual worlds that are frequently user created. MUVEs further incorporate text chat, and data recording. However, as table one shows, they provide a unique combination of features that offer additional potential advantages over other tools as venues for CALL. A feature of MUVEs not found in MOOs is access to commercial quality 3D interfaces that incorporate a high degree of visual appeal. This aspect may enhance learner engagement (Cooke-Plagwitz, 2008). A further distinguishing feature is the presence of multiple communication channels. In contrast to MOOs, users of MUVES can utilize text and voice chat, providing multiple sources of real time feedback on TL production. Another beneficial feature is the availability of user controlled agents known as avatars that facilitate anonymity. Furthermore, an individual can customize the appearance of their avatar, and this may act to enhance the sense of attachment and immersion experienced by users (Svensson, 2003). As avatars can traverse virtual space, and communicate with other avatars in real time through chat and gestures, it is claimed they make possible new motivating forms of social interaction that may enhance participation, and the production of TL output (Cooke-Plagwitz, 2008). The potential advantages for language learners offered by interaction in MUVEs have been noted in the literature (Peterson, 2011; Thorne, Black & Sykes, 2009; Stevens, 2006). Researchers have attempted, in an emergent body of work, to explore learner text chat interaction in MUVEs.

Table 1 *Hypothesized advantages of MUVEs*

Tool	MOO	MUVE
Features	2D theme-based virtual worlds	Immersion in visually engaging theme-based 3D virtual worlds
	Single communication channel	Multiple communication channels
	Interaction through text-based characters	Presence of user controlled personal avatars facilitate enhanced telepresence and engagement

Table 2 *Significant findings of research on the use of MUVEs*

Researcher(s)	Toyoda & Harrison (2002)	Peterson (2006)
Number, background and location of participants	Five learners of Japanese in Australia and native speakers of Japanese located in Japan and the United States	Twenty four EFL learners based at a university in Japan
Project duration	Ten one hour sessions held over a semester	Three one hour sessions
Methodology	Qualitative analysis of text chat transcripts	Analysis of chat transcripts Researcher observation Questionnaires
Key findings	Communication problems arose and were resolved through negotiation of meaning Limited typing skills and L2 proficiency led to technostress and instances of communication breakdown Avatar utilization was limited	Transactional and interactional discourse management strategies used to produce coherent TL output L1 use infrequent Negotiation occurred most frequently in the decision-making task and focused on lexis Presence of avatars enhanced presence and facilitated communication Positive learner feedback

A study on learner and native speaker interaction in the MUVE Active Worlds conducted by Toyoda and Harrison (2002) revealed significant findings. As table two shows, the data indicated that communication problems arose, and it was observed that, on occasion, these were resolved successfully through negotiation of meaning. This study identified a number of factors that hampered interaction. As a result of limited typing skills, and L2 proficiency, a number of subjects experienced persistent difficulties in dealing with the messaging system. This led to instances of technostress and communication breakdowns. The researchers reported that little use was made of the avatars, as the learners appeared fully preoccupied following the discourse, and managing the chat system.

Peterson (2006) explored the task-based interaction of learners in a research project that made use of Active Worlds. Three task types were implemented: jigsaw, opinion-exchange, and decision-making. As table two shows, the researcher found that the learners utilized a mixture of discourse management strategies, and that these facilitated the consistent production of TL output. In a significant finding, it was discovered that the interaction was carried out almost exclusively in the TL; instances of L1 use were infrequent. The data further indicated that the subjects collaborated and engaged in negotiation of meaning in all three sessions. Negotiation was found to focus on unknown lexis. There was limited evidence of task-induced

effects; negotiation was most frequent in the decision-making task. Analysis showed that negotiation was largely incidental in nature, and infrequent across the data as a whole. Researcher observation and learner feedback confirmed that the learners made active use of their avatars, and that they facilitated communication and telepresence. Learner feedback was largely positive, with the majority of participants claiming that the interaction was interesting and enjoyable.

2 Research questions

As the previous discussion has shown, although existing studies have produced some positive findings current research is limited, and many areas remain unexplored. Few studies have focused on exploring learner collaborative interaction, and the role played by the specific communication features of MUVEs, such as avatars. There also remains a need for additional data on the important area of learner attitudes. In order to explore the above issues, and add to the literature, this research will investigate the following questions:

1. Do EFL learners engage in collaborative social interaction in Second Life?
2. In what ways, if any, did the computer-based nature of the interaction and the communication tools provided by Second Life facilitate the production of TL output?
3. What are learner attitudes toward interaction in Second Life?

3 Methodology

3.1 Participants

The learners in this study were eight EFL undergraduate students enrolled at a university in Japan. The learners were science majors who took part as volunteers. Written consent was obtained for the collection and analysis of learner data. The pre-study questionnaire revealed the following information:

As table three shows, three of the learners were female, and ages ranged from 19 to 23 years. The average age of participants was twenty. In terms of computer skills, all

Table 3 *Participant background information*

	Nationality	Gender	Age	Proficiency level
Learner 1	Japanese	Male	23	Advanced
Learner 2	Japanese	Female	21	Advanced
Learner 3	Japanese	Female	20	Intermediate
Learner 4	Japanese	Female	21	Intermediate
Learner 5	Japanese	Male	20	Intermediate
Learner 6	Japanese	Male	19	Intermediate
Learner 7	Japanese	Male	20	Intermediate
Learner 8	Japanese	Male	19	Intermediate

of the learners claimed to be experienced computer users who regularly used e-mail, and word processing software. In their responses, the participants indicated that they possessed no prior experience of using Second Life or any other MUVE.

3.2 Procedures

As research suggests that novice users would benefit from training, a pre-study orientation session was conducted (Peterson, 2006). This provided a thorough overview of the environment, including practice in utilizing communication, and navigation features. The participants then undertook four text chat sessions conducted once a week over a period of one month during the autumn semester in 2009. Each of the sessions involved a different task and lasted approximately seventy minutes. There were slight variations in the duration of the sessions due to occasional lateness. As a result of restrictions on student network access, each of the participants accessed Second Life from a separate off-campus location. The researcher was present in Second Life during each session. Although guidance was provided during the first orientation session, researcher input in the remaining sessions was limited to interventions relating to procedural matters. The learners were requested to work in dyads or small groups if possible. However, they worked with different partners during the tasks.

Data collection took the following form. In each of the task sessions, the researcher logged the participant's text chat using the transcript-recording feature of Second Life. At the conclusion of each session, the data was saved to a log file for analysis. In order to facilitate data analysis, at this stage, automatically generated systems messages were removed. In an effort to obtain additional sources of data, the researcher took field notes of significant events while observing the interaction. These data sources were supplemented by learner feedback gained from a post-study questionnaire, and informal interviews conducted after the final session.

3.3 Research venue: USQ Island

The venue selected for this research, USQ Island, is hosted at the University of Southern Queensland, and presents users with a 3D simulation of an Australian university campus[1]. Features include student lounges, gardens, and a club. USQ Island incorporates a number of features designed to facilitate learning. Innovative teaching tools utilized in this research included a virtual lecture theater that may be observed in figure one. A further novel tool in USQ Island is the *opinionator*. As figure two shows, this Likert scale graphing tool enables data on responses to be collated and displayed in real time as users respond to questions and comments from peers by moving their avatars into different sections marked *strongly disagree*, *disagree*, *neutral*, *agree*, *strongly agree*. USQ Island was utilized as the platform for this research as it provides a reliable platform that restricts access to unauthorized users.

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[1] The author is grateful to Ann Smith and Lindy McKeown for their assistance in facilitating this research.

Fig. 1. Lecture theater in USQ Island

Fig. 2. Participants utilizing the *opinionator*

3.4 Tasks, tools, and venues

The design of the tasks was influenced by the CALL literature, and in particular, research on learner interaction in Second Life and other types of MUVE (Peterson, 2006; Wang, Song, Stone & Yan, 2009). The tasks were designed to meet learner needs, and encourage active participation. They involved the use of specific venues and tools, within USQ Island. The tasks were also designed to elicit meaningful collaboration, by engaging learners in purposeful interaction on topics and activities of likely interest. Table four provides further relevant information on the tasks.

4 Results

Discourse analysis of transcript data coupled with analysis of researcher field notes, post-study questionnaires, and interviews were employed to report on, and justify,

Table 4 *Tasks, activities, venues and tools*

Task type	Session	Task activities	Venue and/or tools utilized
Decision-making	One	Treasure hunt involving the exploration of various locations designed to familiarize learners with navigation and communication features of Second Life. Participants then requested to select from a number of alternatives a location for future meetings.	Garden Student lounge Student club
Opinion-exchange	Two	Participants navigate to a requested location then exchange views on the question "How can language education in Japan be improved?" In response to related follow up questions learners walk their avatars into sections of the Opinionator and provide reasons to support their opinions.	Garden Opinionator graphing tool
Opinion-exchange	Three	Participants navigate to a requested location then exchange views on the question "What do you think about the reaction to the recent swine flu outbreak?" In response to related follow up questions learners walk their avatars into sections of the Opinionator and provide reasons to support their opinions.	Garden Opinionator graphing tool
Presentation	Four	Before the session learners are requested to read articles on the banking crisis, global warming, and gender roles in contemporary Japan. The participants navigate to the requested location then each provided a short written presentation on one of the above topics, and take questions.	Garden Outdoor lecture theater

the findings. During the discourse analysis, evidence emerged for types of collaborative interaction hypothesized as beneficial in the sociocultural account of SLA. In the following discussion, excerpts of learner data are utilized to illustrate significant findings. The data excerpts are unedited and messages not relevant to the interaction are placed in parenthesis. In order to provide for anonymity, each participant is provided with a pseudonym.

4.1 Peer scaffolding focused on lexis

From the sociocultural perspective, the scaffolding that occurs between learners and more capable peers during social interaction plays an important role in language development by enabling learners to expand their problem solving skills through

collaboration (Ohta, 1995). A significant feature of the data in this regard, was the presence of scaffolding involving the successful resolution of communication problems elicited by the use of unknown lexis.

An instance of this type of peer scaffolding where the communication issue was resolved promptly, occurred during the presentation task held at the lecture theater in session four:

(1) 1. Learner 5: In UK, Chancellor Alistair Darling,
2. Learner 5: has announced plans for a one-off super-tax on bankers' bonuses as part of his pre-Budget report to help reduce unemployment.
3. Learner 4: excuse me… have a question what is a super tax
4. Learner 5: ok
5. Learner 5: go ahead
6. Learner 4: what is a super tax
7. Learner 2: he asked what super tax is.
8. Learner 5: super tax is a very high-rate tax
9. Learner 4: thanks

As the above excerpt shows, in line three, learner four signals in a request for assistance that incorporates politeness, and a repetition, that they are unfamiliar with the meaning of *super tax*. Learner five responds promptly in the next two turns, first signaling a willingness to respond, and then inviting learner four to proceed. In line six, learner four then repeats the original request. In line seven, another learner who has been monitoring the interaction, attempts to further assist learner four by drawing attention to the previous request through the use of a repetition. In line eight, learner five provides appropriate additional information relating to the meaning of the unknown vocabulary. In the next turn, learner four confirms that this helpful feedback has resolved the problem, and that understanding has been achieved.

There were also instances where peer scaffolding occurred over an extended period of interaction. A typical instance of this phenomenon occurred in session three during the opinion-exchange task on a recent influenza outbreak:

(2) 1. Learner 3: The threshold can vary, though
(one line of text)
2. Learner 2: what do you mean?
(one line of text)

In the above interaction in line two, learner two appears unable to understand the meaning of *threshold* and signals this situation through the use of a request for assistance. There then unfolds an extended series of collaborative interactions involving scaffolding:

3. Learner 3: ok, I will explain
(one line of text)
4. Learner 3: If only those that want get vaccinated, the rest wouldn't be vaccinated, right?
(one line of text)
5. Learner 2: yep
6. Learner 3: Then the community doesn't have to the flu.
7. Learner 3: sorry

8. Learner 3: Then the community doesn't have immunity to the flu.
(two lines of text)
9. Learner 2: difficult…

In lines three, four, six, seven, and eight, learner three makes repeated attempts to provide assistance in the form of an explanation incorporating additional information. This effort, which involves a self-correction in line eight, initially fails to resolve the issue, as in line nine learner two signals that understanding has not been achieved.

However, a communication breakdown does not occur. As the remainder of the excerpt shows, in line ten, learner three responds to the utterance made in line nine by providing a lengthier and more accurate explanation in lines ten through thirteen. This attempt to resolve the issue through the provision of additional relevant information is eventually successful, as after a delay of one turn, learner two in line fourteen indicates that the problem has been resolved through feedback that incorporates the use of an explicit statement of understanding:

10. Learner 3: In such a community, even those who have been vaccinated can contract the flu.
11. Learner 3: In a community that has a herd immunity, the possibility of someone vaccinated getting the flu is significantlly small.
12. Learner 3: That's the reason why I strongly agree.
(two lines of text)
13. Learner 3: If we don't vaccinate everyone, the whole vaccination is almost useless.
(one line of text)
14. Learner 2: oh i now understand

4.2 Peer scaffolding focused on correction

A further type of peer scaffolding that appeared in the data was other-initiated correction, where a peer would take the lead in assisting their partner in correcting an erroneous utterance by providing feedback. An instance of this type of collaborative interaction occurred at a later stages of session four:

(3) 1. Learner 2: women are less paid, so they have no other choice but to 'hunt' for a rich man
2. Learner 2: this is what he says
3. Learner 2: i never thought of the 'payment' when considering the issue.
4. Learner 3: Melody: Me either. interesting!
5. Learner 2: what do you think about it mito? i want women's opinion.
(three lines of text)
6. Learner 5: sory, payment means spending money?
7. Learner 2: salary, i mean

In the above interaction, in line six, learner five makes an utterance incorporating politeness, which draws attention to the vocabulary error made by learner two in line three. As can be observed in line seven, this prompts learner two to make a correction in the following turn.

4.3 Continuers

The data showed that the learners made frequent use of another type of assistance identified in sociocultural research; this involved the production of TL utterances designed to signal attention, interest, and encourage an interlocutor to continue. These utterances known as continuers (Foster & Ohta, 2005), were a feature of the data as may be observed in the following excerpt from session two:

(4) 1. Learner 7: mito any comment?
2. Learner 6: other countries student doesn't mind making mistakes
3. Learner 3: yeah right
4. Learner 7: How do you know that?
(5 lines of text)
5. Learner 6: I lived in England and everybody didn't mind making it.

In excerpt four, learner seven signals interest by first eliciting task-focused feedback from their interlocutor through the use of a question. After an appropriate response from learner six, a further question relevant to the task is employed in line four. This incorporates a clarification request designed to elicit additional task-related feedback, and signal that the interaction is ongoing. As the above interaction shows, this attempt is successful in eliciting an appropriate response.

Another instance of the use of continuers involving questions relevant to the task appeared in session three:

(5) 1. Learner 5: how about the money issue?
(one line of text)
2. Learner 5: what do you think?
3. Learner 4: All the money spent preparing for swine flu was wasted
4. Learner 7: disagree
5. Learner 3: this issue is difficult
6. Learner 5: why Diane?

This interaction shows how learner five successfully uses continuers in the form of questions designed to signal interest and to elicit a reaction from the group. Data analysis indicated that the consistent use of continuers throughout the sessions appeared an effective means to drive the interaction forward, and also to create a context conducive to ongoing interaction focused on the tasks.

4.4 Social cohesion

A characteristic of the data was the presence of TL dialogue focusing on the establishment, and maintenance, of social cohesion. Research on the use of CMC in CALL conducted from a sociocultural perspective (Darhower, 2002), has indicated that language development may be facilitated when learners build a supportive discourse community based on social cohesion. In this research, social cohesion was achieved through the development of collaborative interpersonal relationships that were sustained through the frequent exchange of information. The subjects built these relationships through the use of politeness strategies.

The data contained evidence that the subjects effectively utilized positive politeness strategies designed to display familiarity (Brown & Levinson, 1987). One frequent use of politeness observed in the data involved greetings and leave-takings. Researcher observation revealed that these types of politeness occurred from the first session onwards, and that the subjects devoted considerable time to both greetings and leave-takings. Analysis revealed that most greetings involved the use of positive politeness, that is, informal utterances designed to signal a common identity, and in-group status. As the following interaction from session one shows, greetings were informal in nature, and directed toward the group:

(6) 1. Learner 4: Hey!
2. Learner 1: hello
3. Learner 1: I'm a student who take the class of the theory of communication.
4. Learner 2: Hey!
5. Learner 1: hello!
6. Learner 2: hello!
7. Learner 8: Hi

The informal nature of the interaction during greetings was also observed in leave-takings. However, in a finding that suggests increasing social cohesion, the data indicated that as the project progressed, leave-takings grew more lengthy, and incorporated off-task utterances involving the exchange of interpersonal information, as may be seen in the following interaction from session three:

(7) 1. Learner 4: bye for now.
2. Learner 6: good bye
3. Learner 4: Hey!
4. Learner 7: buy!
5. Learner 5: by-
6. Learner 1: take care of yourself!
7. Learner 3: See you.
8. Learner 4: see you next week!
9. Learner 6: i have CALL test..
10. Learner 5: Me too.
11. Learner 6: see you next week
12. Learner 1: good luck > diane
13. Learner 4: hey you don't wnat another class:-)
14. Learner 3: Good luck with your test!!
15. Learner 7: good luck diane
16. Learner 5: See you.
17. Learner 2: good luck!diane
18. Learner 3: bye
19. Learner 6: thanks!!!!
20. Learner 6: bye-

As excerpt seven shows, the learners engaged in multiple leave-takings directed towards the group, and specific individuals. Moreover, during leave-takings the subjects utilized another form of positive politeness, small talk. In the above interaction,

the small talk revolves around a forthcoming test. Researcher observation and transcript data revealed that the use of small talk in the initial stages of interaction, and after task completion, increased significantly in the later sessions. This finding draws attention to the efforts made by the subjects to display a collaborative face to interlocutors, and to build rapport.

Additional instances of positive politeness identified in the data that were used to consolidate social cohesion included the use of humor (excerpt eight), colloquial expressions (excerpt nine), and inclusive forms such as we and us (excerpt ten):

(8) l. Learner 1: are you a goblin?
(2 lines of text)
2. Learner 6: haha

(9) 1. Learner 2: a bar in a virtual world
2. Learner 8: oh fantastic!
3. Learner 2: coooooooooooooool!!!!!!
4. Learner 5: woo
5. Learner 7: cooooooooool!!

(10) 1. Learner 3: in fact, most of us are quite proud of the fact that we are not interested in getting a job.
2. Learner 3: We all want to become researchers, so getting a job at a company isn't a real goal for us.

The extensive use of positive politeness designed to minimize the social distance between interlocutors enabled the participants to build supportive relationships, and display sociability. Moreover, researcher observation and transcript data confirmed that the effective use of politeness contributed to the creation of a relaxed, supportive atmosphere, conducive to self-expression.

4.5 Intersubjectivity

A significant feature of the participant's collaborative dialogue was the creation and maintenance intersubjectivity, that is, a shared communicative context and state of understanding that facilitates task completion (Anton & DiCamilla, 1998). An instance of this type of collaborative interaction occurred in the early stages of session two:

(11) 1. Learner 2: actually, I created it myself.
2. Learner 1: you are genius!
3. Learner 4: is everyone here?
(two lines of text)
4. Learner 4: does everyone know the task?
5. Learner 5: I know
6. Learner 2: yes
7. Learner 6: yes
8. Learner 3: yes
9. Learner 1: yes
10. Learner 7: yep

In the opening lines of the above interaction, two learners are engaged in small talk regarding avatar design. The remainder of this excerpt contains a range of interactional features associated with the establishment of intersubjectivity. In line four, learner four attempts through the use of a question incorporating a continuer, to confirm that the other participants are present. In lines five through ten, the other learners signal in their feedback that they are aware of the requirements of the task.

In line eleven, learner four attempts to elicit task-related feedback from the group through the use of a continuer that incorporates a task-focused question:

11. Learner 4: so lets start.do you agree that language education in japan needs reformed?
    (one line of text)
12. Learner 5: I think we need reform
13. Learner 6: yeah maybe
14. Learner 2: abosulutely
15. Learner 2: absolutely
16. Learner 3: I agree
17. Learner 1: i think so too
18. Learner 7: me too
19. Learner 1: Japanese student cannot speak English well
20. Learner 2: Though they have studied it for about 6 years

As may be observed in lines twelve through twenty, this attempt to establish intersubjectivity is successful. In response, the other participants signal agreement, and that the interaction is ongoing. In the final two lines, learners one and two make statements that are designed to move the interaction forward by providing additional information relevant to the task. These utterances indicate that the learners established a shared context, and actively engaged in collaborative interaction focused on the task.

Intersubjectivity was not only established during the sessions, it was also actively maintained, through collaborative discourse involving the use of continuers, politeness, and scaffolding. The ways in which the participants maintained intersubjectivity may be observed in the following interaction which occurred during a group discussion in the later stages of session two, when the participants utilized the *opinionator*:

(12)
1. Learner 1: english skills is not a talent, anyone must have the potential of speaking English
2. Learner 1: i think
3. Learner 3: How do you know?
4. Learner 3: We can only do what our DNA allows us to do.
5. Learner 6: oh..
6. Learner 7: wow DNA
7. Learner 1: because anyone can speak japanese
8. Learner 3: English learning reflects the amount of active FOXP2 gene.

In the above interaction, in lines one through eight, the subjects are engaged in an in-depth discussion of the task focusing on the nature of language aptitude. This interaction involves the expression of a variety of opinions in lines one, seven, and eight, and the use of continuers in lines three and seven.

As the interaction continues, learner two in line nine makes an utterance relating to the nature of language aptitude that is not understood by members of the group:

9. Learner 2: that is called language 'aptitude', i think. >melody
10. Learner 3: What do you mean by "aptitude?" What is your distinction between talent and aptitude?
11. Learner 4: could you explain, shigenori?
12. Learner 2: well, in my understanding,
13. Learner 2: he term 'aptitude' refers to the language-learning potential
14. Learner 6: hmm
15. Learner 4: ic
16. Learner 5: need to check aptitude?
17. Learner 2: some learners are good at memorizing things, while others are good at rule-learning
18. Learner 2: that kind of thing
19. Learner 6: i see
20. Learner 5: hmmm
21. Learner 1: hmm
22. Learner 3: Ok, that's almost as same as what I mean by talent
23. Learner 4: then, do you think their aptitude cannot be changed?

As the above interaction shows, in lines ten and eleven, learners three and four signal that a communication problem has arisen through the use of clarification requests incorporating questions and politeness. In response, learner two clarifies remarks made previously, by providing an extended explanation that includes additional information. In reaction, the other subjects signal through brief utterances containing feedback that although the interaction is ongoing, understanding has not been achieved at this stage. However, they display considerable patience by providing learner two with sufficient time to react. The further attempt to provide additional relevant information by learner two in lines seventeen and eighteen appears to resolve the issue, as the feedback from the other learners in lines nineteen through twenty-two indicates that although a difference of opinion has emerged, a shared understanding has been maintained. In the following turn, learner four makes an utterance signaling that the prior scaffolding has facilitated understanding, and moves the discourse forward with a continuer designed to elicit additional interaction relating to the task.

5 Learner attitudes

In order to gain a broader perspective on the data, and investigate learner views, a post-study questionnaire was administered. Seven learners completed the questionnaire which incorporated ten Likert scale items. The learners were asked to select one response from the following: 1 strongly disagree, 2 disagree, 3 no opinion, 4 agree, 5 strongly agree. Responses are provided in table five. The first three statements focused on exploring attitudes towards the communication features of Second Life. In response to statement one, the learners averaged 4.0, a finding that indicates that the learners were able to utilize the chat system effectively. The majority of participants commented favorably on the role played by the avatars in

Table 5 *Mean scores on post-study questionnaire*

Statement	
1. The chat system was easy to use	4.0
2. Having an avatar helped me to communicate and feel more engaged	4.8
3. I could follow the conversation	4.0
4. The tasks were interesting	4.0
5. I could learn new expressions	3.9
6. I do not think I was learning	2.0
7. I could express my opinions more freely than in a regular class	3.7
8. Chatting in Second Life helped me improve my language skills	4.0
9. Overall I enjoyed the experience	4.0
10. I would like to use Second Life again	4.3

facilitating communication and engagement with responses to the second statement averaging 4.8. In response to statement three, the average was 4.0. This suggests that a majority of the learners claimed that they could follow the conversation without major difficulty.

Statements four through ten were designed to elicit views on the nature of the interaction, and its possible benefits. In reaction to statement four, the average was 4.0 indicating general agreement that the tasks were interesting. The average for statement five was 3.9, and there was general disagreement with the following statement where the response averaged 2.0. In response to statement seven, responses averaged 3.7. This finding suggests that chatting in Second Life reduced inhibition to a degree, and facilitated the free expression of opinions. In the case of statement eight the average was 4.0. This finding indicates that most learners expressed clear agreement with this statement. The largely positive reaction to statements nine and ten, where the mean scores were 4.0 and 4.3 respectively, emphasizes that the majority of participants claimed that the interaction was enjoyable and expressed a preference to use Second Life in the future.

Post-study interviews provided additional insights into learner experiences and attitudes. In feedback to the researcher a broadly positive picture emerged. Several participants noted initial difficulties in dealing with the communication environment. They commented on the challenging nature of the interaction on occasion, and the need for good typing skills. However, with one exception, they claimed that their level of comfort increased markedly by the final session. Learners claimed that they frequently made use of scrolling in order to keep up with the interaction, and revisit problematic utterances. These findings were confirmed by researcher observation. Three subjects claimed that they had studied transcripts of their interaction. There was general agreement that the presence of the avatars facilitated communication, and engendered a heightened sense of engagement. Five learners claimed that they discovered new vocabulary and expressions from taking part in the project. Examples of new vocabulary include *ritual*, *aptitude*, *herbivorous*, *super tax*, and *immunity*. Four participants commented favorably on the motivating nature of the interaction. A majority claimed that they found using the environment enjoyable. Three learners

observed that using the graphing tool during the opinion exchange tasks was particularly interesting. Finally, four learners claimed that using Second Life was more conducive to candid self-expression than a conventional language class.

6 Discussion

In the context of answering research question one (Do EFL learners engage in collaborative social interaction in Second Life?), it was found that a significant feature of the data was the presence of collaborative dialogue involving assistance. As the data discussed previously show, one type of assistance involved the use of continuers incorporating statements, requests, and questions, designed to signal interest, and encouragement to continue. The analysis shows that these utterances were effective in eliciting feedback, and creating a context for continuation of the interaction. A further significant type of assistance identified in the data involved the provision of collaborative peer scaffolding that provided an effective means to overcome communication difficulties relating to the use of unknown lexis. The final type of assistance involved other-initiated correction. This occurred during peer scaffolding when a learner corrected an error in their TL output in reaction to a feedback signal from an interlocutor.

The data showed that during the interaction the participants were able to create, and maintain, social cohesion. In a finding that mirrors results reported in previous research (Peterson, 2006), data confirmed that the use of positive politeness contributed to the creation of the supportive atmosphere that prevailed during the sessions. The consistent use of politeness may reflect the L1 background of the participants who belonged to a culture where the maintenance of peer group status remains an important influence on behavior. An additional explanation for the extensive use of politeness may lie in the text and avatar-based nature of communication in MUVEs, where the social context cues that influence communication in face-to-face contexts such as age, and social status, are reduced. This may have created a situation where the subjects tried to avoid misunderstandings. As has been reported in the literature on the use of other types of CMC (Darhower, 2002), the appropriate use of politeness facilitated a shared perspective toward the tasks. A noteworthy feature of the data was the degree to which the subjects were consistently successful in establishing, and maintaining, states of intersubjectivity throughout all of the sessions. As the discussion has shown, they achieved this considerable feat by taking an active responsibility for managing their interaction, through the provision of feedback, the use of politeness, and helpful assistance related to the task at hand. These behaviours enabled the participants to engage in coherent in-depth discussion involving interaction focused on the tasks.

As regards research question two (In what ways, if any, did the computer-based nature of the interaction and the communication tools provided by Second Life facilitate the production of TL output?), analysis revealed that the computer-based nature of the interaction in Second Life facilitated the consistent production of TL output. Although some learners experienced initial difficulties in dealing with the environment provided, these were overcome as this study progressed, and the effectiveness of the orientation period was confirmed by researcher observation.

This discussion draws attention to potential benefits of computer-based interaction including opportunities for monitoring leading to correction, and the availability of scrolling, which appeared to prevent communication breakdowns. Unlike in other research (Toyoda & Harrison, 2002) these were avoided, which enabled the learners to actively contribute, and keep up with the interaction. Another positive finding was that some learners claimed to have studied transcripts in their free time. Other features of Second Life also appeared to support aspects of the interaction. Researcher observation confirmed that the participants utilized their avatars during the interaction, and that the availability of personal avatars appeared to enhance engagement and enjoyment.

The data collected to answer research question three (What are learner attitudes toward interaction in Second Life?) confirmed a range of broadly positive learner views. The participants indicated that overall, involvement in this research was an enjoyable and beneficial experience. In their feedback, the learners noted that the interaction could be challenging at times. However, they also commented favorably on the valuable nature of the opportunities provided for TL practice in a setting that was less stressful than a regular language class. The high degree of engagement and interest engendered was reflected in the desire expressed by a majority of the learners to take part in future studies involving Second Life.

7 Conclusions

This research was subject to a number of limitations that require acknowledgement in any evaluation of the findings. The number of subjects, and duration of the project sessions, was restricted. Moreover, it was not possible to engage in content creation. However, these factors were the result of institutional constraints that were outside the researcher's control. The findings reported here are the product of the particular learning conditions, including the tasks, project configuration, and context of use. The literature on learner text-based interaction in real time CMC suggests that a degree of caution should be exercised when seeking to generalize the findings of research conducted in this area, as the findings of individual studies may vary depending on the interplay of the variables outlined above (Hudson & Bruckman, 2002; Thorne, 2003).

The findings reported here, when taken as a whole, are broadly encouraging. They suggest that Second Life provides a stimulating environment for learners to undertake a range of beneficial forms of social interaction involving collaborative dialogue in the TL. The participants displayed considerable autonomy, and also obtained valuable practice in managing TL interaction. However, more research appears necessary in order to shed new light on the issues raised by the use of MUVEs in CALL. The nature and effects of learner training, and the influence of task type, require further investigation. The nature of learner social interaction in MUVEs represents an area of significant interest in future research. Moreover, the use of voice chat, and the role played by specific user created affordances, such, as the *opinionator* tool in facilitating learning remain areas in need of additional study.

Recent technological developments raise interesting possibilities for investigation in future research. For example, the emergence of meeting control lights designed to facilitate turn taking by enabling users to signal the next speaker, may significantly facilitate communication. Future research offers the prospect of enhanced understanding

of how language development may be fostered through social interaction in the dynamic communication context made possible by Second Life.

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