Gender Differences in L2 Comprehension and Vocabulary Learning in the Video-based CALL Program

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Abstract—This study examined whether there were significant differences between males and females in comprehension, vocabulary acquisition and vocabulary retention in the video-based computer assisted language learning (CALL) program. In total, 74 male and 43 female university students taking Freshman English course in Taiwan joined this study. A quantitative analysis of video comprehension tests, vocabulary immediate tests, and vocabulary retention tests was conducted. Two types of videotexts ranked as easy and difficult materials were used. The statistic results showed that first, regardless of videotext difficulty, females achieved higher percentage scores than males in comprehension, vocabulary immediate, and vocabulary retention tests. Second, with an easy videotext, females achieved significantly higher scores of comprehension and vocabulary retention tests than males. Third, a within-group comparison showed that females achieved significantly higher scores of both vocabulary immediate and retention tests of the easy segment than their scores of the difficult segment. Fourth, males themselves acquired vocabulary significantly better while viewing the easy segment; however, males' comprehension of the difficult videotext was significantly better than their score of the easy one. Finally, instructional recommendations were presented to enhance L2 instruction through the video-based CALL program.

Index Terms—comprehension, computer assisted language learning, gender, video, vocabulary learning

I. INTRODUCTION

A. Gender and Computer Education

With the advance of technology, computers integrate with other media have been widely utilized in language educational settings. Some learners may receive significant improvements in language skills under such hypermedia environments whereas some learners may confront difficulties and fail to make much progress. There can be various factors influencing language learning performances in hypermedia contexts. Among the learner's factors such as age, academic background, technological knowledge, and gender, gender can be an influential factor. For example, many studies examined male and female students' attitudes toward using computers as an assistant tool to learn languages (Aydin, 2007; Charupan, Soranastaporn, & Suwattananand, 2001; Hong, Ridzuan, & Kuek, 2003; Wilson, 2004). The general results concluded from these studies showed learners' attitudes affect toward using computers their learning outcomes positively. Furthermore, males and females' attitudes varied extremely in many aspects. For example, males had more favorable and comfortable attitudes toward computer use and the Internet than female students (Selwyn, 1999; Slate & Manuel, 2002; Usun, 2003). As to affection aspect, females exhibited more anxiety in technology use than males did (Selwyn, 1999). These findings suggest that males, in general, accept and use technology more comfortably than females. Furthermore, Slate and Manuel, (2002) indicated that significant differences were found between males and females in educational benefits. For example, college freshmen males reported that the information on the Internet is less useful than were reported by females; on the other hand, females preferred using the Internet for educational purposes than their gender counterparts (Slate & Manuel, 2002). In general, these studies yielded significant gender differences in their attitudes toward using computers and the Internet to learn languages. It can be assumed that both genders perform different language learning outcomes due to their different attitudes.

There is an unbalanced number of males and females joining the fields of computer science (CS) and computer engineering (CE). Recently, large-scale studies demonstrated that there was a gradual decline for women in taking degrees or pursuing careers in CS and CE in Greek (Papastergiou, 2008) and in America (National Center for Women & Information Technology, 2009). Whether women can successfully involve themselves in computer-based contexts may rely on their individual perceptions (Papastergiou, 2008), gendered identity in the target society (Norton, 2000), and their family and fellowship support (Lynch, 2002). As Markley (1998) pointed out, women could not interact freely due to power differentials in society when they participated in a computer-based course. Moreover, the literature on computers in language education also abounded with research indicating inequities in access to technology for girls (Hess-Biber & Gilbert, 1994; Norton & Pavlenko, 2000). With inferior position for women, the present study intended to understand whether women could learn a second language successfully through computerized class-based activities.

B.   Gender and Second Language Learning

Another path of gender difference research was also conducted in the field of second language (L2) learning. The results of L2 studies reveal that gender has been shown to be a significant variable in using strategies to learn a second language (Oxford, 2002). For example, women used strategies more frequently than men according to Oxford's (1990) 50 strategies on the Strategy Inventory for Language Learning, including memory, cognitive, metacognitive, affective, and social strategies (Oxford & Ehrman, 1995; Lan & Oxford, 2003). Goh and Foong (1997) found that there were significant differences between males and females in the categories of compensation and affective strategies. Moreover, in a video-based computer assisted language learning context, male and female L2 learners used significantly different categories of strategies to comprehend video-based language lessons (Lin, 2009). Since the earlier research in the above mentioned fields has demonstrated gender can be a significant variable. However, few studies compared male and female learners' language performance in a L2 video-based CALL context. The current study was further administered to examine whether there were significant differences between males and females in L2 text comprehension and vocabulary learning when learning materials interpreted with video and displayed on the computer.

C.   Gender and Cognitive Tasks

Psychologists have found there are significant differences in cognitive performance of males and females. Having an investigation on gender and student-teacher interaction in the language classroom, Batters (1986) concluded several features significantly differing female students from male students. For example, Batters (1986) found that first, females spent more time on "attentive activities" than males. Attentive activities included "listening to the teacher, to the tape, to other classmates, observing and reading" (p. 78). Second, males were more dominant in "oral and participatory activities", such as "speaking to the teacher and to other pupils in the foreign or native language, taking part in groupwork or demonstration and showing spontaneity (Batters, 1986, p. 78)". Furthermore, some studies found both genders performed significantly different language learning outcomes (Cattell, 2000; McGlone, 1980; Springer & Deutsch, 1989; Kimura, 1993). These studies indicated that females performed better than males in listing words that all began with the same letter, or that were all related semantically. Cattell (2000) indicated that males performed better than females in certain tasks of visual perception (such as finding a shape which forms part of a larger pattern of shapes), spatial tasks (such as mentally rotating objects), and solving problems where required learners' mathematical reasoning ability.

II.   METHOD

A.   Participants

The study recruited 117 participants (74 males and 43 females) who took Freshman English course in a public university in Taiwan. Their mother language was Mandarin and English was learned as a foreign language. The average age of the participants ranged from 18 to 23, with an average of 19 years and one month.

B.   Instrumentation and Procedures

Video segments. In this study, two video segments were used and ranked as respectively easy and difficult materials. The segment difficulty was determined by two criteria, students' familiarity with the video topic, and the speaker's speech rate. Two video segments were selected from CNN news 2006 video archives, which are part of an on-line program issued by a local language learning publishing company in Taiwan (Live ABC, 2007). The first segment related to museum visiting introduced Japan's emerging science museum focusing on on-hand learning. It was 506 words in length and was delivered at the approximate rate of 2.02 per second over four minutes, ten seconds. The second segment dealing with the topic of medicine introduced a sleep aid primer for the weary traveler. It was 455 words in length and was delivered at the approximate rate of 2.53 per second over three minutes. The speech rate of the second segment was faster than that of the first one.

Prior to formal data collection, a pilot study was conducted with another 15 freshmen. According to the pilot students' response, the students favored the museum-visiting segment the most. The students expressed that they felt less familiar with the topic of the second segment. The information in that video was of a medical nature, such that a student who was not well versed in medicine knowledge, such as medical terms, would more likely lack proper prior knowledge and unable to comprehend the content successfully. Following the two criteria, the medicine video segment was coded as Difficult, and the museum visiting passage as Easy.

Procedure and data collection. In English class, I assigned thirty minutes for students freely getting on the on-line CALL program to study the selected video clips. This study applied two follow-up tests and a delayed test pertaining to measuring the participants' video immediate comprehension, vocabulary immediate acquisition, and vocabulary retention. Students viewed one segment in one class meeting. The participants took follow-up tests immediately after viewing one assigned segment and took vocabulary retention tests one week after viewing each video segment.

Two video comprehension (VC) tests respectively contained ten multiple-choice questions; the total score of each test was ten points, with one correct response worth of one point. Vocabulary immediate (VI) and vocabulary retention (VR) tests were in cloze format containing the same target words. The twelve gap-filling questions were designed according to the content of the assigned video segment. The total score of each test was 12 points, with one correct response worth

of one point.

III. RESULTS AND DISCUSSION

This study examined whether there were significant differences in language performances of males and females in terms of comprehension, and vocabulary learning. Vocabulary learning was further investigated through tasks of immediate acquisition and retention. The data collected from two VC tests, two VI tests, and two VR tests were analyzed with Independent Samples Tests to determine whether there existed gender differences in comprehension, vocabulary acquisition, and vocabulary retention. In the situation right after video viewing, whether both genders' video comprehension respectively was related to their vocabulary immediate acquisition was further examined by conducting Pearson correlations tests.

A. Effects of Gender on Video Comprehension and Vocabulary Learning

Table 1 summarized means and standard deviations of the three tests for males and females. Mean scores referred to correct response percentage of each test. Regarding the easy videotext, females received higher mean percentage scores on the three tests than males. When viewing the difficult videotext, females also achieved higher mean scores throughout the three tests. The finding suggests that regardless of videotext difficulty, females performed better than males in the tasks of comprehending the content, acquiring vocabulary immediately after video viewing, and retaining vocabulary after one week. The results provided further evidence for previous research by McGlone (1980), Springer and Deutsch (1989) and Kimura (1993) that females may be better at language tasks than males. The results can be explained by Batters' (1986) research outcomes that females focused on more attentive activities than males. When viewing video-based lessons, females can pay more attention to linguistic details and read the content more extensively than males. Furthermore, females' positive attitudes toward using the Internet for educational purposes (Slate & Manuel, 2002) may interpret why females outperformed males in the three tests.

TABLE 1.
MEANS AND STANDARD DEVIATIONS OF CORRECT RESPONSES ON THE THREE TESTS FOR MALES AND FEMALES IN TERMS OF EASY AND DIFFICULT VIDEOTEXTS

Tests	Easy Video		Difficult Video	
	Males ($n = 74$)	Females ($n = 43$)	Males ($n = 74$)	Females ($n = 43$)
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
VC	55.1 (21.9)	67.6 (20.5)	61.1 (22.5)	66.7 (20.8)
VI	75.7 (23.3)	83.3 (23.8)	63.5 (28.0)	71.9 (24.2)
VR	57.3 (30,5)	69.2 (30.5)	52.4 (31.8)	59.3 (28.4)

Note. * $p < .05$
VC = video comprehension, VI = Immediate vocabulary, VR = Vocabulary retention

To understand vocabulary retention of males and females, mean differences between mean scores of VI and VR by males and females were calculated respectively. In general, both males and females' VR scores are lower than their VI scores. The results demonstrate the effect of memory decay on vocabulary acquiring after one-week. Regarding male participants, vocabulary declined rate is 18.4% for easy videotext, 11.1% for difficult videotext; on the other hand, female's vocabulary declined rate is 14.1% for easy videotext, 12.6% for difficult videotext. The results show that among the four conditions, males performed the most conflict outcome, that is, males retained vocabulary in the difficult videotext the best (the lowest decay rate, 11.1%) and vocabulary in the easy video the worst remembered males (the highest decay rate, 18.4%). This is probably because males are better at using reasoning to solve problems (Cattell, 2000). During the process of viewing a difficult text, males likely applied their reasoning skill to analyze the meanings of words and consequently memorized the words deeply, with the least memory decay on vocabulary.

As shown in Figures 1 and 2, both males and females performed in a consistent pattern. Both genders achieved the highest percentage scores on VI tests of an easy and a difficult videotext respectively. This might be attributed to most learners' preference to vocabulary learning when they learn a second language. It can be noted that females scored 83% of correct responses on an easy videotext. Compared to males and females' three tests on an easy videotext respectively, only males' score (61.1) on VC test of a difficult videotext increased, and the other scores achieved by males and females on VI and VR tests of a difficult videotext decreased. The two descriptive results were further elaborated through difference comparisons.
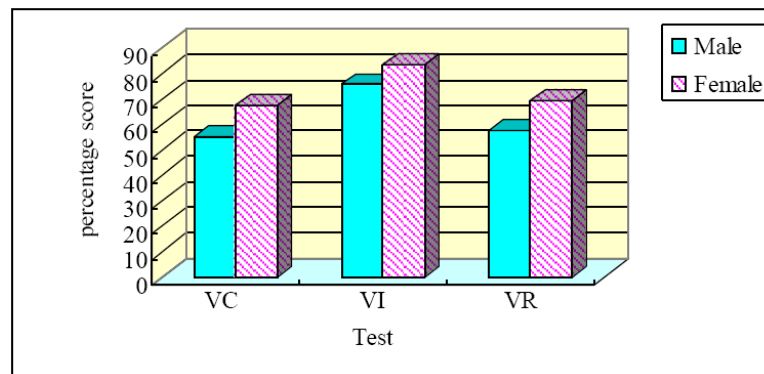
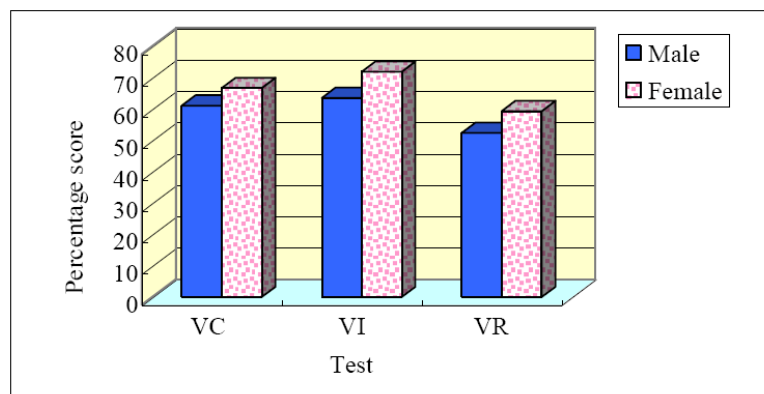Figure 1. Correct percentage scores on the three tests of an easy videotext

Figure 2. Correct percentage scores on the three tests of a difficult videotext

Independent sample tests were conducted to compare the mean differences between males and females. The statistic results revealed two significant differences between the gender groups. Table 2 showed that the participants' performance on the tests over time (comprehension, immediate vocabulary learning, and vocabulary retention) depended on difficulty of videotexts (easy vs. difficult). With an easy videotext, females achieved significantly higher scores of comprehension test ($t = 3.05$, $p = .00$), and vocabulary retention test ($t = 2.03$, $p = .04$) than males. Although mean scores between males and females on VI test did not reach a significantly different level, females also scored higher than males. With a difficult videotext, there was not any significant difference between males and females in VC, VI, and VR tests. The findings suggest that when viewing an easy videotext, female participants comprehend the content and learn vocabulary better than male participants. When viewing a difficult videotext, the performances of both genders are almost even. This also contributed to females' preference of attentive activities in language learning (Batters,1986). With easy texts, females tended to remember details whereas with difficult texts, the attentive skill did not assist females to comprehend the text successfully and achieved significantly higher than males.

In order to determine whether there were, in fact, significant differences between the means of the three tests for males and females respectively, within-group comparisons were further conducted. As shown in Table 3, the analyses for females showed that there was a significant difference between the means of correct responses of easy and difficulty videotexts in VI test ($t = 2.92$, $p = .01$). The data in Table 3 revealed that there was a marginally significant difference between the means of correct responses of easy and difficulty videotexts in VR test ($t = 2.06$, $p = .04$). An inspection of the means indicates that females achieved significantly higher scores of both immediate and delayed vocabulary tests on the easy videotext than their scores on the difficult videotext.

TABLE 2.
INDEPENDENT SAMPLES TEST SUMMARY FOR GENDER AND TESTS

Tests	Female (n = 43)		Male (n = 74)		t	df	Sig. (2-tailed)
	Mean	SD	Mean	SD			
VC (Easy)	67.6	20.5	55.1	21.9	3.05	115	.00*
VI (Easy)	83.3	23.8	75.7	23.3	1.70	115	.09
VR (Easy)	69.2	30.5	57.3	30.5	2.03	115	.04*
VC (Difficult)	66.7	20.8	61.1	22.5	1.35	115	.18
VI (Difficult)	71.9	24.2	63.5	28.0	1.64	115	.10
VR (Difficult)	59.3	28.4	52.4	31.8	1.18	115	.24

Note. * $p < .05$
VC = video comprehension, VI = Immediate vocabulary, VR = Vocabulary retention

TABLE 3.
PAIRED SAMPLES TEST SUMMARY FOR FEMALE WITHIN GROUP COMPARISONS

Tests	Easy Videotext		Difficult Videotext		t	df	Sig. (2-tailed)
	Mean	SD	Mean	SD			
VC	67.6	20.5	66.7	20.8	0.28	42	.78
VI	83.3	23.8	71.9	24.2	2.92	42	.01*
VR	69.2	30.5	59.3	28.4	2.06	42	.04*

*Note. * p <.05*
VC = video comprehension, VI = Immediate vocabulary, VR = Vocabulary retention

The analyses revealed the different pattern for males. The results in Table 4 showed that for males, gender variable did not consistently favor the easy videotext. Males themselves acquired significantly better score in VI test while viewing the easy videotext ($t = 3.6$, $p = .00$). In contrast, significant difference was found between the means of easy videotext (55.1%) and difficult videotext (61.1%) in males' comprehension tests ($t = -2.27$, $p = .03$). An inspection of the means indicates that males had a higher comprehension test score when viewing a difficult videotext.

TABLE 4.
PAIRED SAMPLES TEST SUMMARY FOR MALE WITHIN GROUP COMPARISONS

Tests	Easy Videotext		Difficult Videotext		t	df	Sig. (2-tailed)
	Mean	SD	Mean	SD			
VC	55.1	21.9	61.1	22.5	-2.27	73	.03*
VI	75.7	23.3	63.5	28.0	3.60	73	.00*
VR	57.3	30.5	52.4	31.8	1.23	73	.22

*Note. * p <.05*
VC = video comprehension, VI = Immediate vocabulary, VR = Vocabulary retention

This result can be explained from the author's findings gathered in earlier studies (Lin, 2009). Among three types of video comprehension strategies investigated in the two studies, compensation, memory, and cognitive, the most frequently used memory strategy is that males prefer to use knowledge and experience gained from life; furthermore, the most frequently used cognitive strategy by males is to grasp main idea (Lin, 2009). When viewing a videotext at a difficult level, males likely utilized their prior knowledge to catch main ideas of the video segment and as a result males performed better comprehension.

B.   Relationships between Video Comprehension and Vocabulary Acquisition

Pearson correlation tests were conducted to compare mean scores of males and females' comprehension tests and vocabulary immediate tests respectively. Regarding to both genders, video comprehension and vocabulary acquisition are positively correlated with each other (see Table 5). As shown in Table 5, significant relationships were also found between video comprehension and vocabulary acquisition. As to an easy videotext, the relationship between females' comprehension and vocabulary acquisition ($r = .53$, $p < .01$, moderate) is stronger than males' ($r = .40$, $p < .01$, moderate). The results suggest that compared to females, males may not completely rely on vocabulary to comprehend the content; they likely utilized other resources. As to the condition of viewing a difficult videotext, the correlations between the two scores for both genders are the same ($r = .49$, $p < .01$, moderate). These results suggest a relationship, but do not imply causality. At present, the results of correlation tests confirm a supportive relationship between comprehension and vocabulary for both genders when viewing easy and difficult videotexts.

TABLE 5.
PEARSON CORRELATIONS TEST SUMMARY FOR FEMALE AND MALE PARTICIPANTS' VIDEO COMPREHENSION AND VOCABULARY IMMEDIATE TESTS

Gender	Text	Correlations (VC-VR)	Sig. (2-tailed)
Female	Easy	.53**	.000
(n=34)	Difficult	.49**	.000
Male	Easy	.40**	.000
(n=74)	Difficult	.49**	.000

**. Correlation is significant at the 0.01 level (2-tailed)

IV.   CONCLUSION

It is common for the instructor to teach learners with videotexts. No instructor would want to set a curriculum that would unduly disadvantage one particular gender group of students. Therefore, it is important to determine whether or not video comprehension is truly representative of a gender's group underlying ability. At present, the study was set out to determine whether there were gender differences in comprehension, vocabulary immediate acquisition, and vocabulary retention of videotexts varying levels of videotext difficulty. Results of the present study provide potentially useful data for better understanding both genders' second language learning in a video-based CALL context. I described what the data suggested about the development of second language comprehension ability and vocabulary acquisition in terms of different levels of text difficulty. In general, gender differences emerged in tasks of comprehending videotexts

and learning vocabulary. Armed with the statistically significant results, instructional recommendations were presented to elaborate video segment selection for students and further enhance the instruction of video comprehension.

First, applying easy videotexts to foster students' comprehension and vocabulary learning. From two within group comparisons, another general finding suggests that using easy videotexts, both males and females significantly acquire vocabulary as soon as they complete viewing the assigned video segment. This finding was consistent with the result found in earlier reading comprehension research that the text type (the level of text difficulty) has an impact on reading comprehension (B ügel & Buunk, 1996).

Second, encouraging students to apply their prior world knowledge to make sense of the content of videotexts. This is because the significantly greater comprehension of difficult videotexts observed in the male group in this study. Kintsch (1998) conceptualized comprehension as a paradigm for cognition and stated that all cognitive processes required knowledge. As the case of videotext comprehension in this study, male participants' prior knowledge probably foster their comprehension. The teacher may choose videotexts with topics familiar to the students. When viewing such kind of videotext, students may rely on their prior knowledge rather than word-by-word translation.

Third, instructing students the strategy of grasping main ideas in the videotext. Most reading comprehension educators agree that catching main ideas is a key to effective comprehension. In this study, no significant result was found in males and females' video comprehension test scores on a difficult videotext. Moreover, earlier research revealed that reasoning and catching main idea were males' favorite cognitive behavior. The teacher may train the students the strategy of grasping key concepts in the text. In addition, the teacher may conduct some activities themed at key concepts, such as listing out key concepts or write a brief summary after viewing the video.

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