The Role of Gesture and Video Games in Second Language Acquisition

by

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B.Ed., University of Victoria, 2000

A Thesis submitted in Partial Fulfillment of the

Requirements for the Degree of

MASTER OF ARTS

University of Victoria

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Abstract

With the growth of recent research on the internal benefits of gesture for second language learners, the emphasis has begun to shift away from the traditional focus on addressee-related benefits. The current study explores student-student interactions which reflect internal benefits during face-to-face video game play. Data was collected in the conference room at a local Victoria high school and involved 7 participants; 6 English as a Second Language students and one native English speaker. Using discourse analysis as a method of data analysis, Long's social constructivist model is taken as the grounded theory whereby it is thought that learners construct their new language through interaction that is socially mediated (Brown, 2007). The database is composed of videotaped sessions where student dyads, in a laddered consecutive order, take turns first as 'novice' gamers when learning how to play and then teaching in the next dyad. Each dyad experienced 5 minutes of instruction, 10 minutes of game play and 10 minutes of reflection about the game using a set number of questions. Videotapes of participants and

transcripts were later examined and re-examined for face and body gestures, signs of social bonding as well as different types and uses of vocabulary.

Two dyads emerged as having the most interesting results on almost all measures. These dyads both displayed a high number of gestures, vocabulary, mimicking and simultaneous gesturing. These findings reflect the potential utility of using student gesture to predict and gauge learner readiness, engagement and learning. This study has implications for both the instruction and learning of a second language as well as the use of interactive media and even video games for educational purposes. In addition, it contributes to the understanding of student-student interaction and the social construction of learning English as a second language.

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Acknowledgements

Completing a Masters Degree has been a goal of mine since attending my first conference and presenting a poster as an undergraduate student in Education. Shortly after graduation, several years in Stockholm, Sweden almost resulted in the pursuit of further education, but extensive travel ultimately took precedence. Upon my return to Victoria, I resolved to enroll as a student again at the University of Victoria while teaching in the Victoria School District. One principal in this district, Dr. John Fawcett, was a wonderful support and friend in this endeavor years before it even began.

I would like to express my appreciation for my supervisor's support and guidance throughout the process of planning and writing my thesis. In addition, the course instructors were excellent guides and a source of inspiration. My brother, Jared Barber, provided the anonymized charicatures of the screenshots depicted in the figures throughout my thesis. My husband, Stuart, provided unwavering support and encouragement throughout my degree. He is my greatest source of inspiration and a wonderful life partner. Our baby daughter, Freya, who was born just prior to my first defense date, was a constant source of motivation in the final push towards completion.

Chapter I - Introduction

Given the increased prevalence of multiculturalism in Canadian schools, there is a growing need to identify factors that support the learning of a diverse English as a Second Language population. The number of ESL students in schools has grown in the past decade; these students need to accelerate language performance late in their public school experience as this is particularly when academic skills become important for school success and further educational opportunities. The potential for building on students' skills and strengths using technology is described by Gee in terms of language learning.

Ethnographical research data is discussed in Gee's book *Situated Language and Learning: A Critique of Traditional Schooling* (2004), highlighting children's literacy lives before they begin school, as well as the disconnect that they experience once they start. Even prior to entering school, children are playing complex video games and interacting with family members about these experiences. At a young age, they are also reading complex instructions for game strategies and rules, and are able to communicate abstract ideas at advanced levels because of the situated practice that they have experienced while immersed in virtual worlds. Situated learning is an immersive experience where specialist language is learned while experiencing multi-sensory and multimodal forms of representation in a real or virtual world. There is great potential to create multimodal experiences that provide a multiplicity of ways to make meaning through different senses with situated practice in immersive technological environments. Specialist varieties of language will become more accessible and meaningful to students

who would otherwise only have access to abstract ideas (Figure 1.1). Specialist academic language could be more easily translated into vernacular through modes of semiotic representation like gesture, body posture and movement (Figure 1.1). The ease of accessing complex abstract knowledge and information could become more available on demand or within school settings. With a new emphasis on non-academic varieties of specialist English, gaming can be seen as culturally appropriate learning (Gee, 2004).

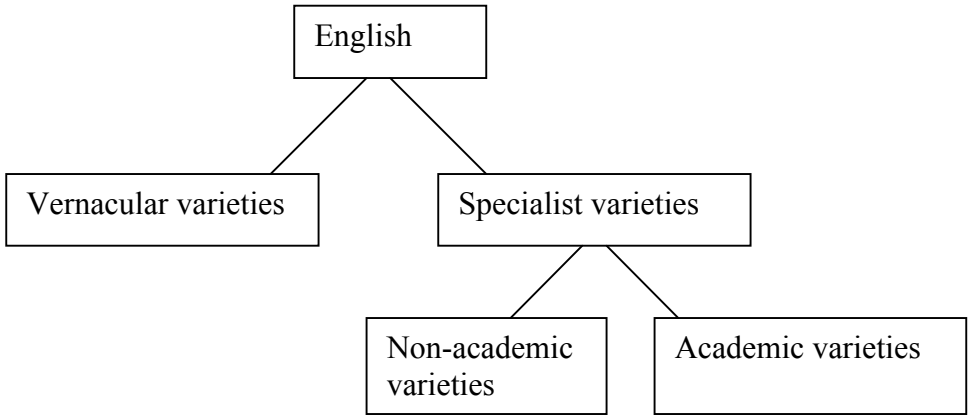

Figure 1.1. Varieties of language (Gee, 2004, p17).

In the everyday social and communicative multimodal worlds of children, ways of making meaning other than the traditional approach are emphasized based on need (Jewitt, 2008). Multimodality is defined as a set of modes for making meaning such as movement, writing, image, gesture, gaze, posture, speech, sound and music (Figure 1.2). The more one mode is used, the more articulated it is in literary practices (2008). Jewitt describes how the complexities of literacy are reflected in the historical, cultural and situated practice of people's lives and the school should re-enforce literacies that are local

and situated rather than the idea of a neutral set of literacy skills that can be applied universally (2008). This underscores the need for an awareness of the vital role that the social lives outside of school play in the total amount of multimodal resources available to individual students. Student linkages to community resources outside the classroom, such as the library and the internet, have been shown to directly affect student motivation and reading achievement (Guthrie, Shafer, Von Secker, & Alban, 2000). The idea of multiliteracies challenges the singular role of dominant forms of literacy in traditional schooling. A multiliteracy perspective takes into account the role of engagement, motivation, identity and culture into teaching pedagogy. All of these factors are vital for aiding Canadian and international second language students feel a sense of belonging and intrinsic motivation.

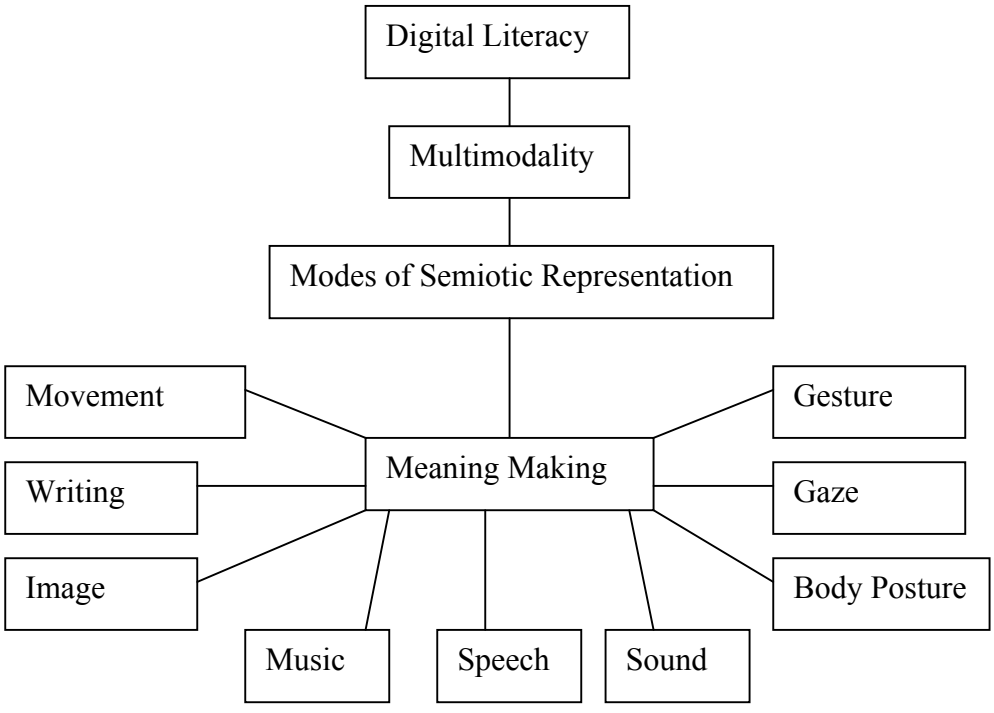

Figure 1.2. Multimodality as a set of modes of representation

Research in disciplines other than education have shown that video games strongly elicit autonomic responses, or changes in heart and breathing rate, and pupil dilation, thus mediating alertness and wakefulness as well as motivation (Hebert, Beland, Dione-Fournelle, Crete & Lupin, 2005; Segal & Dietz, 1991). In addition, video games elicit neuropsychological responses of arousal as opposed to traditional learning paradigms (Koepp, Gunn, Lawrence, Cunningham, Dagher, Jones et al., 1998). These findings hold promise for use of the medium of multi-sensory video games in educational settings, even if the games themselves may not. Cross-disciplinary research studies may be necessary in order to gain a balanced perspective of the potential gains of generating, communicating, and negotiating meaningful content through the medium of digital technologies.

The potential impact of technology and immersive technological experiences on future teaching practice and policy is profound. Current models of effective instruction make special note of the potentially important role of technology. In *Reading Next—A Vision for Action and Research in Middle and High School Literacy*, several points relate to the use of computers. Motivation and self-directed learning are suggested in the report with an emphasis on instruction and supports for independent learning tasks that students will need for lifelong learning (Biancarosa & Snow, 2006). Technology is referred to as both a facilitator (i.e., a tool) and a mediator (i.e., a topic) of literacy (Biancarosa & Snow, 2006). As a facilitator of literacy, technology is more of a tool. It provides the needed supports for students, instructional reinforcement and an opportunity for guided practice of decoding, vocabulary and strategies. For teachers, the use of various multimedia technologies can provide students with background knowledge as well as

make text more accessible through simulated demonstrations, graphics, video and animation. As a mediator of literacy, technology represents a topic unto itself. Digital technology is literally changing the reading and writing and speaking demands of modern society, requiring new skills and types of literacy (Biancarosa & Snow, 2006). For example, the layout of information on the internet is not linearly structured as in a novel. Web pages offer links, windows and menu bars and provide the opportunity for active interaction with the user and between users through blogs, emails and collaborative discourse. This fast-paced, networked system requires critical thinking that is both flexible and adaptable. A differentiated instructional approach that incorporates multiple modes of semiotic representation would provide context-rich presentation of concepts as opposed to merely context-reduced text, supporting second language students with visual and other learning aids (Figure 1.2).

The differentiation instructional perspective is that the life worlds of students often involve technology. Many students use computers in their free time, so using computers and other media during school hours can serve to capitalize on student interests, making the learning experience more authentic. If students consider their identities as being associated with the use of various technology, then by including these technologies in schools, we may be giving them a sense of belonging (Gee, 2004). This may be relevant since it has been found that many students who struggle experience a decrease in their sense of belonging (Guthrie & Davis, 2003). Second language students are particularly vulnerable in feeling different and isolated from the other students since their culture and language are distinct from the majority. Being exposed to authentic

learning experiences, which capitalize on their interests and build on their strengths while aiding language acquisition would be beneficial for all.

Due to the sheer amount of information that is readily available via the Internet and other media, the nature of the relationship between education and knowledge needs to be re-examined, as well as what constitutes knowledge and truth (Lankshear, Peters & Knobel, 2000). In an article about effective literacy instruction for adolescents, Alvermann (2002) indicates that the literacy skills of young people are not keeping up with societal demands of life in the *information age*. Changes are constant and show no sign of stopping, demanding the discussion and reading of increasingly complex materials. There is a growing awareness of the critical role of digital literacy by society and educators alike; the influence on young people's lives is undeniable (Alvermann & Hagood, 2000). More credence is now given to students' technological interests outside of school time; however, more than a cursory nod is needed toward crediting and building upon their exposure to a wide variety of images and symbols through their exposure to technology.

Young students are regularly expected to abandon their culture and personal lives (i.e., their *life worlds*) at the classroom door, including their experiences with culture and leisure activity interests. Today's reality for many students is that their life worlds often involve technology. Schools and teachers are slow in incorporating the real life experiences of students into pedagogical practices that are related to the curriculum of the classroom. The use of digital technology is widely regarded by educators as an extra or bonus step to be implemented if there is extra time. Teachers feel pressure to cover all required curriculum demands and, since technology is not one of those demands, it is not

deemed essential in the planning stages. However, the everyday lives of today's children and adolescents are intricately intertwined with the use of technology. It is common in online gaming communities for players to develop friendships and meet regularly while living countries apart. In a study done by Greenfield Online (Alvermann, 2002), 73% of youth polled between the ages of 12 and 17 in the United States use the Internet. For these students in particular, the prospect of working with a computer is motivating and even promotes collaboration with others. Studies show that, on average, children aged 2 to 18 spend up to 40 hours per week outside of school in front of a screen watching television, playing video games, or surfing the Internet (Olfman, 2009). Therefore, the integration of technology in the classroom makes sense from both engagement and motivational perspectives. In this modern context, the video game industry has come to represent a global influence for youth that is pervasive across all aspects of popular culture: music, television, movies, comic books, and online fan sites. It is a new culture that schools have just begun to acknowledge.

The findings of the National Reading Panel have given a strong endorsement to the effectiveness of constructing mental images that represent or summarize text (Pressley, 2002). The situated language and learning that is possible with the advent of educational computer simulations and games makes this a reality for all. Today's citizens need to be literate in different semiotic domains (representational, symbolic) beyond traditional print (Gee, 2007b). Of course, this creates an even greater need for people to think critically and to be mindful consumers of information that they see, hear or read. The development of a discerning eye while reading and viewing a variety of texts is considered to be a critical literacy (Alvermann, 2002).

Although computer technology is more readily available today than it was 20 years ago, it has not been seamlessly integrated into school curriculum. Despite the pervasive availability of modern technology in today's classrooms and the awareness of the role that computers serve in students' everyday lives, there is usually little technical support or professional development funding available for training teachers on how to incorporate such technology in core subjects. This likely reflects a lack of awareness in teacher training, teacher's unfamiliarity with today's technology, and the absence of well-defined requirements from the Ministry of Education. Children today are much more technologically savvy and comfortable using a wide range of digital technology in their everyday lives. Ministry curriculum has not responded accordingly to recommendations derived from research on the importance of technology, or from changes in technological literacy practices at home. Indeed, curriculum has lagged behind the fast pace of constant change in the digital world.

Students enter schools with a wealth of specialized linguistic knowledge. Given the prevalence of technology, the way that it immediately captures the interest of children and adolescents, and their specialized linguistic knowledge associated with digital literacy, it would seem that present curriculum may be underutilizing an important educational tool. The contribution of a video game may hold the potential to positively influence students' interactive communication. It would therefore be of interest to examine the specific contributions of a video game. The proficiencies and specialized knowledge of today's children should be strengthened and incorporated into the classroom to enrich learning and maximize their chances of social and academic success in school. Youth of all ages from a variety of different cultural backgrounds have

practiced their digital literacy skills to the point of mastery. It would be a missed opportunity to ignore this fact and not integrate it into the general classroom.

Integrating technology into the language class would make full advantage of the existing skills and interests of second language students. These students include international, landed immigrant and new Canadian citizens, who have increased tremendously in number over the past decade. Further research and resulting teaching methods need to address the diversity in culture and language ability. Some preliminary evidence supports the notion of integrating technology, education, and student culture to facilitate curriculum goals.

The Roles of Gesture and Technology in Learning

The majority of experimental studies on gesture have been conducted by Goldin-Meadow and her associates at the University of Chicago (Goldin-Meadow, 2001). At their core, these studies have found that gestures can facilitate a change in knowledge. For example, a mismatch between speech and gesture reflects a readiness to learn or a predictor of transition. In addition, gesturing in the presence of objects lowers the cognitive load (i.e., working memory, which reflects the ability to simultaneously hold information in memory while at the same time manipulating or using that information to complete another task goal) and allows students to provide more complex explanations (Baddeley, 1992). If the reduction in cognitive load while practicing language is a goal, then it is worth noting that physical arrangements and proximity to mediational tools facilitate and support conversations (Roth, McGinn, Woszczyna, & Boutonne, 1999).

Key studies in gesture analysis related to second language acquisition were summarized in the 2010 review paper by Marianne Gullberg. Gullberg states that gesture

has traditionally been viewed as addressee-directed communicative functions for interlocutors. However, the internal functions of gesture perhaps hold the most potential for individuals as learners. Like Roth, Gullberg addresses the benefits of reducing cognitive load when she cites recent studies that also suggest gesture serve speaker-directed, cognitive purposes (Goldin-Meadow, Nusbaum, Kelly & Wagner, 2001). Gullberg concludes that gestures give second-language learners support during the transitional stages of language competencies (Gullberg, 1997). So, the pressure on working memory to produce social or academic language is lessened by the use of gesture as well as the presence of objects.

The question of whether gesture in the second language (L2) input affects L2 learning was examined in two studies of adult English learners of French and French children learning English. In the first study, both groups showed that they retained significantly more expressions if they were presented with gesture (Allen, 1995; Tellier, 2008). The second study focused on the connection to language and speech. It was found that speakers of different languages gesture differently for both cultural and linguistic reasons. In the study, English speakers said "rolling down" while gesturing both components at the same time. Alternatively, Turkish speakers expressed the same idea using two lexical verbs, or "descend while rolling down" accompanied by one gesture expressing only path (downward) or only manner (rolling). Therefore, cross-linguistic influences can affect what meaning they express and how they are encoded linguistically (Kita & Ozyurek, 2003).

In a study entitled Gestures as Self-Generated Cues, Frick-Horbury reported positive effects of hand gestures on recall of words for learners of a second language

(2002). Specifically, gestural cues facilitate or prime recall for the producer as well as encourages speech production. In cases where the participant is describing difficult terms and is hesitant, there is more gesturing. This study used a list of words that participants learned and then recalled right away and again 2 weeks later. They are first introduced to the words by having them presented, with the producer providing a description of each individual word. The participants were asked to stand during their recall sessions as this was thought to promote gesturing. The gestures that were coded for included iconic, metaphoric, body-focused movements, and vague gestures. Body-focused gestures were forms of motor stimulation, like patting the leg. Vague gestures were less directive and expressive of speech, such as shrugging.

The "Next Steps" in Research on Gesture

As Gullberg (2010) stated in her recent review paper, more research on the role of gesture and second language acquisition is needed. In addition, the learning benefits of gesturing is a new focus of research that holds much promise but has yet to be fully explored in research studies. Gullberg also notes that combining qualitative and quantitative research methods will facilitate a more comprehensive understanding of gesture as well as its generalizability to the classroom. The qualitative approach would provide information about the variation of gestural forms and functions along with cultural, social, linguistic and discursive contexts in which conversations occur. Using the quantitative approach, the most common measure in bilingual studies is gesture rate. This assumes that the more speech there is, the more gestures will occur, with the difference between the number of fluent and disfluent speakers' utterances and gestures reflecting an important marker of literacy.

Research on the role of gesture for cognitive and emotional functions are lacking for second language learners. Some facial gestures like frowning have been shown to reflect certain emotional states such as fright or discontent (Pantic, 2005). This facial gesture for self was conducted in the area of gesture research but not specifically for second language acquisition. This is potentially important since, as seen with other gesture research, facial gesture may indicate or reinforce internal states such as learner readiness and engagement. There is great potential of using gesture as a gauge for learning and to help students feel more comfortable with communication.

Though there has been significant research in gesture studies on general body gestures using the hand, arm or other parts of the body, little research has been done for the gestures of second language students. Specifically, what types of gestures occur or co-occur and which are indicative of learning or engagement for second language students. This is the gap in research, which this study aims to address through video analysis of second language students interacting while playing a video game together. It is thought that the potential influence of gesture on teaching and learning can be gleaned from the close examination of the videos.

This research endeavour of investigating the role of gesture in second language acquisition is both needed and timely. Given that the number of second language students has grown significantly in British Columbia, it makes sense to focus on improving education for secondary ESL students. In pursuit of this endeavor, helping educators become more aware of visible indicators of engagement or learning in these students has the potential to provide the feedback, which can then inform teaching practices. Schools and teachers require evidence-based research on the need for effective

strategies to ensure that secondary ESL students can reach their full potential in the general classroom.

A contemporary educational context with technology in use and gaming builds on students' strengths with technology. This would be one way to invite active engagement and equal participation from all ESL students, regardless of language proficiency. Recent research has revealed avid engagement in new digital and media literacies such as computer games, showing a blend of productive and receptive activities that are seldom passive reception (Gee, 2004). With this new innovative approach to secondary ESL instruction, language learning through digital literacies becomes more of an affiliation with global youth culture that crosses national boundaries.

Purpose of Present Study

The current study focuses on three questions. These are: 1) What types and rates of gestures are used during face-to-face interactive gaming; 2) What types of gestures co-occur; 3) Do the gestures used serve to benefit the learning for second language learners; 4) Do the gestures used serve to facilitate engagement for second language learners. The research for this thesis is grounded in questions about how second language students use gesture and language, both verbal and non-verbal, to engage and communicate while playing a video game together.

Chapter II – Research Design and Methods

Participants

The participants (n=7) of this study were all students at Mount Doug Secondary School in Victoria, BC. The school is part of Victoria School District #61 in an upper socio-economic neighborhood. Seventy percent of the students at the school are from outside of the catchment area. A meeting was arranged with the principal about the recruitment process and it was during this meeting that he phoned two teachers to arrange for class visits. The researcher visited both ESL and regular English class settings, and asked students to volunteer following a brief description of the proposed study. The seven volunteers were given an informed consent handout to take home to their parents or guardians to sign, and the teacher was given copies of a written ESL test for the six volunteer ESL students to complete in class. These forms and tests were picked up after a few days, the dyads and schedules were set, and then given to the students and teachers. The dyads comprised of students who had different first languages together so that they would be forced to communicate in English.

Dyads

Interactions were observed in dyads as pairs of students are more likely to reciprocally engage with one another; one individual is often left out in groups of three. Volunteers were grouped into dyads based on their first language (mixed) and level of English proficiency. The dyads' language levels and mother tongue were 1) advanced (Korean female) and intermediate (Chinese male), 2) intermediate (Chinese male) and

intermediate (Korean male), 3) intermediate (Korean male) and intermediate (Brazilian Spanish male), 4) intermediate (Brazilian Spanish male) and intermediate (Korean male), 5) intermediate (Korean male) and native speaker (English female), 6) native speaker (English female) and intermediate (French female).

Materials

The required materials for this study included the Wii Interactive Gaming System ® with two remote controls, and the Wii Baseball ® game by Nintendo. The choice of game was based upon a pilot study conducted at EA Sports in Burnaby, BC. Several games were tried out in a dyad for 15 minutes each while being filmed. The number of interactions were subsequently counted and the game with the highest number of interactions was Wii Baseball ®.

Procedure

Once volunteers completed a written test, their writing samples were assessed and ranked according to level using the Secondary Writing aspects in the English as a Second Language Standards for British Columbia (2001). The level of English mastery was used to create the participant dyads. A Canon Optura 100MC video camera and tripod was used to record the learning interaction, with participants videoed from the waist up focusing in particular on their faces. A TV and VHS were used to play back the interaction for each dyad. A stopwatch was used to ensure that each dyad engaged in game play for 10 minutes, and that each subsequent joint reflection session (see description in procedure) also lasted 10 minutes. A series of interview questions were used to facilitate discussion during the joint reflection session. The questions were: 1) What was easy or hard about the game; 2) When you played, did you think in English or

in your first language; 3) To the learner: If you had to teach this game to somewhat, what would you do or say; 4) To the teacher: After playing and now watching the game, what would you do differently. Each participant was interviewed individually with their partner present about their perceptions, how they used language to communicate, and how they felt while playing the game.

Arrangements were made for the seven students to arrive at the learning session in a specific order to form the specified dyads based on language competency. Data collection took place in a supervised classroom setting that normally serves as the school's conference room. The first student of the dyad to arrive was required to learn how to set up a game and briefly practice the Nintendo Wii Baseball video game with the tester, so that the student could serve as the *instructor* with game expertise in the next dyad. The student was not given any guidance on how to instruct about the game with the next student. Since technology and learning was of interest, the ability of the student to convey specific instructions was thought to be potentially important.

Before each session, the game was restarted on the screen for baseball, a new VHS tape was put in and the recording started. The video camera tape was replaced with a new one every two sessions. The researcher gave the same instructions at the start of each session. After each dyad session, students were asked to provide their email address and to indicate whether they wished to have 40 minutes of tutoring time in exchange for their participation in the study. Each dyad pair played as opponents using Wii remotes on the same TV screen, standing next to each other in the same room with the tester sitting beside the video camera. Upon arrival 15 minutes later, the next student would then serve as the *learner* without previous exposure to game play. The instructor would teach

the learner how to select a character, and set up the game. They then played a game together for 10 minutes, followed by 10 minutes of reflection in response to guiding questions asked by the tester and while viewing a replay of their game on the television. Upon conclusion of this reflection session, the dyad sequence would then continue with the previous instructor returning to class, and the previous learner serving as the instructor in the next dyad pair. These staggered sessions continued in the same way until all participants had been tested.

DYAD	EXPERT	LEARNER
1	A- ADV Korean female	B INT Chinese male
2	**B** - INT Chinese male	**C**- INT Korean male
3	**C**- INT Korean male	**D** - INT Brazilian Spanish male
4	**D** - INT Brazilian Spanish male	**E** -INT Korean male
5	**E** -INT Korean male	**F** - native speaker English female
6	**F** - native speaker English female	**G** - INT French female

Table 2.1. Dyad changes

Data Coding

Qualitative interpretive inquiry, involving both conversational and discourse analysis, was employed to examine the dyad interactions. Conversational analysis closely examines the interaction between participants, both verbal and non-verbal. Discourse analysis involves examining spoken words and the context in which they occur. Participant interactions were interpreted using both videotape and interview data collection methods. The video was played back using iMovie software ® was transcribed

in detail for both speech and gesture, and was viewed and reviewed sometimes solely with video and solely with audio. iMovie software is used to view individual players while they play the game, making it possible to code for a variety of multimodal communications such as facial expression, body posture, and voice. Muted video frames were both slowed and sped up in order to 'make the situation strange' (Roth, 2005): the goal was to observe the interaction from novel perspectives until a particularly telling segment was found or a pattern perceived. These segments were transcribed and analyzed closely for patterns and signposts.

The cultural and social contexts were examined afterwards while viewing the videotapes. Specific clips were taken out and examined closely from multiple perspectives in order to find patterns and evidence of the criteria that was coded for gesture. Of particular interest was when participants struggled to communicate and seemed to compensate with gesture.

As gesture is encouraged in the standing position and has been shown to facilitate recall and increase verbal output, the game that is chosen for this study is one that requires a standing position to play (Frick-Horbury, 2002). It is thought that a shared experience with an interactive video game while standing may foster oral language communication and gesture. Second language students with varying levels of English proficiency are grouped into dyads. Other than one dyad, the participants had not met before and the game provides a meeting ground that is equally accessible by all and would afford verbal and non-verbal communication in a shared discourse. The pairs played the same interactive game together at the same time and were assigned the roles of teacher and student. One student was the 'expert', having been taught by the previous

student in the consecutive pairing who had already played the game once. This student then taught the next student how to choose a character, set the game up, practices and then the dyad played a game together. The instruction time was 10 minutes in learning how to play, then playing for 15 minutes and subsequently reflecting back on what happened in the game while watching a recording of the game on VHS. The video game used was Wii Baseball by Nintendo, which was chosen because baseball is an international sport that is played around the world. It was hoped that some familiarity with the sport and the game would foster engagement and 'level the playing field' for students from different parts of the world who speak different languages. This is because baseball is a popular sport in both eastern (e.g., Japan, Korea) and western cultures. Self-consciousness is a common deterrent for attempting to practice speaking a second language; if video games are associated with fun and leisure for students then perhaps the game will facilitate the use of gesture and other language practice as a result of reduced fear of making a mistake or the need for perfection.

After the data gathering, video tape recordings provided data for qualitative research with the aid of iMovie software. Video was examined for evidence of specific types of oral language use such as description, asking for directions and giving assistance. Verbal and non-verbal communication can provide information about level of engagement.

Gesture rate in terms of the four most common types were coded: beat, deictic, iconic and metaphoric gestures. Video from all six dyads were transcribed and coded for these classifications in terms of the rate of gesture for each dyad. This classification system, focused on function, was used so that generalizability of results is comparable to

other studies. Then, gesture rate is measured again using another classification system focused on form of gesticulations within the categories: facial gesture for self, facial gesture for other, body gesture for self, body gesture for other, and social bonding, simultaneity and mimicking of gesture. The reason why the gestures were measured again was because the internal cognitive functions of gesture were also of interest in addition to those intended for communicative purposes with an interlocutor. As seen in past research, the presence of mimicking gestures was significant for language learning. This is because imitation is a sign of social bonding as it creates a shared sense of context and interpersonal rapport. Also, it makes the partners more similar to each other (McCafferty, 2002).

As a teacher with eleven years of teaching experience at the middle and high school level, I am immersed in the culture of the profession and need to re-visit the data multiple times in a variety of ways in order to be able to see it objectively and understand it from a whole new perspective. My ontological awareness of the situation makes it even more necessary to scrutinize the data in multiple ways, with novel perspectives often requiring 'making the situation strange' (Roth, 2005). By attempting to change my usual perspective from that of the teacher to those of the student in focus and her/his peers, I consider multiple perceptions (teacher perception, self-perception, meta-perception and peer perception), which is simultaneously presented in the video. For example, if a participant is observed frowning then their self-perception or peer perception may be low. In addition to the objective video and audio data represented in the primary sources of information, I interviewed students about their own subjective recollections of their experience as participants in the sessions.

Key studies related to gesture that had implications in the classroom were summarized in a recent review paper by Wolf-Michael Roth entitled Gestures: Their Role in Teaching and Learning (Roth, 2001). Roth states that though gestures are a central feature of communication, the International Society for Gesture Studies limits itself to hand and arm movements in connection to how they are interpreted by others in relation to the words that are spoken. According to this definition, four characteristics of gesture include having: a) a starting position from rest; b) a peak or moment of accented movement; c) a preparation followed by a recovery phase where the hand goes back to rest; d) symmetry. Roth restricted this review to studies of gesture accompanied by speech. These gesticulations are commonly classified according to the coding scheme introduced by McNeill in the seminal work Hand and Mind: What Gestures Reveal About Thought (1992). According to this taxonomy, there are four basic types of gestures: beat, deictic, iconic, and metaphoric gestures. Representational gestures such as iconic and metaphoric convey meaning by illustrating some aspect of what is being said; however, metaphoric pertains to abstractions. Deictic gestures illustrate what is being talked about, but in proximity to what is being discussed. Rhythmic gestures (beats) refer to some aspect of the conversation itself and are simply used to emphasize certain utterances (Gullberg, 2010).

In a recent article on mimesis, which is associated with the term “imitation”, it is stated that mimesis is fundamental to communication and culture (McCafferty, 2008). Specifically, mimesis is central to how emotions are expressed and understood in cultures. In addition, it plays a prominent role in second language acquisition. First, it helps the speakers make meaning for themselves and the interlocutor and, second, it

addresses the role of identity in second language acquisition. Therefore, nonverbal communication is not only a crucial part of cross-cultural communication but linked to the whole *languaculture* and should be viewed as the foundation for second language learning. Interestingly, spontaneous gestures (gesticulation) are present in every culture. In addition to mimesis, McCafferty found that interactional synchrony is a mirroring of movement that is not always two-sided between interlocutors (2002). In most cases, students mimic the teacher's gestures but those of each other. However, when students work together and are seen coordinating movements and/or copying each other's movements, they are learning and teaching within the Zone of Proximal Development. In fact, a lack of such coordination leads to frustration and can be a sign of disagreement.

The rate and type of gesture for each dyad was coded for using two different classification systems. One established classification system currently used by most gesture researchers (McNeill, 1992) and the other was established for this study based on issues in current second language and digital literacy research. For this classification system, in addition to facial and body gesture, social bonding, mimicking, simultaneous gesturing and vocabulary were also coded. Vocabulary was divided into three categories: game vocabulary, gesture with vocabulary and gesture in place of vocabulary. These three categories of vocabulary were counted for the three phases of each data collection session: instruction, game play and reflection.

Coding was done from the transcript as well as from video screenshots. The transition from screenshot to charicature was done after coding was complete and in consultation with the illustrator. The coding of data was verified in consultation with my Supervisor, Dr. Robert Anthony.

Examples of Coding

The transcriptions were coded in two different ways. The first is the most common way that gesture researchers code gestures: iconic, deictic, metaphoric and beat. This is coding for function, or representation and categorizes how it is said. The gestures are thought to convey meaning by iconically illustrating some aspect of what is talked about. The second way that the transcriptions were coded was for form, or structure where what is said and the movement itself is analyzed into movement phases. The articulators themselves (e.g. the hand, the head) are coded for form.

The six dyads were coded in 8 categories: a) facial gesture, both to something or someone as well as for self; b) body gesture, both to something or someone as well as for self; c) social bonding; d) mimicking; e) simultaneity, f) vocabulary. In order to gain a full understanding of these categories, examples of each are given along with the raw number of incidents in which they occurred during the data gathering process.

Facial Gesture for Self

In order to show the gestures used in the coding examples, video screen shots were taken from the original video. The video screen shots were then converted into anonymized charicatures by making freehand sketches over the original pictures on a TouchPad computer. Examples were taken from all sections of the data collection; instructional, game play and reflection. To make coding procedures for gesture clear, the following pictures were be examined for facial gesture that is for self. Facial gesture for self and other was considered to be any overt expression from the neck up, which may have involved the use of hands on or near the face.

This example of a facial gesture for self in Figure 2.2 is when the participant struggles with his pronunciation of a word in English and covers his face with both hands and the front of his shirt.

Figure 2.2. Covering face

A second example is shown in Figure 2.3, where the participant frowns deeply with a furrow in her brow following a foul ball.

Figure 2.3. Deep frown after a foul ball

Facial gesture for self can also be seen in figure 2.4 when the participants were playing and both of them touch their own heads with their left hand when the participant strikes out. They are reacting to what is happening in the game individually as they watch.

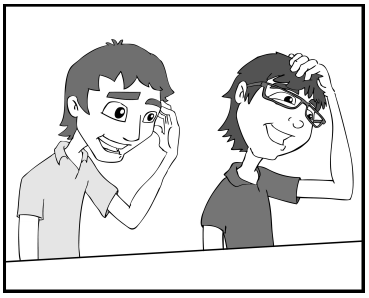

Figure 2.4. Touching heads

Facial Gesture for Other Coding Examples

An example of facial gesture for other is seen in Figure 2.5, where the participant closes her eyes tight, wrinkles her nose and smiles wide with her upper teeth showing. At the time, she is joking about how silly real baseball players look when they pitch. This gesture is for other because it reinforces what she is saying to the researcher.

Figure 2.5. Wide smile

Body Gesture for Something or Someone

Figure 2.6 is an example of body gesture. In this picture, M2 gestures with her open hands as if they rotate around a ball while she states that she mixed French and English in her participation. This gesture was used to refer to and reinforce the word "mixed" in her answer to a question during the reflection.

Figure 2.6. Hand gesturing to support language

Another example of body gesture for other is in Figure 2.7 when one participant, the 'novice' wins the game and offers his partner a hand to shake. His partner, the 'expert' moves to slap his partner's hand, but switches hands at the last second, either to protect his injured hand or so that he can shake hands instead of slapping hands. The 'novice' is obviously gesturing for his partner to shake hands. Then, in Figure 2.8, the 'expert' shakes the 'novice's' hand and smiles. They both smile broadly showing their top teeth, a genuine sign of happiness and looks toward the TV (Pantic, 2005). This gesture of a handshake was made for communication purposes with each other.

Figure 2.7. Communicative gesture

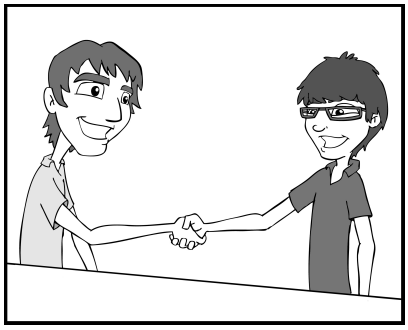

Figure 2.8. Communicative gesture 2

Body Gesture for Self

An example of coding body gesture for self can be seen in figure 2.9 below, where the participant raises his arms after scoring a home run. This gesture was for self and not other because it is a gesture that can indicate personal engagement.

Figure 2.9. Body gesture for self

A second example of body gesture for self is shown in Figure 2.10 where the participant raises both arms and waves his fists while smiling. This occurred immediately following his triumphant win. In Figure 2.11, Dyad 6 exhibited the same type of body gesture for self when the participant raised one arm way up in the air as she said "Sweet!", following success in the game.

Figure 2.10. Triumphant arm rise

Figure 2.11. Triumphant arm rise 2

Social Bonding Coding Examples

Simultaneity

An example of simultaneous gesturing was observed with dyad 4 in Figure 2.12. During the reflection, the students both clasp their hands together at the same time.

Figure 2.12. Simultaneous hand clasping gesture

Figure 2.13. Simultaneous leaning gesture

Another example of simultaneity in gesture can be seen in Figure 2.13, where both participants lean on the table with both hands holding the edges. They positioned themselves in this way spontaneously at the same time during the reflection.

Mimicking

Mimicking is another form of social bonding, where one participant copies the behaviour of another. In Figure 2.14, the participant begins folding a sheet of paper given to her by the researcher and her partner copies her, gazing at her as she folds.

Figure 2.14. The participant mimics folding page

Vocabulary

The determination of themes was made by carefully examining the transcript. Aside from gesture, speech and vocabulary usage were analyzed. Three types of vocabulary were examined for each dyad, including game vocabulary, vocabulary with

gesture and gesture in place of vocabulary. Game vocabulary was considered to be words associated with the game of baseball, such as pitching, balls, curve and swing. Vocabulary with gesture was considered to be words in conjunction with gesture, or spoken at the same time as the occurrence of gesture. For example, when a participant says "swing your arm" and then swings her arm at the same time, it is considered to be vocabulary with gesture. Though she used the word 'swing' which is a game-related vocabulary word, it was used along with the corresponding gesture, so it was counted as being vocabulary with gesture. Another example of vocabulary with gesture is seen in Figure 2.15, where the participant says the word "talking" while gesturing with both hands near his mouth. He makes an 'O' with his whole right hand, touching the thumb of his left hand to the other fingertips on the same hand, then moves both hands back and forth from his mouth alternatively.

Figure 2.15 Hand gestures for the word 'talking'

Gesture in place of vocabulary occurred when the participants lacked the vocabulary and, instead, made a physical gesture instead for communicative purposes. The following excerpt from the transcript exemplifies this category:

M2: “It was not that hard to just (uncrosses arms, brings right hand up above shoulder and pushes it forward and to the left in an arc).”

J: Pitch.

M2: Pitch.

Here the participant, M2, was trying to explain how it was not that hard to pitch but, as she didn’t know the word for pitch she made a pitching motion instead. This was considered to be gesture in place of vocabulary because the use of the gesture served to communicate the word to the interlocutor.

Chapter III - Results

The following sections in the results will present findings related to each question in turn. To investigate what types and rates of gestures are used during face-to-face interactive gaming (Research Question 1) and what types of gestures co-occur (Research Question 2), the number of incidences of gesture were counted for each dyad. The question of whether the gestures used serve to benefit the learning for second language learners (Question 3) was assessed by counting the number of incidences of vocabulary for each dyad across the three stages of data collection: instruction, game play and reflection. Communicative gestures and gestures for self were compared to assess whether the gestures used serve to facilitate engagement for second language learners (Question 4).

Gesture: Rates and Types

Research question 1 is related to the types and rates of gestures used during the data collection. The record of the instruction, face-to-face interactive gaming and reflection sessions were coded using two approaches. The first approach to coding for gesture employed in this study was developed by McNeill (1992): beat, iconic and metaphoric gestures. Beat gestures were considered to have occurred when a given word matched the rhythm of speech and gesture. Iconic gestures matched the gesture to concrete meaning. Unlike iconic gesture, metaphoric gesture matches the gesture to an abstract idea. In addition, other features focusing on facial gesture, body gesture, social bonding and vocabulary usage were also coded.

McNeill Approach:

Iconic gestures (see table 1) associated with concrete meaning or what is talked about were numerous, with the highest number observed for dyad 4. Metaphoric gestures, or gestures to match an abstract idea, were only observed for dyad 5 with only 5 instances. Beat gestures, or gestures matching word to rhythm of speech, were also largely absent from the data save for dyad 6 with a single instance. It was upon completing the coding using this approach that it was decided to use another coding scheme that would reflect all types of gestures, as well as vocabulary.

Table 3.1. Number of Iconic, Metaphoric and Beat Gestures.

	Dyad 1	Dyad 2	Dyad 3	Dyad 4	Dyad 5	Dyad 6	TOTAL
Iconic	51(20.3%)	46(18.3%)	42(16.7%)	64(25.5%)	24(9.6%)	24(9.6%)	251
Metaphoric	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	5(100%)	0 (0.0%)	5
Beat	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1(100%)	1
TOTAL	51	46	42	64	29	25	

Note. Values in parentheses represent percent of total gestures, for each gesture type, within each dyad.

Interaction approach:

The second approach to coding for gesture was developed for this specific study after the data had been collected. The categories include: a) facial gesture, both to something or someone as well as for self; b) body gesture, both to something or someone as well as for self; c) social bonding, including mimicking and simultaneity; d)

vocabulary, including game vocabulary, vocabulary with gesture and gesture in place of vocabulary.

Table 3.2. Total Number of Facial Gestures Within and Across Dyads

	Facial Gesture: To something or someone	Facial Gesture: For self	TOTAL
Dyad 1	44 (41%)	63 (59%)	107
Dyad 2	27 (51.9%)	25 (48.1%)	52
Dyad 3	22 (28.2%)	56 (71.8%)	78
Dyad 4	71 (64%)	40 (36%)	111
Dyad 5	21 (32.8%)	43 (67.2%)	64
Dyad 6	46 (31.5%)	94 (68.5%)	146
TOTAL	231	321	552

Note. Values in parentheses represent percent of a given facial gesture subtype within dyads.

Table 2 summarizes the instances of facial gesture within each dyad. The table depicts the number of gestures made by the participants for two purposes. The first is gesture as communication with an interlocutor in order to reinforce communication. The second is gesture for self exhibited on the face or body, which is not done with the express purpose of communicating with the interlocutor. The highest number of facial gestures to something or someone occurred in dyad 4 and the lowest in dyad 5. Facial gesture for self was by far the highest in dyad 6. Overall, the incidence of facial gestures was highest for dyads 4 and 6.

Table 3 summarizes the instances of body gesture within each dyad. Body gesture to something or someone as well as for self are shown. The incidence of body gesture to something/someone was highest for dyad 6 by almost twice the amount relative to other dyads. The number of body gestures for self was also highest for dyad 5 and 6. Overall, the incidence of body gestures was highest for dyad 6. Dyad 5 had an

Table 3.3. Total Number of Body Gestures Within and Across Dyads

	Body Gesture: to something/someone	Body Gesture: For self	TOTAL
Dyad 1	59 (79.7%)	15 (20.3%)	74
Dyad 2	65 (74.7%)	22 (25.3%)	87
Dyad 3	42 (55.3%)	34 (44.7%)	76
Dyad 4	72 (62.1%)	44 (37.9%)	116
Dyad 5	63 (42.3%)	86 (57.7%)	149
Dyad 6	129 (70.1%)	55 (29.9%)	184
TOTAL	430	256	612

Note. Values in parentheses represent percent of a given body gesture subtype within dyads.

elevated number of body gestures for self; however, upon closer examination, these gestures were made largely by one participant and were negative in nature. For example, crossing arms across the chest, pulling up the shirt sleeves past the elbow, and scratching the back of the neck. It is thought that this was due to a cultural clash since this participant from Korea was male and seemed to dislike playing the game with a female, unlike in the previous pairing where he played with a male from Brazil.

Coding for Social Bonding and Vocabulary: Gestures that Co-Occur

Research question 2 focused on whether gestures co-occur between interlocutors. Social bonding, mimicking and simultaneity were considered as well as three categories of vocabulary: game vocabulary, vocabulary with gesture and gesture in place of vocabulary.

Social Bonding

Table 4 details the incidents of social bonding as well as mimicking and simultaneity. For all three categories, dyad 5 had zero or only one incident. The number of incidents of social bonding was highest for dyad 4. Mimicking was most common for dyad 4, whereas simultaneous gestures were most common for both dyads 4 and 6. Of interest was how dyad 6 swapped gestures that were typical of each other's body language. For example, one participant started the session flicking her hair back with her hand and, by the reflection, her partner was exhibiting the same behaviour.

Table 3.4. Total Occurrences of Social Bonding, Mimicking and Simultaneity

	Social bonding	Mimicking	Simultaneity	TOTAL
Dyad 1	21 (43.8%)	11 (22.9%)	16 (33.3%)	48
Dyad 2	27 (55.1%)	12 (24.5%)	10 (20.4%)	49
Dyad 3	16 (34.8%)	16	14 (30.4%)	46
Dyad 4	45 (49.5%)	22 (24.2%)	24 (26.4%)	91
Dyad 5	0 (0.0%)	0 (0.0%)	1 (100%)	1
Dyad 6	27 (44.3%)	10 (swap) (16.4%)	24 (39.3%)	61
TOTAL	136	71	89	296

Note. Values in parentheses represent percent of a given gesture subtype within dyads.

Dyads 4 and 6 most actively used gesture across all subtypes, from facial and body gesture to social bonding, mimicking and simultaneity. In particular, dyad 6 had the highest overall incidence of gesture across coding schemes. This consistent presence of gesture use for dyad 6 was interesting in that, despite having never met before, they seemed to bond quickly and get along very well, as evidenced by the swapping of each other's typical mannerisms. This was particularly striking given that dyad 5 did not seem to communicate well right from the earliest stage of interaction (i.e., during the instructional phase).

Vocabulary Use

Vocabulary use was coded into three categories: game-related vocabulary; vocabulary with gesture and gesture in place of vocabulary. Table 5 depicts the number of incidents for each type of vocabulary.

Table 3.5. Total Occurrences of Game Vocabulary, Vocabulary with Gesture and Gesture in Place of Vocabulary

	Game Vocabulary	Vocabulary with Gesture	Gesture in Place of Vocabulary	TOTAL
Dyad 1	54 (73%)	16 (21.6%)	4 (5.4%)	74
Dyad 2	63 (74.1%)	18 (21.2%)	4 (4.7%)	85
Dyad 3	23 (74.2%)	7 (22.6%)	1 (3.2%)	31
Dyad 4	103 (97.2%)	2 (1.9%)	1 (.9%)	106
Dyad 5	101 (80.8%)	19 (15.2%)	5 (4%)	125

Dyad 6	79 (65.3%)	34 (28.1%)	8 (6.6%)	121
TOTAL	423	96	23	542

Note. Values in parentheses represent percent of a given vocabulary subtype within dyads.

Game vocabulary refers to words used by the participants that are related to the baseball game. Vocabulary with gesture refers to instances when the participants used body gesture at the same time or in concert with game vocabulary. Finally, gesture in place of vocabulary occurs when participants struggled to find a word and used gesture in place of saying the word. Dyad 6 exhibited the highest use of vocabulary along with gesture. This same dyad also exhibited the highest number of gestures in place of vocabulary. Respectively, dyads 4, 5, and 6 exhibited the highest use of game vocabulary. This pattern is consistent with the results for gesture coding in that dyad 6 had the highest incidence of vocabulary paired with gesture, as well as gesture in place of vocabulary.

Coding for Vocabulary: Do Gestures Benefit Learning?

A third research question under consideration concerned whether the gestures used served to benefit learning for second language learners. For the purpose of answering this question, learning is considered to involve practicing both the words and the associated gestures of a language, as they are both considered to be of value in the process of acquiring a new language and a signal for readiness. In order to address this question, the three categories of vocabulary (game vocabulary, vocabulary with gesture, gesture in place of vocabulary) were considered for the separate components of the data

collection: instruction, game play and reflection. Total vocabulary use for each phase of data collection is reported in tables 6, 7 and 8.

Table 6 shows the instructional component of the data collection, where an "expert" participant taught the "novice" participant how to play the video game. The three categories of vocabulary were game vocabulary, vocabulary with gesture, and gesture in place of vocabulary. Dyad 6 had by far the highest number of instances for use

Table 3.6. Vocabulary Use During Initial Instruction

	Game Vocabulary	Vocabulary with Gesture	Gesture in Place of Vocabulary	TOTAL
Dyad 1	6 (66.7%)	3 (33.3%)	0 (0.0%)	9
Dyad 2	14 (53.8%)	11 (42.3%)	1 (3.8%)	26
Dyad 3	12 (92.3%)	0 (0.0%)	1 (7.7%)	13
Dyad 4	22 (88%)	3 (12%)	0 (0.0%)	25
Dyad 5	8 (72.7%)	1 (9.1%)	2 (18.2%)	11
Dyad 6	33 (91.7%)	3 (8.3%)	0 (0.0%)	36
TOTAL	95	21	4	120

Note. Values in parentheses represent percent of vocabulary use during instruction within dyads.

of game vocabulary, likely since the "expert" was a native English speaker who regularly played video games. Dyad 4 had the second highest number of instances for game vocabulary and both the "expert" and the "novice" in this group played the real game of baseball in their spare time and therefore knew much of the associated vocabulary.

Table 7 summarizes vocabulary use during game play. During this component of data collection, dyad 5 exhibited the highest number of instances of game vocabulary. This may have been since the "expert" participant seemed to be listing off game words like it was a test. All dyads except number 3 showed significant use of game vocabulary as compared to any other type of vocabulary. Unfortunately, since this dyad was running late, the school announcements came on which may have kept the participants from speaking. The incidence of vocabulary with gesture and gesture in place of vocabulary was low or non-existent during the game play component of data collection. This was

Table 3.7. Vocabulary Use During Game Play

	Game Vocabulary	Vocabulary with Gesture	Gesture in Place of Vocabulary	TOTAL
Dyad 1	17 (94.4%)	1 (5.6%)	0 (0.0%)	18
Dyad 2	29 (64.4%)	15 (33.3%)	1(2.2%)	45
Dyad 3	0 (0.0%)	0 (0.0%)	1 (100%)	1
Dyad 4	30 (93.8%)	2 (6.3%)	0 (0.0%)	32
Dyad 5	44 (86.3%)	7 (13.7%)	0 (0.0%)	51
Dyad 6	26 (100%)	0 (0.0%)	0 (0.0%)	26
TOTAL	146	25	2	173

Note. Values in parentheses represent percent vocabulary use during game play within dyads.

likely because the participants' language was limited to short and simple utterances and, despite being in the standing position during play, one of their hands was always occupied by the Wii remote.

After the game was completed, the participants reflected on their game-playing experience. Table 8 depicts the number of instances for vocabulary use during the reflection in the categories of game vocabulary, vocabulary with gesture and gesture in place of vocabulary. Overall, vocabulary use was highest in this section of the study for all dyads. In particular, dyads 4 and 5 exhibited the most occurrences of game vocabulary, with dyad 6 employing the most vocabulary with gesture.

Table 3.8. Vocabulary Use During Post-Game Reflection

	Game Vocabulary	Vocabulary with Gesture	Gesture in Place of Vocabulary	TOTAL
Dyad 1	33 (67.3%)	12 (24.5%)	4 (8.2%)	49
Dyad 2	31 (68.9%)	12 (26.7%)	2 (4.4%)	45
Dyad 3	18 (94.7%)	0 (0.0%)	1 (5.3%)	19
Dyad 4	61 (91%)	5 (7.5%)	1 (1.5%)	67
Dyad 5	51 (78.5%)	11 (16.9%)	3 (4.6%)	65
Dyad 6	21 (35%)	31 (51.7%)	8 (13.3%)	60
TOTAL	215	71	19	305

Note. Values in parentheses represent percent of vocabulary use during reflection within dyads.

Visual Representation of Vocabulary

In order to visually see the difference between the number of instances for vocabulary use in the three phases of data collection, a more visual representation is depicted in Figures 3.15, 3.16 and 3.17.

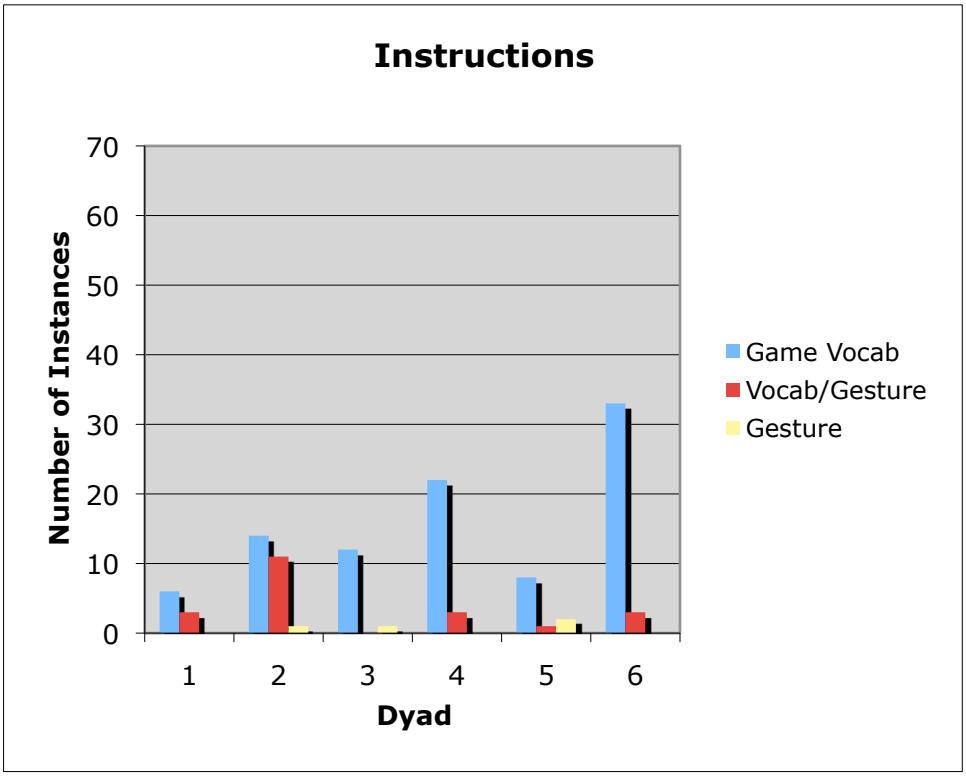

Figure 3.1. Number of instances of vocabulary use during instruction

In figure 3.1, instances of vocabulary use are shown during the instructional phase of data collection. Dyad 6 exhibited the highest instance of game vocabulary, likely since the 'expert' was a native English speaker.

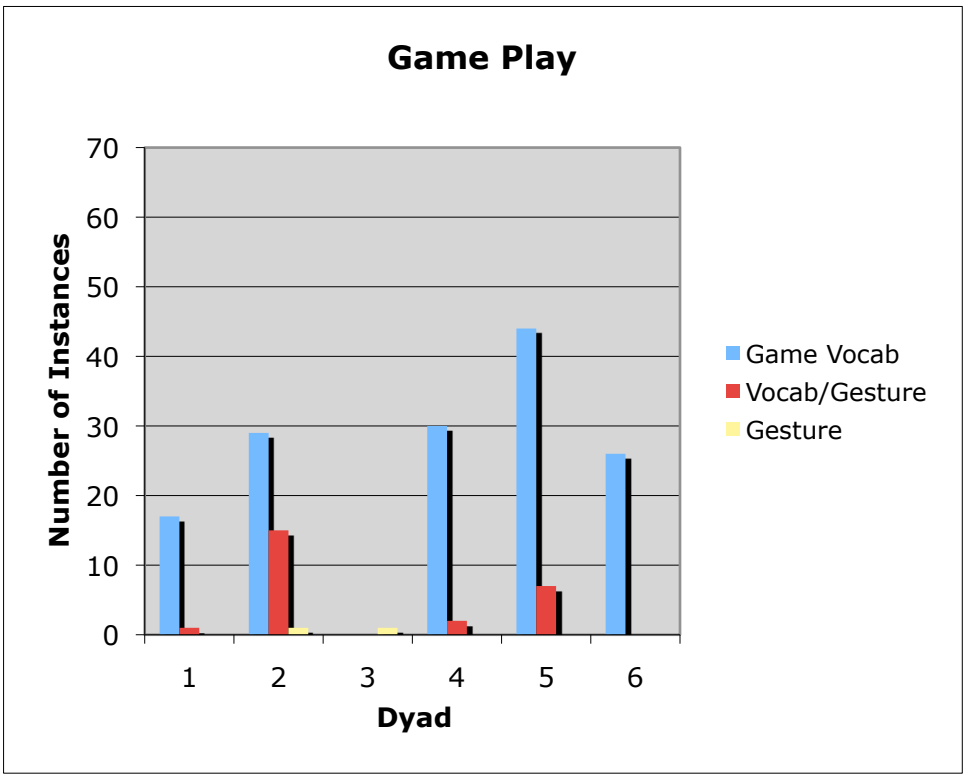

Figure 3.2. Number of instances of vocabulary use during game play

In Figure 3.2, the instances for vocabulary use are depicted during game play. Here it can be observed that vocabulary use for most dyads fluctuated when compared to the instructional phase. Dyad 6 and 1 experienced a drop in game vocabulary during game play, whereas dyads 5, 4, 2 and 1 experienced an increase.

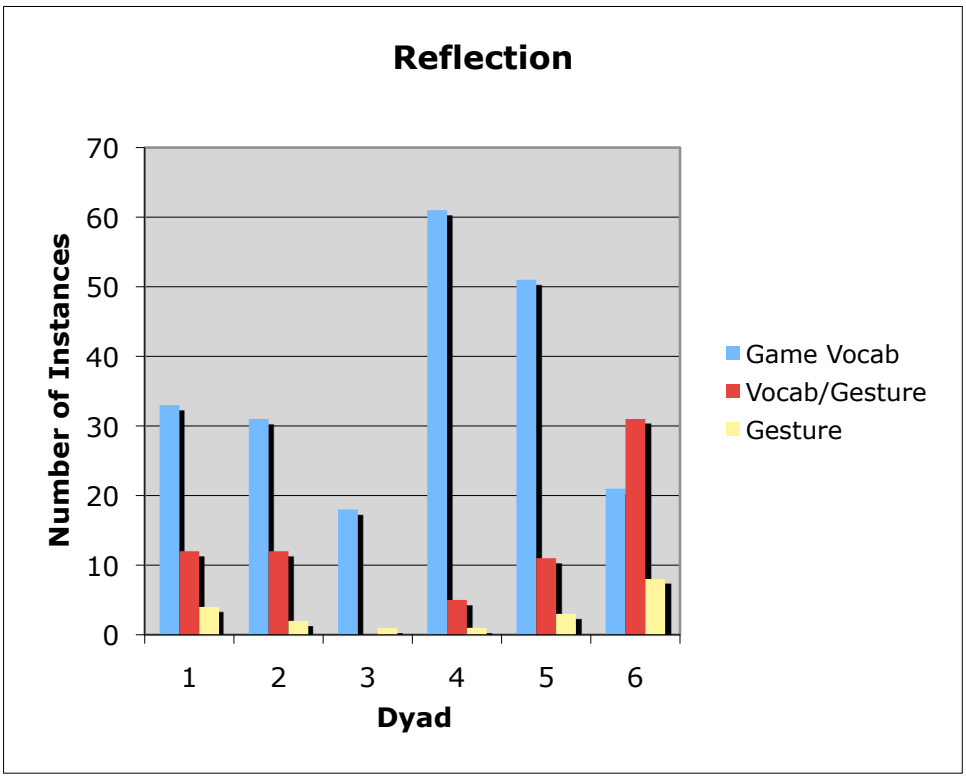

Figure 3.3. Number of instances of vocabulary use during post-game reflection

Finally, in the reflection component of data collection depicted in Figure 3.3, note that the incidence of all three types of vocabulary were higher than in the instruction and game play components of data collection. In particular, the use of game vocabulary was significantly higher during the reflection, except for dyad 6. The student in this dyad who did most of the talking during the reflection was not the native English speaker but rather the second language student from France. This student had a lower intermediate level of English and no background knowledge about baseball, which may explain the lower incidence of game-related vocabulary in this session.

Coding for Communicative Gestures and Gestures for Self: Does Gesture Use Facilitate Engagement?

Question number four for this study was concerned with whether the gestures used by the participants serve to facilitate engagement for second language learners. In order to address this question, the total number of communicative gestures, or facial and body gestures for someone/something, was compared with gestures for self (both face and body).

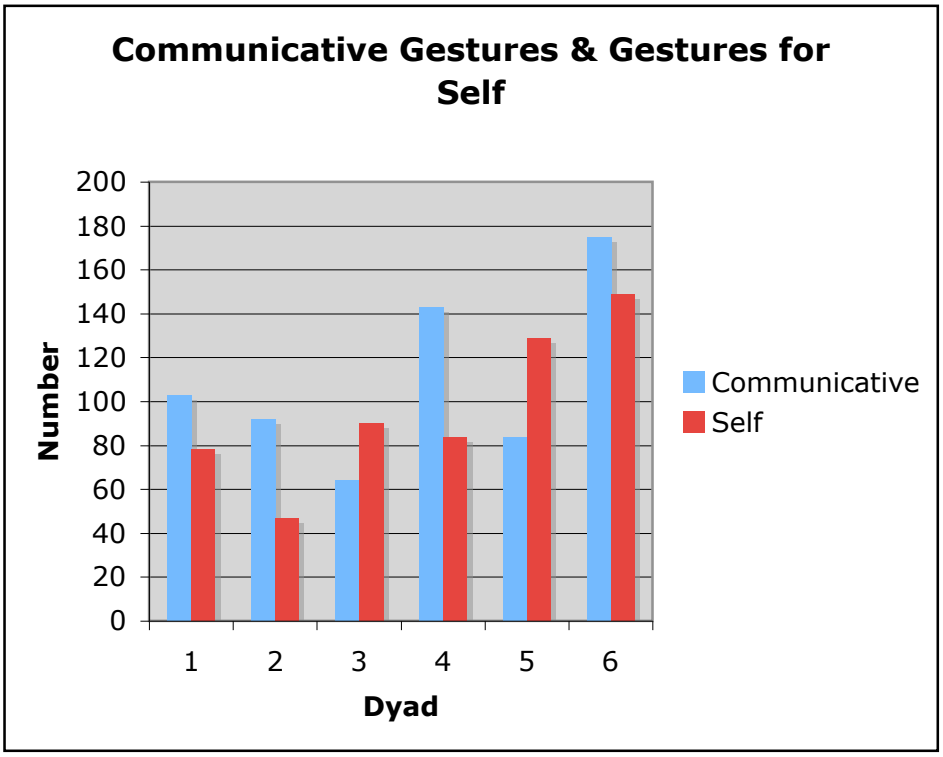

Figure 3.4. Total number of communicative gestures and gestures for self

The number of communicative gestures, both face and body, was variable for each dyad. Dyads 4 and 6 exhibited particularly high numbers of communicative

gestures. Figure 3.4 indicates that gestures for self, both face and body, were most common for dyads 5 and 6. The most interesting dyad in terms of all gestures was dyad 6 because the participants exhibited by far the highest number of facial gestures for self and body gestures to someone or something. This group used facial gestures for themselves while playing the game but also bodily gestures while in conversation with their partner. Figure 3.4 indicates that dyad 6 had the highest total number of communicative gestures; body gestures were proportionally 158.85% higher than the average total and facial gesture was proportionally 154.94% higher. One dyad stood out not only because of the number of gestures but also due to the type of gestures and how they were socially referenced. For example, of the types of gestures that dyad 6 exhibited, many were also mimicking and simultaneous. The number of these occurrences was 211.40% higher than the average.

Summary of Results

In summary, the patterns observed throughout the various coding approaches indicated that dyads 4 and 6 exhibited the most use of gesture, including the highest incidence of simultaneous gestures. Dyad 4 displayed the highest incidence of facial gesture for other, mimicking, and game vocabulary. In addition, dyad 4 also had the second highest incidence of game vocabulary during the instructional and reflection components of data collection. Dyad 6 had the highest overall incidence of gestures, both communicative and for self. In particular, the highest incidence of gesture for dyad 6 occurred in facial gesture for self and game vocabulary during instructional time. In addition, this dyad also had the highest incidence of vocabulary with gesture and gesture in place of

vocabulary during the reflection. Overall, the incidence of vocabulary use across all dyads was lowest during game play, and highest during the reflection. The increased use of gesture compared to the other dyads benefitted the second language learners in dyads 4 and 6, as their use of vocabulary was also high. Whether one is a result of the other is not known. For dyads 4 and 6, simultaneous gesture use was also high, which may have influenced the use of gesture and vocabulary.

Chapter IV - Discussion

According to Gullberg, a goal of current research on gesture and second language is to examine the internal functions of gesture as opposed to the traditional focus on addressee-directed communicative functions for interlocutors (2007). Studies of this nature are particularly useful in establishing signs of readiness or engagement in the learning process. In keeping with this suggestion, the current study investigated four research questions: **1)** What types and rates of gestures are used during face-to-face interactive gaming; **2)** What types of gestures co-occur; **3)** Do the gestures used serve to benefit the learning for second language learners; **4)** Do the gestures used serve to facilitate engagement for second language learners. In the following sections, I summarize results that address each of these questions, implications of the present findings, as well as limitations of the present study and potential directions for future research.

Rates and Types of Gestures

To investigate the rates and types of gestures employed during face-to-face interactive gaming, two approaches to coding for gesture were used when examining the transcripts. Using McNeill's approach as an initial guide, the iconic, metaphoric and beat gestures were coded with limited results. The only gestures that were apparent in any quantity were the iconic gestures, which are associated with concrete ideas. This may have been because the participants were second language students and, as a result, their language was limited to concrete vocabulary and simplified conversation. Iconic gestures were numerous for all dyads, but particularly for dyad 4. As seen in the results, the

majority of these gestures occurred in the instruction and reflection phase of data collection. Both participants in dyad 4 were very familiar with the game of baseball and played in their free time, which could have affected their level of comfort in using these gestures. Metaphoric gestures were almost non-existent except for 5 incidents with dyad 5. The fact that there were any incidents as compared to the other dyads may have been due to the fact that one of the participants in this group was a native English speaker and the other had an English language level that was upper intermediate.

The second approach to coding for gesture that was used, the interaction approach, included facial gesture, body gesture, social bonding, including mimicking, simultaneity, and vocabulary, including game vocabulary, vocabulary with gesture and gesture in place of vocabulary. Facial gesture for other was highest for dyad 4 and lowest for dyad 5. In dyad 4, the facial gestures typical were laughing, nodding, and smiling which are all signs of positive emotion (Pantic, 2005). The high number of facial gestures for other in this dyad may have been related to the occurrence of school announcements during the data collection. This was because one of the participants was late coming to the session, which made it go overtime and overlap with the school announcements as well as a few minutes of the scheduled morning break. As students are not usually permitted to speak during the announcements, the participants' inability to speak freely may have negatively affected their verbal interaction with each other while positively affecting their non-verbal communication in the form of facial gestures.

The rates and types of body gesture observed varied between the dyads. Overall, body gesture was highest for dyad 6 and particularly for body gesture to someone or something. The body gestures typical of this dyad were tossing hair to one side, tucking

hair behind one ear, and shaking of the head and hair. As stated in the Results, it seemed that body gestures were elevated if they were either very positive as in dyad 6, or very negative as in dyad 5 with common gestures including crossing of ones arms (Pantic, 2005).

While the rates and types of gesture were recorded using the videotaped sessions of the data collection sessions, knowing the true experience of the participants was difficult. It is hoped that by using a selection of gesture markers drawn from current trends in research that the data represents an objective representation of the participants' true experience. People all over the world can communicate to some extent using facial gestures and by paying attention to voice, even in the absence of full verbal comprehension. Following participation with a partner in a video game, students were asked to reflect upon their personal experience and to describe what happened. Students did not expand upon their emotions while playing, but non-verbal behaviour such as facial and verbal expression can be used to infer emotional states if they are noticeable and decodable (Wierzbicka, 1999). Faces are the projectors for the mechanisms that control our emotional and social behavior. For example, our emotions are reflected in 'rapid facial signals', which are due to changes in neuromuscular activity. These changes provide visual cues that underlie facial expressions (Pantic, 2005). The analysis of facial gestures and voice together facilitate a fuller understanding of human communication (Busso & Narayanan, 2007). Of course, the subjective experience of a person cannot be fully discovered unless the person is asked as well (Scherer, 2005).

Co-Occurrence of Gesture: Social Bonding, Mimicking and Simultaneity

Research question 2 looks at whether gestures co-occur. Perhaps most interesting was the finding that, upon close examination of the video and transcript for dyad 6, gesture swapping took place throughout the game and during the reflection. Gesture swapping is considered to be a means of building solidarity and social bonding, since interactional synchrony is a mirroring of movement between interlocutors (McCafferty, 2002). Sometimes this can be a transmittable, reciprocal trait between interlocutors such as in dyad 6. This mirroring conduct was observed in dyad 6 when the 'expert' participant tossed her hair to the side several times throughout the session and, just before the reflection, her 'novice' partner adopted this gesture and flipped her own hair on several occasions. At the same time, the novice tucked her hair behind one ear on several occasions when the expert partner adopted her gesture. On various occasions, the facial and body gestures exhibited by an individual participant were subsequently adopted by the other person in the dyad. This is particularly interesting given that these two students had never met before the session, so the occurrence of this behaviour so soon into their relationship was both novel and unexpected. Gesture swapping occurred frequently for dyad 6 throughout the game and their post-game reflection.

The next types of coded gesture considered included social bonding, mimicking and simultaneity. Social bonding creates feelings of inclusion and belonging. It logically follows that a learning environment which promotes feelings of belonging encourages risk-taking on the part of the students. McCafferty (2002) reported that when students work together and are seen coordinating and/or copying each other's movements, they are learning and teaching within the Zone of Proximal Development (ZPD). Vygotsky

(1978) originally tied imitation to development through the ZPD, arguing that learners only imitate that which falls within their ZPD. Therefore, if the object of imitation is not within their grasp or ZPD, they cognitively cannot imitate but can only mimic the action without true understanding. Imitation is connected to the acquisition of culture since how we express and understand emotions through non-verbal cues such as facial expression solidifies our membership within cultures (McCafferty, 2002). In fact, a lack of such coordination leads to frustration and can be a sign of disagreement (2002). This signal of disagreement or misunderstanding may exist on several levels, such as the flow of ideas, the pace of learning, or simply a clash of cultures or cultural expectations.

The gesture swapping which occurred was not unique to dyad 6; in fact, other types of imitation behaviour occurred in other dyads as well. Aside from being a sign of learning and teaching within the ZPD, reciprocal imitation is thought to play a vital role in the acquisition of language and is a precursor to symbolic processes (Nadel, 1999). In all but one dyad, the common pattern of gesture began as very separate and individual for each person but, over the course of the session, took on a shared nature as seen by the presence of mimesis and simultaneity. This was true both during game play as well as the reflection. This means that students adopted each other's mannerisms (mimickery) or gestured at the same time (simultaneity). Dyad 4 exhibited a high number of mimicking and simultaneous gesturing behaviour.

For example, in Figure 4.1, they assumed the same posture at the same time when told by the tester that they were good at the video game. Then, in Figure 4.2, they laughed together at the same time while clasping their hands together. In Figure 4.3, mimicking behaviour was seen when the 'novice' crossed his arms after looking at the

'expert' who already had his crossed. This dyad was observed exhibiting simultaneous gesturing on multiple occasions throughout the session. One hypothesis for why this occurred is that, as students got to know each other through the active game, they bonded with and mimicked each other.

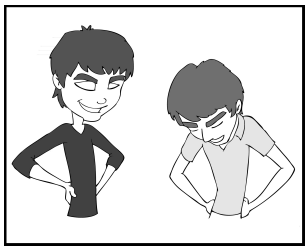

Figure 4.1. Similar poses

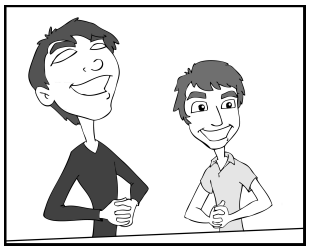

Figure 4.2. Laughing together

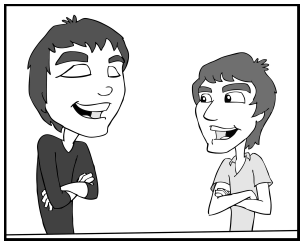

Figure 4.3. 'Novice' on right mimics 'expert'

When the participants did not bond and exhibited no mimicking behaviour, such as with dyad 5, they did not seem to get along. This lack of coordination was viewed as a sign of disagreement between the participants, as stated by McCafferty (2002).

Learning Benefits of Gesture: Game Vocabulary, Vocabulary with Gesture and Gesture in Place of Vocabulary

Research question 3 queries whether the gestures used benefit the learning. Vocabulary use is considered here, including game vocabulary, vocabulary with gesture and gesture in place of vocabulary. While analyzing the video, it was observed that more vocabulary and vocabulary-related gesture occurred during the reflection sessions and while the participants struggled to think of the right word. For example, in dyad 4, while the 'expert' gave instructions to the 'novice', he said "this" three times and gestured what he wanted to describe. Also, gesture was used in place of vocabulary when the participants did not know the word, which was then provided by the researcher. Both participants in dyad 4 had played baseball outside of school in their spare time, aiding in their grasp of game-related vocabulary and their enthusiasm for the game. This may have also contributed to their level of social interaction and knowledge of game-specific vocabulary. Dyad 4 provides an interesting contrast to dyad 6, which had a member who had never before played the game and did not know how to play but which also exhibited a high level of game vocabulary during the session. The reasons for the high number of game vocabulary and the participants' level of background knowledge may have differed between the dyads, but the resulting high frequency of game vocabulary was the same. The high incidence of gesture, particularly social bonding, was common for both dyads and perhaps serves as one commonality between the two dyads.

During the reflection, the 'novice' in dyad 6 was frequently observed using gestures in combination with vocabulary. Interestingly, specific gestures were consistently used with specific words. For example, when she described how she

"mixed" English and French in her mind while she played, she held her hands apart at chest level with the palms facing in and rotated them up and down around each other. She used this same word and gesture on two instances. In addition, when she used the words 'thinking' or 'mind' she placed her open hands on either side of her head and pointed at her temples. Similarly, when she said 'French', she brought one hand with outstretched straight fingers down and perpendicular onto her other open hand. As she did this, her intonation was low and seemed confident. Conversely, when she used the word 'English', which was her second language, her fingers pointed in towards her body, which seemed less confident. When asked whether she thought in English or French during the game, she replied:

M: Um, it was like half and half (both hands open, palms down in front of chest, alternatively moving straight up and down as she speaks in rhythm).

When gesture was used in conjunction with vocabulary, this seemed to internally reinforce the meaning of the words. Rather than enhance communication for the interlocutor, the gesture seemed to serve more of an internal function for the communicator. In contrast, when a gesture was used in place of a vocabulary word, this aided communication by providing the corresponding gesture where recall of vocabulary failed. Without providing gesture, the message to the interlocutor would have been lost. This supports Gullberg's conclusion that gesture provides second language learners support or a coping strategy during the transitional phases of language competencies and lessens the cognitive load on working memory (Gullberg, 1997).

It was noted that both participants in dyad 4 play baseball in their free time. This may explain why both their communicative gestures and vocabulary were particularly

high; they were not only aware of some of the game-related vocabulary but also some of the more advanced expressions. They both exclaimed during the reflection that they enjoyed playing the video game, so their interest and engagement in the game was high. These participants became both absorbed and focused during the game, indicated by the number of gestures for self and other. As noted by Gee, capitalizing on student interests outside of school can make their learning experience more authentic and result in giving them a sense of belonging and internal motivation (2004).

Engagement Facilitated by Gesture in Second Language Students

To examine whether gestures facilitate the engagement of second language students (Research question 4), communicative gestures and gestures for self were compared. In Figure 3.4, it can be seen that overall, the communicative gestures and gestures for self were the most common in dyad 6. In addition, dyads 4 and 6 had particularly high numbers of communicative gestures, while dyads 5 and 6 had high numbers of gestures for self. The most interesting dyad was dyad 6 because the participants exhibited by far the highest number of facial gestures for self and body gestures to someone/something. This dyad used facial gestures for themselves while playing the game but also bodily gestures while in conversation with the interlocutor. For example, in Figure 2.3 the 'novice' is seen frowning deeply after she made a mistake in the game and got a foul ball. The elevated incidence of all types of gesture was interesting in that dyad 6 also had high levels of gesture with vocabulary, mimicking and gesture swapping behaviour. This level of participation could suggest a high level of engagement by the participants. It is possible that the reliance on gesture not only allowed the second language student to participate more, but also to communicate about

more complex ideas in the reflection, as predicted by Gullberg (1997). Another hypothesis is that the avid engagement in new digital and media literacies of computer games helped to establish a context with a blend of productive and receptive activities, which Gee thought were not merely passive reception (2004).

In the following excerpt of the transcription, it is thought that social bonding results in a series of communicative gestures with the face and body.

S: Ooh! Woo! (both arms go straight up full length in a 'v' above head, hands closed into fists, mouth open in a small 'o')

H: Oh (covers mouth with right hand, crosses legs and then uncrosses, smiles, lowers hand to side)

J: (laughs) I haven't seen that before.

S: Yeah, I'm the best one (adjusts belt)

H: (laughs, pitches)

S: (swing) You see that?

H: Sit down.

S: Ha ha ha.

H: Out. Yes (clenches and unclenches fists)

S: Oh (scratches between eyes)

The participants respond to each other about the game using gesture and voice, bonding socially. This gesture of raising the arms above the head is indicative of self motivation. Dyad 4 exhibited such simultaneous shows of emotion using body gesture. For example, when the 'novice' hits a home run, it is seen in the photo that he raises his

arms over his head and opens his mouth while the 'expert' leans to the side and covers his mouth.

In figure 4.4, the participant uses bodily gesture to emphasize her point and to help her explain an abstract idea with limited vocabulary. One reason that she does this

Figure 4.4. Gesture in communication

could be due to cross-linguistic influence. She is a short-term student from France, where gesturing while speaking is commonplace. The participant gestured while speaking in this way several times during the reflection component, using gesturing at the same time as the words were spoken. The gestures reflected the meaning of the vocabulary, such as seen in the photo. The photo in figure 3 captures her explanation of how she mixed English and French in her mind while playing the game.

Excerpt from transcript:

M2: But when I don't know the word (squints right eye, vocal emphasis)
I think of the word (double hand gesture forward and down to emphasize word) in French (fingers bent perpendicular to

palm on ‘French’, pushes hand forward on word). Was like (palms facing each other in front of chest, alternate hands up and down) was like, mixed (hands open and rotating side to side facing each other, then right hand swats at chest level, smile).

J: Okay. Interesting.

M2: (rests open hands on front of thighs, crosses wrists, interlocks fingers)

J: Is there a specific example

M2: (sucks in lips, bites)

J: ..for when that happened?

M1: (looks at J, then TV)

J: That you can think of?

Game: Strike! Batter out!

M2: (looks at TV) Um, no, no. I can’t remember now but (open hands beside head with palms facing in, then moves in front of chest palms in, clasps hands, wrings them, looks to left) No, I just mixed (fingers open, palms facing each other, moves up and down as if around a ball).

Limitations & Future Directions

Although the current study adds to the knowledge of the role of gesture in second language acquisition, it is uncertain whether the frequent occurrence of gesture is encouraged by the context of the interactive video game or the presence of an interlocutor. The Wii video game required the active participation of students using

physical movement in a standing position, which is different from the traditional learning context of sitting individually at a desk with pen and paper. Therefore, replication of this study with the addition of an alternate situation where participants do a traditional grammar sheet and compare the incidence of gesture could produce stronger comparative effects. This limited the generalizability of the results to other existing studies. For example, in one study that looked at whether the presence of gestures in the input affected learning in a context where participants were exposed to a language that they did not know, it was found that gestures served to highlight linguistic forms, not just meaning (Gullberg *et al*, 2007).

A second limitation of the current work is that participants' behaviour and gestures were observed and recorded but they were not asked to expand on these after playing the game. Instead, participants were asked to answer pre-set questions and were given an opportunity to reflect upon their experience. Also, their limited language level may have hindered their ability to fully explain what they felt and experienced. So, although they were given an opportunity to explain their behaviour during the game and what they felt, the limited questions and their language level may not have fairly represented their true experience. It was thought that their gestures and words would be more telling through the examination of the videos in regards to their engagement, level of learning and participation in the process. Although facial gesture and voice are used to facilitate an understanding of communication and emotional state, the true experience of a person cannot be fully understood until they are asked and are able to effectively communicate their answer (Scherer, 2005).

An important avenue for future research will be learning the specific non-verbal and verbal cues for learner readiness in second language acquisition and to relate findings to discussions about input and desired learning outcomes. This was an area of research identified by Gullberg as yet to be examined in her review of current studies on the subject of gesture and second language acquisition (2007). Identifying the cues for learner readiness in second language students is potentially complicated by the factors of cross-linguistic influence and the difference in cultural norms. Prior research has speculated that gesture can faciltate L2 comprehension, but this has remained untested (Gullberg, 2010). Though two studies have examined whether gestures in the L2 input affect L2 learning, but did not relate findings to (comprehensible) input in second language acquisition (Krashen, 1985).

Another important follow-up of the current analysis will be to more systematically investigate the difference between an interactive context which promotes gesture and a learning environment that is more traditional where the students are seated individually and working with paper and pencil. It would be beneficial to examine the differences in student engagement, vocabulary use and learning. This would provide insight into the role of input and gesture in second language acquisition. This could be a logical extension of the current study if it were to be repeated for another project.

Chapter V - Conclusion

In the current study, participants were videotaped while learning and playing a video game and then reflecting upon their experience in dyads. The video was analyzed for different types of gesture and vocabulary. The two most interesting dyads in this study were 4 and 6, which displayed high use of vocabulary, particularly during the reflection and a high number of gestures throughout the session, including signs of social bonding like mimicking and simultaneous gesturing.

In recent years, the emphasis for research has shifted from the traditional focus on addressee-related effects to internal benefits of gesture for second language learners. The current investigation presents an addition to this area of second language studies and establishes a meaningful relationship between the types and rates of facial and body gestures, number of occurrences of social bonding as well as vocabulary observed while dyads play an interactive game together. The identification of the rates and types of gestures, learning benefits and student engagement presents important insight into second language learning.

Implications

To date, most of the student-student interaction studies on gesture for second language students have focused on addressee-related benefits rather than internal functions. With the new focus on students' internal benefits, student engagement and motivation are being considered in the process of interaction with an interlocutor. The current study contributes to the further understanding of the internal state of second language students when interacting with others. Vocabulary, gesture and social bonding

were observed in the highest numbers within the same two dyads. The interactions observed indicated that the participants were not only very engaged and motivated to play the game, but also to freely practice specialist varieties of non-academic English in an informal and non-threatening setting without hesitation. In a more traditional academic setting, these same students may not have been as willing to practice using English for fear of making a mistake. Though the individuals in most dyads were second language students and not paired with a native English speaker, they created much input, sometimes corrected each other's mistakes or provided each other words when needed and the interactive baseball game helped to provide a native language situation. In addition, the reflection afforded the most chances for each individual to be asked questions by the native English speaking researcher, to extend their target language by having to describe their experience playing the game and to have mistakes corrected when needed. These are all factors in Long's constructivist model of language acquisition (Brown, 2007).

Gesture, gaze, movement and body posture are just a few modes of semiotic representation that aid learners in making meaning. These modes were used to code for gesture in this study. Multimodality is known to aid learning as it is a form of differentiation, or making learning accessible to many learning needs and styles, not just second language learners. Other modes of representation include image, music, sound, and speech; all of which were present in the data gathering sessions where participants freely interacted in dyads while playing a video game. Digital technology is a large part of the life worlds of students. It is a natural extension for educators to allow students to

benefit from the multimodal aspects of this medium while building upon their strengths and interests outside of school.

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