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Article

Effects of L1/L2 Captioned TV Programs on Students' Vocabulary Learning and Comprehension

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Abstract

This study investigated the effects of different types of captions on English as a Foreign Language Learners' (EFL) vocabulary learning and comprehension. Eighty students in a Chinese university participated. Students were divided into four groups with two classes of freshmen, one class of juniors, and one class of graduate students. Each group watched four video clips with four caption conditions: L1 Chinese, L2 English, dual (L1 and L2), and no captions. The order and caption conditions were counterbalanced. The purpose of the study was to find which caption condition is more effective for EFL learners. Four by four mixed ANOVAs were used to compare the differences among the four conditions and groups. Results indicated that students' performances were statistically significantly different across captions and class levels. In general, students in L1, L2, and dual captions statistically outperformed the no caption condition in vocabulary and comprehension. Results of the effects of L1, L2, and dual captions on vocabulary learning and comprehension were mixed. The pedagogical implications of using authentic TV series and multimedia captions were discussed.

Keywords: dual captions, Chinese EFL, comprehension, vocabulary learning, class levels.

Introduction

In the field of second language acquisition and computer-assisted language learning, ample studies point out that with advanced technology, foreign

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language learners are exposed to captioned television (TV) series on their personal computers (Chai & Erlam, 2008; Rodgers & Webb, 2017). Many universities in China use authentic TV series and videos in foreign language classes. Undoubtedly, the Internet has made language learning from captioned TV series more accessible.

The term caption is defined in the Oxford English Dictionary as a text displayed at the bottom of a screen that is the partial transcript or translation of a conversation or narrative. In the current study, the term *dual captions* refers to videos that are presented with *L1 captions* (first language) and *L2 captions* (second language) simultaneously at the bottom of the screen. *L1 captions* refers to when captions and the audio speech of a video are in the same language. *L2 captions* refers to when captions and the audio speech are in different languages. Since the Chinese government requires that all foreign films released in China be provided with captions (S. J. Chen, 2004), foreign films and TV series in China are often accompanied by dual captions or L1 Chinese captions. L2 English captions are less commonly seen either on the TV or the Internet. Since many Chinese EFL students like to watch American TV series during their free time and there are different captioned options available, it is useful to examine which caption type better helps improve students' English comprehension and vocabulary learning. The results of this study shed light on the use of captions with authentic materials inside and outside EFL classrooms.

Literature Review

A number of studies investigated the use of captioned videos for language learning. While some studies investigated the quality of captions (e.g., Dollerup, 1974), the majority of research has been centered on the effects of captions within the following three aspects: under different caption conditions (i.e., two, three, four caption conditions); on different language skills (i.e., vocabulary learning and comprehension); and the relationship between language skills and learners' language proficiency levels.

Effects of Videos under Different Caption Conditions

In regards to the effects of the different types of captions on language learning, some studies argued that captions were not often beneficial for students (e.g., Koolstra, Peeters, & Spinhof, 2002). According to Koolstra et al. (2002), captions can attract students' attention and may easily distract them from watching the images. However, more studies found favorable results of captioned videos on vocabulary learning and video comprehension. Price (1983) first indicated that captions did not interfere with learners' listening but could instead facilitate non-native speakers' comprehension.

Scholars have investigated the effects of captions under two caption conditions (Chai & Erlam, 2008; Markham & Peter, 2003; Winke, Gass, & Syndorenko, 2010): L2 captions and no captions. These studies demonstrated that L2 captions were more effective than no captions in vocabulary learning as well as video comprehension.

Additionally, researchers have examined the effects of captions under three conditions: L1 captions, L2 captions, and no captions (Lavaur & Bairstow, 2011; Markham, Peter, & McCarthy, 2001). In Markham et al. (2001), 169 Spanish second language learners were divided into three groups and each group watched videos with only one caption condition. Findings demonstrated that the L1 English captioned group significantly outperformed the L2 Spanish captioned group, and the L2 Spanish captioned group, in turn, had a substantially higher score than the no captioned group in video comprehension. These results further reflected Paivio's dual-coding theory which indicated that learners can use two stimuli independently to gain knowledge: verbal information and nonverbal images. This suggests that captioned videos involving audio, visual text, and image can facilitate information processing and language learning. Paivio (1991) argued that captions may have a positive influence on language learning in that they help language learners make connections between auditory and visual input.

Compared to studies on the effects of captions under two and three caption conditions, research on four caption conditions, particularly dual captions, were seldom addressed. Even though dual captions of foreign TV programs are popular in Chinese social media (S. J. Chen, 2004), only a few studies examined the effects of dual captions on Chinese learners (e.g., Chang, 2003; Lwo & Lin, 2012; Raine, 2012). Lwo and Lin (2012) was the only study found that examined the influence of captions on Chinese learners under four conditions: L1 Chinese, L2 English, dual, and no captions. In the study, 32 Chinese junior high school teenagers were assigned to four groups based on their proficiency in English. The results indicated that L2 English and dual captioned groups performed better than the other groups in reading comprehension. This finding is in line with the Multimedia Principle (Fletcher & Tobias, 2005) which posits that people learn through a combination of different channels to process information. According to this principle, learning is improved when the graphics and words are shown simultaneously. It should be noted that Lwo and Lin solely examined students' reading comprehension when viewing a still image with a reading text. No audio or video was involved in the investigation. Unlike Lwo and Lin (2012), the present study implements video clips and investigates whether students can improve their vocabulary learning and comprehension when dual captions are presented in TV programs.

Effects of Captions on Vocabulary Learning and Comprehension

Table 1 shows several recent studies that investigated the effects of captions on vocabulary and comprehension from different populations and contexts. The studies in Table 1 revealed that the L2 captioned group outperformed the no captioned group in vocabulary for Iranian (Hsu et al., 2013), Chinese (Shabani & Zanussi, 2015), and Taiwanese EFL students (Wang, 2007). Apart from the different language captioned conditions, some studies investigated the conditions of full caption and keyword caption in assisting vocabulary learning (Hsu, Hwang, Chang & Chang, 2013; Perez, Peters & Desmet, 2014). For example, Perez et al. (2014) found that the full captioned group outperformed the keyword captioned group in meaning recognition, but not in comprehension. Because keyword captions are not readily available on the Internet, the present study focused on students' English learning in real life scenarios when dual captions are presented.

Table 1
Selected Articles on the Effects of Captions on Vocabulary Learning and Comprehension

Article	**Vocabulary**	**Population**
Shabani & Zanussi, 2015	L2 English caption > No caption group when viewing English videos	Iranian EFL students
Wang, 2007	L1 Chinese / L2 English caption > No caption group when viewing English videos	Chinese EFL students
Hsu et al., 2013	L2 English full caption/Keyword caption > No caption group when viewing English videos	Taiwanese EFL students
Article	**Comprehension**	**Population**
M. L. Chen, 2012	Reading comprehension: L1 Chinese > L2 English caption group (there is an ordering effect) when viewing English videos	Chinese EFL students
Hsieh, 2015	Listening comprehension: L1 Chinese > L2 English caption when viewing English videos	Taiwanese EFL students
Markham et al. 2001	Comprehension: L1 English > L2 Spanish caption when viewing Spanish videos.	Spanish as a Foreign Language students

Note. ">" means "significantly outperform". The effects of captions in comprehension were investigated under three categories based on previous scholars: reading, listening, and overall comprehension.

In terms of comprehension, captions that were in the students' first language, whether it was Chinese, English, or Spanish, were more effective than captions in their second language (M. L. Chen, 2012; Hsieh, 2015; Markham et al., 2001). Although some previous studies claimed to investigate the effects of captions on listening comprehension (Hsieh, 2015) and reading comprehension (M. L. Chen, 2012), it was unclear whether students were able to comprehend the video by reading the captions or by listening to the audio. Instead of examining listening or reading comprehension individually, the current study follows Winke et al.'s (2010) approach and examines the effects of captions on students' overall comprehension.

The Relationship Between the Effects of Captions on Language Skills and Learner's Proficiency Level

Other studies took a different angle and discussed the relationship between captions and students' language proficiency levels. Hui (2007) examined the effects of captions on Chinese EFL students' vocabulary learning and discovered that both Chinese captions and English captions contributed to students' vocabulary acquisition. Particularly, lower proficiency level students benefited significantly more from the L1 captions than from the L2 captions in learning about word meaning; whereas, there was no statistically significant difference between the effects of L1 and L2 captions on higher level students. By using a Caption Reliance Test on high school EFL students, Leveridge and Yang (2013) found that students had different reliance on captions depending on their proficiency levels. Lower level participants relied more on captions for listening comprehension than higher level students. Additionally, Taylor (2005) discovered that L2 Spanish third year learners outperformed L2 Spanish first-year beginners in comprehension. Furthermore, L2 Spanish beginners found the Spanish captions distracting and had trouble paying attention to the captioned videos.

A review of the literature indicated several gaps in the use of captions in language learning research. The present study contributes to the literature in three ways: First, it investigates the effects of captions under four different conditions and fills the research gap by examining the influence of dual Chinese–English captions in authentic TV programs. Second, it utilizes a within-group analysis research design, which differs from prior between-group studies (e.g., Wang, 2007; Markham et al., 2001). This research approach collects all participants' performance under four caption conditions, accounts for participants' individual differences, and has greater statistical power. Third, because the study also looks at the effects of different caption types in different class levels, the results have pedagogical implications for university teachers in using captions to improve language learning for different class levels. The research questions addressed in the study are as follows:

1. Which caption condition is more effective in increasing students' vocabulary learning across class levels?
2. Which caption condition is more effective in improving students' comprehension across class levels?

Methodology

Participants and Sampling

Eighty Chinese EFL students from four different classes in a public university located in central China participated in the study. All students were informed that their participation was completely voluntary and their performance in the experiment would not influence their course grade. They were informed that their records would be kept confidential.

The sampling technique followed convenient sampling (Dörneyi, 2007). All 80 participants were English major students. They were 18 to 24 years old, with an average age of 20. Five students were male and 75 students were female. The study consisted of more females than males, which is usually a common feature with students who are English majors in China. The National College Entrance English Exam (NCEEE) was required for admission into universities in China, and a minimum score of 110 out of 150 in the English exam of the NCEEE was required for admission into the English Language department. According to the background questionnaire, 63% of the students began learning English in middle school. Among all participants, 76% perceived themselves as high-intermediate English learners and 23% perceived themselves as low-advanced learners. Considering the English admission requirements and students' backgrounds, it was concluded that the 80 students had an intermediate English proficiency level or higher among their EFL peers.

Procedure

Because the four groups were divided based on class levels, the students viewed the videos in four different orders. Four of the groups' experiments were conducted in the same week at four different times in a multimedia classroom. There was a screen and a projector in each classroom. As presented in Table 2, the order and caption conditions were counterbalanced using Latin Squares[1]. Students first viewed video 1, followed by video 2, video 3, and video 4. The first group was made up of freshmen, the second group consisted of junior students, the third was a class of first-year graduate students, and the fourth group was another class of freshmen. The fourth group, consisting of freshmen like the first group, provided more information to interpret the results of the freshman students.

Table 2
Orders of Four Caption Conditions

Group	Video 1	Video 2	Video 3	Video 4	N
Group 1 (freshmanClass1)	V1Chinese	V2English	V3Dual	V4No	20
Group 2 (juniors)	V1English	V2Dual	V3No	V4Chinese	20
Group 3 (1st year Grad)	V1Dual	V2No	V3Chinese	V4English	20
Group 4 (freshmanClass2)	V1No	V2Chinese	V3English	V4Dual	20

Note. V=video clips. N= number of participants. All eighty participants viewed the video clips under four conditions.

All participants were presented with a seven-page paper which included the procedure, background information, and four listening tests. Each listening test included one vocabulary and one comprehension test. The experiment took approximately one hour to complete. Students in each group watched the clips together. To avoid any special focus on captions, they were not informed that they would watch four clips with different caption conditions. After watching each video clip, students immediately completed a listening test.

Background Questionnaire

Students were asked to fill out a background questionnaire which comprised of their gender, age, years of learning L2 English, and their self-perceived English proficiency level. Unlike ESL students, EFL students are not required to take the Test of English as a Foreign Language (TOEFL) exam in order to be admitted to the university. As a result, no TOEFL scores were collected.

Authentic TV Clips

Four video clips were selected from one episode of the TV series *Hannah Montana*. The reason for choosing this musical comedy show was because of its relaxing content. Krashen (1982, 65–78) suggested that low anxiety is necessary for language acquisition to occur. The episode was cut into four video clips running from three to five minutes in length, and the video clips were to be watched consecutively in four different caption conditions that were created using Windows Moviemaker. All participants indicated that they had no prior knowledge of the content before watching the video clips. Each clip contained an independent story that students could be tested on after a viewing. Each video was viewed only once without pause.

Vocabulary and Comprehension Tests

There was one vocabulary and one comprehension test after each video clip. Instructions were given in both English and Chinese to make sure students understood the test questions. The exact sentences where the word appeared in the clips were given in the test so that students could better understand the context of the word. For instance, "He is so hot, and I'm so lame". In this sentence, lame was underlined, and students needed to give the correct Chinese translation or English synonym. There were four vocabulary tests in total. Each vocabulary test consisted of five sentences, with one underlined word in each. Students' prior knowledge of vocabulary was also evaluated: after completing the vocabulary and comprehension tests, participants were asked to mark whether they knew the words tested in the vocabulary test or not before watching the videos.

With regard to the comprehension tests, students were allowed to answer the questions in either English or Chinese. This was to ensure accurate answers and make students more comfortable with the tests. For example, for a comprehension question like "What is Miley afraid of if she tells the truth to Lily?", students could answer in either English or Chinese.

Scoring of Tests

Each test had ten questions: five vocabulary questions and five comprehension questions. One question counted as one point. Each test was 10 points. Exact translations or synonyms received full credit (1 point). Half credit (0.5 points) was given if students were partially correct in their answer. For example, for listening test 1, vocabulary test question 4, "Don't look at my booty," the correct answer was "bottom or butt." If a student translated it as "body parts," he or she was partially correct. Incorrect translations were given no credit (0 points). Additionally, because the study focused on the vocabulary students learned from watching the video under different caption treatments, students' final vocabulary scores were calculated as their scores from the vocabulary test minus the words they indicated that they already knew in the prior knowledge vocabulary test.

In scoring the comprehension tests, each accurate idea (one per question) received full credit (1 point). If the answer was partially correct, students received 0.5 points. For example, for listening test 1 comprehension test question 1, "what does Oliver think about Hannah Montana?" the correct answer is "Oliver thinks that she is a goddess." If a student answers "beautiful, sexy, fantastic," the answer is partially correct. If the answer was incorrect, they received 0 points. An answer key for the listening tests was created by the two raters. The two raters, two Ph.D. students in the field of language education,

scored all the tests and the rater agreement was 91%. A third rater joined and rated the tests that were scored differently. The three raters reached an agreement for the differing ratings.

Analysis

Preliminary data analyses were conducted to measure how reliable each vocabulary and comprehension test was and how reliable the tests were in general. As illustrated in Table 3, although the reliability estimates for vocabulary tests 2, 3, and 4 were comparatively low, one could argue that there were only five items in each vocabulary test and the Cronbach's alpha may be lower due to the number of the items. However, all 80 participants viewed the video clips in four caption conditions and they all completed the 20 vocabulary and 20 comprehension test items. The Cronbach's alpha was .666 for total vocabulary tests and .815 for the total comprehension tests which are considered highly reliable (Bartz, 1988). Since the purpose of the study was to examine which caption condition students performed better under, the total four tests had a Cronbach's alpha of .800 which indicated that the four tests, when combined together, were reliable.

Table 3
Reliability Estimates (Cronbach's alpha) for Vocabulary and Comprehension Tests

Tests	Vocab. (5 items)	Comp. (5 items)	Total for test (10 items)
Test 1 (Video 1)	.578	.641	.733
Test 2 (Video 2)	.245	.613	.450
Test 3 (Video 3)	.473	.536	.622
Test 4 (Video 4)	.187	.484	.386
Totals for vocab/ comp.	.666 (for all vocabulary tests, 20 items)	.815 (for all comprehension tests, 20 items)	.800 (for all 40 items)

To test whether there were interaction effects between caption conditions and class levels and to measure which caption condition is more effective for the Chinese EFL students, a four (caption conditions) by four (groups/ class levels) mixed design ANOVA was conducted twice (Fox, 2008). The first ANOVA analysis measured vocabulary gain and the second measured comprehension. Then post hoc tests, multiple comparisons using the Bonferroni method, were performed to examine which caption condition students performed better under in terms of vocabulary learning at each class level.

Results

RQ 1. Which Caption Condition is More Effective in Increasing Students' Vocabulary Learning Across Class Levels?

Prior to performing the mixed design ANOVA on vocabulary performance, a series of assumptions were tested. Students' vocabulary scores were normally distributed. No outliers were detected. There were homogeneities of variances ($p > .05$) and covariances ($p > .05$), as assessed by Levene's test of equality of variances and Box's test of equality of covariances matrices. A two-way mixed ANOVA was performed to examine whether there was an interaction effect between caption conditions and class levels. The assumption of Mauchly's test of sphericity was met for the two-way interaction, $\chi^2(5) = 5.131$, $p = .400$. The tests of within-subject effects (Table 4) indicated that there was a statistically significant interaction between caption conditions and class levels on students' vocabulary performance, F (9, 228) = 12.491, $p < .05$, partial $\eta^2 = .330$.

Because a statistically significant interaction was found, four separate within-subject ANOVAs were performed to investigate the main effect of caption conditions on vocabulary learning. The within-subject ANOVAs demonstrate vocabulary score differences between caption conditions at each class level. As shown in Table 5, results indicated that there was a statistically significant effect of caption conditions on students' vocabulary performance for FreshmanClass1, $F(3, 57) = 10.553$, $p = .000$, partial $\eta^2 = .398$; Juniors $F(3, 57) = 14.622$, $p = .000$, partial $\eta^2 = .435$; 1st year graduate students, $F(3, 57) = 7.703$, $p = .000$, partial $\eta^2 = .288$; and FreshmanClass2, $F(3, 57) = 8.041$, $p = .000$, partial $\eta^2 = .297$.

Table 4
The Interaction Effect Between Caption Conditions and Groups/Class Levels on Vocabulary

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
CaptionType	Sphericity Assumed	11.390	3	3.797	4.806	.003	.059
CaptionType *Group	Sphericity Assumed	88.807	9	9.867	12.491	.000	.330
Error (CaptionType)	Sphericity Assumed	180.116	228	790			

After finding a statistically significant effect, post hoc tests, pairwise comparisons, using Bonferroni were performed to compare which caption condition students performed better on vocabulary learning at each class level (Table 6). Table 7 presents a comparison formula that summarizes which caption condition is more effective than another for students' vocabulary learning at each class level.

Table 5
The Main Effect of Caption Conditions on Vocabulary Performance

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
FreshmanClass1						
CaptionType	31.569	3	10.553	12.557	.000	.398
Error (CaptionType)	47.903	57	.840			
Junior						
CaptionType	30.063	3	10.021	14.622	.000	.435
Error (CaptionType)	39.063	57	.685			
1stYearGrad						
CaptionType	21.563	3	7.188	7.703	.000	.288
Error (CaptionType)	53.188	57	.933			
FreshmanClass2						
CaptionType	16.912	3	5.911	8.041	.000	.297
Error (CaptionType)	39.962	57	.701			

Note. Numbers on the table demonstrate the results when the Mauchly's test of sphericity is assumed.

Table 6
Comparing the Effects of Caption Conditions on Vocabulary Performance for Class Levels

	Caption condition	Caption condition	Mean Difference	Std. Error	Sig.	95% Confidence Interval Difference	
						Lower Bound	Upper Bound
FreshmanClass1	Chinese	English	.575	.203	.064	-.022	1.172
		Dual	-.300	.325	1.000	-1.258	.658
		No	1.350*	.262	.000	.579	2.121

	English	Dual	-.875	.338	.108	-1.870	.120
		No	.775*	.245	.030	.055	1.495
	Dual	No	1.650*	.339	.001	.653	2.647
FreshmanClass2	Chinese	English	-.325	.241	1.000	-1.036	.386
		Dual	.500	.320	.811	-.443	1.443
		No	.875*	.266	.023	.091	1.659
	English	Dual	.825	.298	.073	-.051	1.701
		No	1.200*	.255	.001	.449	1.951
	Dual	No	.375	.188	.364	-.179	.929
Juniors	Chinese	English	-1.225*	.268	.001	-2.013	-.437
		Dual	.050	.243	1.000	-.666	.766
		No	-1.175*	.275	.002	-1.983	-.367
	English	Dual	1.275*	.265	.001	.494	2.056
		No	.050	.290	1.000	-.804	.904
	Dual	No	-1.225*	.225	.000	-1.887	-.563
1st Year Grad	Chinese	English	1.050*	.297	.013	.177	1.923
		Dual	-.225	.277	1.000	-1.042	.592
		No	.725	.349	.309	-.302	1.752
	English	Dual	-1.275*	.291	.002	-2.132	-.418
		No	-.325	.230	1.000	-1.003	.353
	Dual	No	.950	.368	.110	-.133	2.033

Note. * $p < .05$

Table 7
Summary of the Effects of Captions on Vocabulary Learning at each Class Level

Class level	FreshmanClass1	FreshmanClass2	Juniors	1st YearGrad
Vocabulary learning	Chinese > No; English > No; Dual > No	Chinese > No; English > No	English > Chinese; English > Dual; No > Chinese; No > Dual	Dual > English; Chinese > English

RQ 2. Which Caption Condition is More Effective in Improving Students' Comprehension Across Class Levels?

A series of assumptions was met before performing the ANOVA analysis. There were homogeneities of variances ($p > .05$) and covariances ($p > .05$). The assumption of Mauchly's test of sphericity was met for the two-way interaction, $\chi^2(5) = 9.887$, $p = .079$. The tests of within-subject effects in Table 8 revealed that there was a statistically significant interaction between caption conditions and class levels on students' comprehension, F (9, 228) = 4.671, $p < .05$, partial $\eta^2 = .156$.

Table 8
The Interaction Effect between Caption Conditions and Groups/Class Levels on Vocabulary

Source		Condition III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
CaptionType	Sphericity Assumed	43.509	3	14.503	26.999	.000	.262
CaptionType *Group	Sphericity Assumed	22.582	9	2.509	4.671	.000	.156
Error (CaptionType)	Sphericity Assumed	122.472	228	.537			

Since a statistically significant interaction was found, four separate within-subject ANOVAs were performed to investigate the main effect of caption conditions on comprehension. The within-subject ANOVAs demonstrate comprehension score differences between caption conditions at each class level. As shown in Table 9, results indicated that there was a statistically significant effect of caption conditions on students' comprehension for FreshmanClass1, $F(3, 57) = 4.843$, $p = .005$, partial $\eta^2 = .203$; Juniors $F(3, 57) = 3.432$, $p = .023$, partial $\eta^2 = .153$; 1st year graduate students, $F(3, 57) = 27.273$, $p = .000$, partial $\eta^2 = .589$; and FreshmanClass2, $F(3, 57) = 13.450$, $p = .000$, partial $\eta^2 = .414$.

After finding a statistically significant effect, post hoc tests, pairwise comparisons, using Bonferroni were performed to compare which caption condition students performed better with on comprehension at each class level (Table 10). Table 11 is a comparison formula that summarizes which caption condition is more effective than another for students' comprehension at each class level.

Table 9
The Main Effect of Caption Conditions on Comprehension

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
FreshmanClass1						
CaptionType	9.609	3	3.203	4.843	.005	.203
Error (CaptionType)	37.703	57	.661			
Junior						
CaptionType	6.062	3	2.021	3.432	.023	.153
Error (CaptionType)	33.562	57	.589			
1stYearGrad						
CaptionType	27.959	3	9.320	27.273	.000	.589
Error (CaptionType)	19.478	57	.342			
FreshmanClass2						
CaptionType	22.459	3	7.486	13.450	.000	.414
Error (CaptionType)	31.728	57	.557			

Note. Numbers on the table demonstrate the results when the Mauchly's test of sphericity is assumed.

Table 10
Comparing the Effects of Caption Conditions on Comprehension

	Caption condition	Caption condition	Mean Difference	Std. Error	Sig.	95% Confidence Interval Difference	
						Lower Bound	Upper Bound
FreshmanClass1	Chinese	English	.400	.197	.342	-.181	.981
		Dual	-.575	.277	.310	-1.390	.240
		No	-.050	.266	1.000	-.834	.734
	English	Dual	-.975*	.298	.024	-1.852	-.098

		No	-.450	.223	.350	-1.107	.207
	Dual	No	.525	.268	.388	-.263	1.313
FreshmanClass2	Chinese	English	-.075	.193	1.000	-.643	.493
		Dual	-.500	.235	.280	-1.192	.192
		No	.950*	.226	.003	.284	1.616
	English	Dual	-.425	.218	.400	-1.068	.218
		No	1.025*	.231	.002	.346	1.704
	Dual	No	1.450*	.299	.001	.570	2.330
Juniors	Chinese	English	.025	.194	1.000	-.545	.595
		Dual	-.425	.230	.483	-1.103	.253
		No	.350	.235	.920	-.343	1.043
	English	Dual	-.450	.198	.211	-1.034	.134
		No	.325	.262	1.000	-.447	1.097
	Dual	No	.775	.315	.142	-.153	1.703
1st Year Grad	Chinese	English	.775*	.164	.001	.292	1.258
		Dual	.325	.182	.544	-.212	.862
		No	1.575*	.186	.000	1.028	2.122
	English	Dual	-.450	.205	.244	-1.053	.153
		No	.800*	.190	.003	.241	1.359
	Dual	No	1.250*	.180	.000	.721	1.779

Note. * $p < .05$

Table 11
Comparisons of the Effects of Captions on Comprehension at each Class Level

Class level	FreshmanClass1	FreshmanClass2	Juniors	1st YearGrad
Comprehension	Dual > English	Chinese > No; Dual > No; English > No	No significance	Chinese >English > No: Dual > No

Discussion

The results reveal that captions can aid vocabulary learning and comprehension. This finding is consistent with previous studies which suggest that captioned videos have a positive effect on language learning (Chai & Erlam, 2008; Lwo & Chia-Tzu, 2012; Markham & Peter, 2003). While most previous studies investigated the effects of captions under only two conditions (L1 captions versus L2 captions), this study also examined the influence of dual captions.

The statistically significant interaction effect between captions and class levels demonstrates that students performed differently across different class levels on their vocabulary and comprehension scores. The two freshmen classes both performed better on the Chinese-only and English-only caption conditions and worst in the no-caption condition, suggesting that freshmen students learn more words when viewing videos with captions. This result aligns with Wang's (2007) and Hui's (2007) findings that both Chinese-only and English-only captions aid vocabulary acquisition. Similar to FreshmenClass1, first-year graduate students did better with the Chinese and dual captions. However, no significant effect was found between Chinese and no captions, and dual and no captions. Additionally, dual and Chinese captions were more effective than English captions for first-year graduate students' vocabulary learning, whereas this effect was not the case for the two freshman groups. This varied result indicates that the effects of captions on vocabulary learning is a complex issue and the three caption conditions benefit students differently across class levels. Surprisingly, juniors did not perform well with the Chinese and dual caption conditions. On the contrary, they learned more words under the English captions and no-caption conditions. This counterintuitive finding may be due to the fact that students' vocabulary learning is measured by the vocabulary scores received from the test minus the words they already knew in the prior vocabulary knowledge test. Some juniors knew more words tested in vocabulary test 2 (dual captions) and 4 (Chinese captions) beforehand than in vocabulary test 1 (English captions) and 3 (no captions), therefore, they were not able to score high with the dual and Chinese captions. In all, for vocabulary learning, Chinese-only and English-only captions were more effective than no captions for freshman students; dual and Chinese captions worked better than English captions for first-year graduate students; and finally, for juniors, no captions and English captions were found to be more effective.

In terms of comprehension, statistically significant results among the effects of L1, L2, and dual captions on comprehension were mixed. Dual captions were more effective than English captions for FreshmanClass1. Chinese captions were more effective than English captions for first-year graduate students. This suggests that L2 English captions were not as effective as dual and L1

Chinese captions for FreshmanClass1 and first-year graduate students in video comprehension. For FreshmanClass2, viewing videos with any of the three caption conditions (L1, L2, dual captions) was more effective than viewing videos without captions. For juniors, no significant differences were found, suggesting that juniors performed almost the same across caption conditions.

Results reveal a significant finding that not only Chinese captions and English captions alone are helpful to learners, but dual captions are also helpful and can be more effective for certain language levels of students. It raises an interesting point that dual captions, which required students to watch the video, listen to the audio, and read the two captions concurrently, did not seem to distract students from learning the vocabulary. Furthermore, students' vocabulary improvement can be particularly effective in the dual caption condition as in the case of one freshman class and one first-year graduate class in the study. This result aligns with Chang's (2003) and Raine's (2012) findings that dual captions can be effective in language learning. However, it contradicts with Mayer's (2001) "redundancy effect," which claims that additional verbal material should be presented as speech rather than on-screen text because written text interferes with learners' comprehension and will lead to poor understanding.

The mixed results among the L1, L2, and dual caption conditions for the different class levels demonstrate that video captions benefit EFL college students differently in vocabulary learning and comprehension. In the EFL classroom context, teachers should be aware of the effects of different types of captions. To build students' confidence and interests, teachers can use dual captions, L1 Chinese captions, or L2 English captions at the beginning, then gradually increase the difficulty of viewing options to no captions. For different listening purposes, teachers can use different captions to tailor student needs. For example, teachers can use either L1, L2, or dual captions to improve students' vocabulary learning. In terms of comprehension, for higher level classes, teachers can use no captions to challenge students, then use dual captions to have students confirm and check comprehension. For lower class levels, teachers can use dual captions first as it is effective in facilitating students' comprehension. Captions give learners hints and help them in understanding and learning English from the videos. They can help students perform beyond their current abilities. In multimedia settings, captioned videos can be used as a self-paced choice for EFL students' independent learning. In this way, students can adjust which caption condition to use based on the difficulty level of the video, their different proficiency levels, and their own language learning needs.

Additionally, because foreign-language TV series are regarded as authentic input, it is essential for EFL teachers to make full use of this resource. As

Vanderplank (2016) argued, captioned videos should not only be restricted to serve deaf and hearing-impaired people, but should also be seen as a great resource for language learners. The captioned videos can be implemented both in and out of school context by foreign language teachers. The current study on captioned videos was conducted in a multimedia classroom setting, a place where the participants attended English classes every day. Students enjoyed and laughed constantly while watching the comedy clips during the experiment. This provided evidence of the feasibility and practicality of using captioned videos in EFL classroom settings.

Conclusion

One limitation of the study is that it uses a convenient sampling technique, thus the generalizability of the finding is limited. However, the study contributes to research on the effects of captions under four caption conditions in Chinese EFL context. Findings on the comparisons between the different caption conditions at each class level can help guide language teachers and learners to make decisions on the type of captions to use for learning. The mixed findings on students' class levels and language performance under the four caption conditions indicate that more studies need to be conducted to investigate how class levels influence students' performance in vocabulary and comprehension tests.

There are several recommendations for future research. In the current study, students did four vocabulary tests which consist of only five items each; future studies should increase the number of items so that students' vocabulary learning can be more accurately measured. Additionally, instead of focusing on different class levels, researchers can randomly assign students into the four caption conditions and examine the effects of four caption conditions on one class level. Furthermore, future research can measure students' proficiency levels using standardized test scores and investigate the relationship between students' proficiency levels and the various types of caption conditions. Moreover, studies can look at what exactly Chinese students pay attention to during different caption conditions. For example, Winke, Gass & Sydorenko (2013) used an eye-tracking study to investigate factors influencing the use of L2 English captions by foreign language learners. Studies on learners' eye-movement on captions can shed light on the relationship between dependence on captions and language learning. Finally, the effective incorporation of captioned TV series as part of authentic listening materials in EFL settings has not been fully investigated. Future studies should examine strategies on how to implement captioned TV series in class and how to create interactive activities to help students learn while watching captioned TV series.

Notes

1. Following Wallis and George (2016), a 4 x 4 square matrix was used so that all participants' performance under each caption treatment could be observed and variations for the different video clips and captions were controlled.

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