The effects of pictures on the reading comprehension of low-proficiency Taiwanese English foreign language college students: An action research study

Yi-Chun Pan[*], Yi-Ching Pan

National pingtung Institute of commerce, Taiwan

Abstract. This study investigates the extent to which the presence of pictures in text benefits low-proficiency Taiwanese English foreign language (EFL) college students. The findings show that the low-proficiency participants had significantly higher scores on their translation tasks when the text was presented together with the pictures, and that the accompanying pictures facilitated those low-level participants in comprehending not only the simpler but also the more difficult text. Student responses to the effects of visuals on their reading comprehension also revealed that the pictures enhanced their understanding of the text itself. Implications are suggested for EFL college teachers, textbook designers, and materials developers.

Do pictures facilitate one's comprehension of text? A significant body of research (Alesandrini & Rigney [1]; Daley [2]; Eisner [3]; Evans [4]; Gyselinck & Tardieu [5]; Hanley, Herron, & Cole [6]; Liu [7]; Mackay [8]; Marcus, Cooper & Sweller [9]; Mautone & Mayer [10], Omaggio [11]; Rose [12]; Tang [13]) addresses this question directly; the general consensus is that visuals in text have positive effects on reader comprehension. Within the context of these studies, "visuals" refer to any graphic displays (either in dynamic or static form) that depict all or some of the accompanying text's content. Some examples of visuals are pictures, photos, maps, diagrams, charts, animations, and cartoons.

In one study on reading comprehension, Tang [13] asked one group of seventh-grade EFL students to read academic texts with the help of graphic classification trees reflecting the organization of the text; another group of students read the text without the graphic trees. The results showed that the students who had the graphic trees performed significantly better on comprehending the text. In another investigation by Mautone and Mayer [10], students reading scientific text about how airplanes lifted with corresponding pictures outperformed their counterparts reading the text without any visual forms. Similarly, Evans' study [4]) found that texts that included charts and tables as visual support elicited better comprehension in Japanese readers of expository texts in English.

Several researchers (Alesandrini & Rigney [1]; Levie & Lentz [14]; Levin, Anglin, & Carney [15]) have suggested that the presence of visuals elicits improved comprehension due

___
[*] E-mail: pan_yichun@yahoo.com

to the four major functions that visuals serve in reading. First, they substantially overlap the text or repeat the text's content. Second, they improve the coherence of the text. Third, they provide the readers more concrete information. Finally, they not only illustrate the text but develop the readers' interest in the material. The combined effect of these four functions of visuals facilitates the comprehension of text.

In addition, some researchers (Bernhardt [16]; Gyselinck & Tardieu [15]; Hibbing & Rankin-Erickson [17]) believe that the supplementation of text with visuals provides readers with two sources of information from which to draw upon when reading the material. When the readers cannot comprehend a particular passage, they may shift their attention from the text to the accompanying visual images. In return, the visuals, which they do comprehend, might lead them to notice the text's linguistic input and thus enable them to comprehend the text through matching and mapping among factors such as word recognition, syntax, intertextual perceptions, and background knowledge. The interaction between the text and visuals will accordingly facilitate reader comprehension.

Whereas extensive research has demonstrated the facilitating effects of visuals on reading comprehension, within tertiary education, preference for the use of written texts over pictures remains (Lowe [18]). The prevailing assumption is that pictures simply entertain and are thus an inappropriate tool for adult learning (Thomas, Place, & Hillyard [19]). This study re-examines the role of pictures within the context of higher education learning contexts and investigates to what extent the presence of pictures in text benefits Taiwanese EFL college students who possess low proficiency. If any significant results occur, the incorporation of pictures into both teaching and texts would be strongly recommended to college EFL teachers, textbook designers, and material developers.

1. Literature review

This section consists of two parts. First is a description of the dual coding theory (DCT), a theoretical framework for this study, which explores the connection between visuals and reading comprehension. Second is a review of the empirical studies that use DCT as a theoretical framework to investigate the effects of visuals on reading comprehension.

1.1. Dual coding theory

A number of theoretical frameworks have been employed to describe, explain, and predict the effects of visuals on reading comprehension, among them, the theory of mental models (Johnson-Laird [20]), the transmediation theory (Siegel [21]), the repetition hypothesis (Gyselinck & Tardieu [5]), and the dual coding theory (Paivio [22,23]; Sadoski & Paivio [24]). Perhaps the most comprehensive theory that elaborates upon the relationship between imagery and reading is the dual coding theory.

According to Paivio's dual coding theory (DCT), words and images have different cognitive representations; hence, the human brain uses separate systems for different types of information: the verbal system and the imagery system. The verbal system deals with linguistic codes, such as words, speech, or language; on the other hand, the imagery system primarily deals with visual codes, such as images, pictures, or concrete objects. Paivio [23] indicated that when verbal information is acquired, it moves to the verbal system. Likewise, when visual information is acquired, it moves to the imagery system. The crucial point occurs when information in either system can activate information in the other system. For instance, it is confusing when students see the word "Shrek". However, those who have seen the movie of the same name may immediately reference an image of green ogre by trig~~~~~ ~~~ image processor. Consequently, the int~

both the verbal and imagery systems works better than either one alone (Lai [25]).

In reading, DCT accounts for bottom-up and top-down processing. In terms of bottom-up processes, DCT assumes that readers organize parts of language and create mental images of them through different sensory methods. Based on their familiarity with the language components and the context in which they appear, readers may use the mental images to discover links between graphemes and phonemes and the sensory configurations of language components such as letters and words, as well as phrases/sentences. Regarding top-down processes, DCT gives readers a broader and more specific account of meaning, coherence, and inferences drawn from the text. Activating both verbal and nonverbal mental images of the text helps readers create different contexts for drawing inferences and integrating text. This, in turn, allows them to better understand the text, from simple perception of its components to inferring meaning from the text as a whole.

DCT provides theoretical justifications for the use of visuals in instructional presentations. Human memory is composed of two independent but interconnected coding systems: the verbal system and the imagery system. Generally, each of the systems functions independently, but most information processing requires connections and reinforcement between the two systems. In other words, the pairing of verbal information with visual images has the potential to improve comprehension.

1.2. Empirical studies on reading comprehension facilitation through visuals

Numerous researchers have used DCT as a theoretical framework to examine whether or not visuals enhance reader comprehension of text. Purnell and Solman [26] indicated in their study that students receiving both the text and the visuals performed better than those receiving the text alone. The findings are in accordance with DCT in that activation of both

codes can have additive effects on comprehension (Paivio [23]).

Other findings also demonstrate consistency with DCT. An investigation conducted by Kullhavy, Lee, and Caterino [27] revealed that fifth graders better understood information in maps and prose directions when it was presented in both spatial and elaborated verbal forms rather than either form alone.

Another study proving DCT was carried out by Gambrell and Jawitz [28]. Students who had access to both text and illustrations performed better than those who had studied text alone. Similarly, Mayer [29] found that words and pictures together produced better recall and transfer than either did alone.

Further evidence can be drawn from research conducted by Hudson [30], which revealed that reading comprehension in lower proficiency students improved when the students first viewed pictures related to the passage, then were asked focus questions, and finally wrote down predictions before reading the passage. Based on his finding, Hudson concluded that the visuals may have facilitated reading comprehension because they offered additional contextual information to the students, confirming the value of DCT.

Furthermore, Hall, Bailey, and Tillman [31] conducted a study to examine the effects of illustrations on reading comprehension, and the findings showed that the with-illustration groups outperformed the text-only group. With DCT as the basis for their theory, the researchers demonstrated that there was a marked improvement in student comprehension when they were exposed to information presented and processed in both verbal and imagery systems.

In conclusion, reading research studies within the DCT framework demonstrate that the combination of text and visuals elicits beneficial effects in terms of comprehension of the material. Visuals not only offer additional contextual information to facilitate comprehension, perhaps more importa

trigger referential connections between verbal and imagery systems, providing an additional route to comprehension. It is believed that the use of visuals in the development of instructional materials will promote reading comprehension acquisition.

2. The study

Research using DCT as a rationale has demonstrated that a combination of verbal and nonverbal coding systems works better for both L1 and L2 reading than either system works alone. However, pictures bear the stigma of being entertaining only to children and not being appropriate for serious academic work among adults (Thomas, Place, & Hillyard [19]). This study re-explores the role of pictures in higher education learning contexts, investigating to what extent including pictures as visual support for texts increases the reading comprehension of low-proficiency EFL college students. The specific research questions are:

● Do pictures give low-level learners a better understanding of text that meets their proficiency level?

● Do pictures also facilitate low-level learners' understanding of text that exceeds their proficiency level?

The hypothesis of this study is that regardless of whether text meets or exceeds a student's proficiency level, the addition of pictures will enhance his or her comprehension.

3. Method

This section introduces the method of the study and gives details of its overall design, including the participants, instruments, procedures for data collection, and data analysis.

3.1. Participants

The sample for this study was drawn from four classes (Computer Science Class Business Administration Class, Information Management Class, and Accountancy Class) of first-year college students instructed by the researcher in southern Taiwan. These students were required to take a reading proficiency test when they enrolled. The test was identical in format to the reading section of the elementary level of the General English Proficiency Test (GEPT). The 35 test questions evaluated the vocabulary, grammar, and reading abilities of the students. The passing score for the reading section was 80 out of 120.

Because the goal of this research was to investigate the effects of pictures on the reading comprehension of EFL college students with low proficiency, the researcher only recruited students who scored lower than 80. Of those students, only 95 (49 male and 46 female) were eligible for participation. In terms of their personal information, those students had been studying English for an average of 8 years, and their mean age was 18 at the time of the study.

3.2. Instruments for Data Collection

Two reading texts, three pictures, a translation task, and a questionnaire were employed to collect data for this study. The translation task would evaluate the effects of pictures on students' understanding of the texts and the questionnaire was used to assess student viewpoints on the effects of pictures on their reading of the passages.

Reading texts. Basic and advanced texts were used in this study (see Appendix A). The low-level text had a word count of 123, was constructed for elementary-level students, and selected from the textbook Topics in English (Heaton & Dunmore [32]). The high-level text was created by the researcher and modified by a native-English-speaking EFL teacher. It was longer, at 162 words, and had more complicated syntax and a difficult vocabulary. Although the text levels were different, both conveyed the same information (i.e. describing accident) as the pictures.

Pictures. Three sequential pictures (see Appendix B) accompanied the text. The first image illustrated two cars traveling in opposite directions on a main road while a motorcycle approached along a side street. The second picture revealed that the motorcycle turned left at a high speed on to the main road directly in front of the other car. The third picture showed that one car, although it braked hard, hit the motorcycle, and the other car hit the corner of the T-junction. In addition, in the third picture, it is seen that the motorcycle rider was not seriously injured, while the car that hit it and the motorcycle were badly damaged.

Translation task. One of the included assignments for this study was a translation task. The participants were required to translate the English text into Chinese. Their translation pieces were subsequently used to determine if the inclusion of pictures in the text facilitated their reading comprehension.

Questionnaire. The four-item questionnaire (see Appendix C) utilized a five-point-scale format to elicit students' responses. The numbers on the scale indicated the participants' degree of agreement with the statements, with 5 being the highest and 1 the lowest. The questionnaire was distributed to the treatment groups, which read the text accompanied by pictures. The four statements dealt with the effects of pictures on identifying the main idea of the text (Statement 1), guessing the meanings of unknown words (Statement 2), enhancing comprehension (Statement 3), and helping students to translate the text from English to Chinese (Statement 4). Data Collection

The 95 participants were randomly divided into four treatment groups (T1, T2, T3, and T4), with 23 or 24 students in each group. T1 and T2 both read a low-level text, but T2's text had pictures. Similarly, T3 and T4 both read a high-level text, but T4's text had pictures.

Data were collected over a one-week span. The researcher gave the student participants a specific task corresponding to their treatment. Students in T1 and T3 read and conducted an English-to-Chinese translation of a passage that did not have any accompanying pictures; on the other hand, students in T2 and T4 translated an English passage that contained pictures to Chinese and then completed a questionnaire to elicit their opinions of the effects of visuals on comprehension.

3.3. Data analysis

The data collected from the questionnaire were analyzed and displayed both as a frequency and a percentage distribution. In addition, t-tests were conducted to determine the existence of any significant differences in the translation task amongst the four groups. Regarding the scoring of the translation task, ten points were awarded for sentences numbered 3, 4, 6, and 7, whereas fifteen points were given for sentences 1, 2, 5, and 8. The reason for this difference in scoring is that the 10-point sentences were shorter and contained easier vocabulary, whereas the 15-point sentences were longer and contained more difficult vocabulary items. Points were given for half-correct (5 for the 10-point sentences and 7 for the 15-point ones) and one-third correctly translated exercises (3 for 10-point, 5 for 15-point). Translation that was less than one-third correct was awarded zero points on the basis that the incomplete information signified no comprehension. To ensure scoring objectivity, each translation work was evaluated by the researcher and her colleague, and the interrater reliability was .87.

4. Results

Figure 1 illustrates the mean scores of each group on the translation task. The group that received the low-level text with the pictures outperformed the group that only received the low-level text. Similarly, the addition of pictures to the high-level text improved the performance of that group compared to their counterparts, who read a high-level contained no pictures.
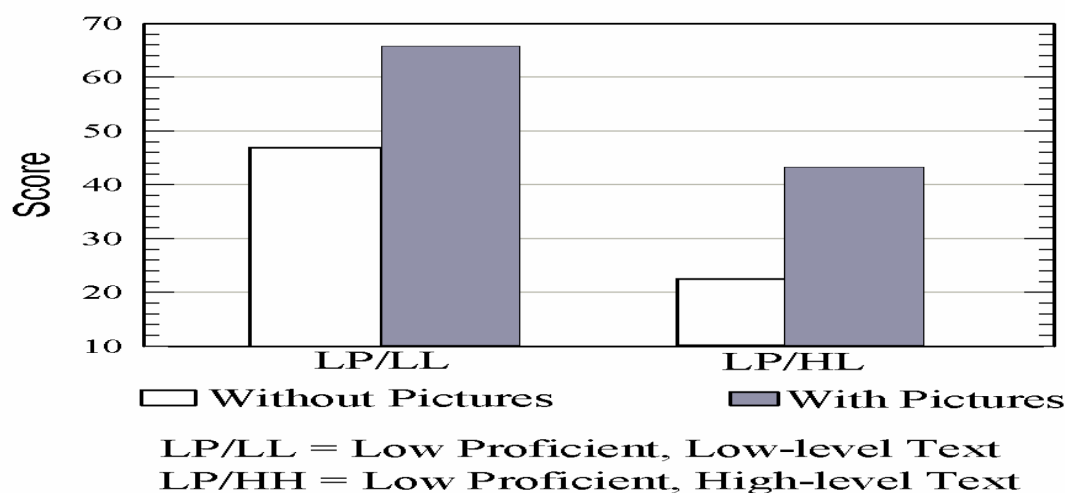
Figure 1. Participants' translation mean scores.

T-tests were carried out to assess the observed differences for statistical significance (see Table 1). In terms of the low-level text, the group that read text with pictures scored significantly higher than the group without (p=.004). The same result occurred with the high-level text groups; the group exposed to pictures scored significantly higher than their counterparts (p=.000). In sum, the use of pictures had a facilitating effect on low-proficiency participants' reading comprehension. This facilitating effect applies to both the simpler and the more difficult text.

Table 1. Means and Standard Deviations of the Translation Task

Groups	M	SD	t
Low-level text only (N=24)	47.71	19.659	-3.061**
Low-level text with pictures (N=24)	66.13	21.963	
High-level text only (N=24)	22.33	15.717	- 4.165***
High-level text with pictures (N=23)	43.22	18.591	
Low-level text with pictures (N=24)	66.13	21.963	3.851***
High-level text with pictures (N=23)	43.22	18.591	

**p< .01, ***p< .001

Regarding students' questionnaire responses on the effects of pictures on reading (see Tables 2 and 3), they generally agreed that pictures assisted their reading comprehension. However, the two groups held different views regarding the degree to which pictures helped them guess the meanings of the unknown words. More than half (62.5%) of the low-level-text-with-picture group believed that the pictures helped them make intelligent guesses, whereas over 50% of the high-level-text-with-picture group thought that the pictures had only a moderate effect. One possible explanation for this may be that for the high-level-text-with-picture group, the pictures do not contain enough inherent data to allow the students to generate inferences. In other words, th are not elaborative enough to promp

make sensible connections between words and images.

The two groups also had different responses in terms of resorting to pictures for help when experiencing difficulty in understanding the text. Only one third of the low-level-text-with-picture group indicated that they would use pictures as a facilitator when unable to comprehend the text, whereas 60.9% of the high-level-text-with-picture groups answered that they would use pictures to facilitate their comprehension when difficulty arose. It is likely that the low-level-text-with-picture group could understand the text better, so it was not necessary for them to refer to the pictures to generate meaning. By contrast, the high-level-text-with-picture group had difficulty understanding the text; therefore, they had to look at the pictures to discover clues to help them comprehend the text.

Table 2. Frequency and Percentage of Questionnaire Statements 1-4
Low-Level Text Picture Group (N=24)

Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1.　The pictures improved my understanding of the passage.	8 33.3%	7 29.2%	6 25%	3 12.5%	0
2.　The pictures helped me guess the meanings of any words I did not know in this passage.	9 37.5%	6 25%	7 29.2%	2 8.3%	0 0
3.　When experiencing difficulties with I used the pictures to help me understand..	3 12.5%	5 20.8%	8 33.4%	5 20.8%	3 12.5%
4.　The pictures helped me complete the task of translating from English to Chinese.	5 20.8%	10 41.7%	6 25%	2 8.3%	1 4.2%

Table 3. Frequency and Percentage of Questionnaire Statements 1-4
High-Level Text Picture Group (N=23)

Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. The pictures improved my understanding of the passage.	10 43.5%	3 13.1%	9 39.1%	1 4.3%	0 0
2. The pictures helped me guess the meanings of any words I did not know in this passage.	1 4.3%	10 43.5%	6 26.1%	4 17.4%	2 8.7%
3. When experiencing difficulties with I used the pictures to help me understand..	8 34.8%	6 26.1%	4 17.4%	5 21.7%	0 0
4.　The pictures helped me complete the task of translating from English to Chinese.	4 17.4%	7 30.4%	8 34.8%	2 8.7%	2 8.7%

5. Discussion

Results demonstrate that the low-proficiency participants had significantly higher scores when pictures were presented with the text, and that these accompanying pictures facilitated their comprehension of not only the simpler but also the more difficult text. These results are in accordance with the hypothesis, they support the results of previous studies, and they are congruent with DCT.

DCT contends that the process of reading involves two interconnected but independent coding systems. Pictures are stored only in the imagery system and language is stored only in the verbal system, but these two systems may develop referential connections. In this study, the pictures could not be stored in the verbal system because they are not verbal; they could, however, be stored in the imagery system and associations could be drawn with their respective text descriptions from the verbal system. DCT offers an explanation of why pictures that reiterate information from the text facilitate textual comprehension. The groups exposed to pictures performed significantly better on the translation task because the inclusion of pictures with the text provided readers with two sources of information instead of one.

The positive effect of pictures on reading comprehension revealed in this study can be further explained by Johnson-Laird's [20] theory of mental models. According to Johnson-Laird, visuals can reduce the cognitive load in complex tasks because they can present essential information more concisely than equivalent textual statements. As a result, visuals facilitate mental model building. In this study, pictures are easier to process than text because they show spatial relations and help readers construct internal representations analogous to those described in the text, whereas text alone leaves the readers with no mental structure to work with.

Schmidt's noticing [33] more comprehensively reveals why the low-proficiency participants receiving the high-level text and pictures had significantly higher scores than their counterparts who received the high-level text. During the process of reading comprehension, readers consciously conduct analyses and comparisons of what they have noticed while reading. When the reader has trouble understanding the text's linguistic input (e.g. vocabulary and structure) due to its level of difficulty, the pictures can focus the reader's attention on the linguistic input. The low-proficiency subjects in this study devoted more attention to pictures when they could not comprehend the text. The pictures provided them with an additional source to draw meaning from the text. Hence, the low-proficiency students who read the high-level text with the pictures perform better on the translation task than those exposed to the high-level text without the pictures.

In this study, although pictures enhanced the reading comprehension of both low-level and high-level texts, a significant difference (p=.000) was found between the low-level-text-with-picture and high-level-text-with-picture groups. This means that the participants in the high-level-text-with-picture group had markedly lower scores than those in the low-level-text-with-picture group. Despite the fact that text difficulty is one of the factors that affects performance on the translation task, pictures also play a role to some extent. The implication of this result is that pictures have a more beneficial effect only when they closely mirror the structure and complexity of the text. When the information drawn from both the text and the pictures is integrated well, it is as if the information has been presented twice, thus improving performance. On the contrary, the impact of pictures diminishes when they do not reflect the linguistic complexities of the text. The effect of pictures on reading comprehension largely depends on the quality of the repetition effect (Gyselinck & Tardieu [5]).

Student responses to the effects of visuals on their reading comprehension also

that pictures assist them in catching the gist of the passage and improving their comprehension. However, a majority of students disagreed with the effectiveness of using visuals to guess the meanings of unknown words. The plausible explanation is that the pictures do not contain enough text-redundant information, therefore reducing the occurrence of intelligent guesses.

This study suggests that the reading comprehension of the low-level students was greatly facilitated when the pictures and the text carry the same information. On the other hand, when visuals do not reflect the text's linguistic complexity to a sufficient degree, the facilitating effect may decrease.

6. Implications

In this study, low-proficiency EFL college students improved their comprehension of text (both simpler and more difficult) with the addition of the pictures. These results imply that the myth that pictures simply entertain and are thus an inappropriate tool for adult learning no longer applies. Instead, for low-proficiency students, pictures operate beyond the decoration function; they serve as an external image-based tool to create or confirm understanding. Consequently, materials developers should incorporate visuals when designing textbooks for EFL college students, and teachers should utilize visuals when developing teaching materials for their low-proficiency students. The following are suggestions for EFL college teachers, textbook designers, and materials developers.

Firstly, pictures can be a useful tool for reducing the cognitive load and thus supporting reading comprehension when they reflect the linguistic complexities of the text and contain a sufficient amount of information relative to the content. Because of this, EFL college teachers, textbook designers, and materials developers should choose pictures with caution; that is, pictures should match the text to assist students

in comprehending what they have read in regard to both language and content.

Secondly, while pictures are a useful tool to create understanding, they can actually interfere with comprehension when the text and pictures do not match. As a result, EFL college teachers, textbook designers, and materials developers should pay close attention to the relationship between text and pictures in the materials they use with their readers or students. Nevertheless, if a text-picture mismatch does occur, teachers can try to use it productively. For example, such a mismatch can be used to provoke discussions that can lead to a deeper understanding of the text and the development of evaluation skills. Teachers should prepare students for the mismatch in advance so that they won't be disappointed and possibly disengage from the text.

Thirdly, when low-proficiency EFL college students are provided with texts that exceed their proficiency level, the accompanying pictures should be as elaborative as possible. Two sequential stages of pictures can be presented when teaching more difficult texts to those EFL college students with limited proficiency. In the first stage, students are introduced to visuals of vocabulary items; then in the second stage, visuals of text content (i.e. main ideas) are added to help them understand what they read. The inclusion of too much information in one picture is not recommended because it might distract the reader's attention and they may get lost.

Fourthly, in addition to using pictures as an external tool to support comprehension, teachers can instruct low-proficiency students to create or develop a mental image of what they read. Several studies have determined that the potential of students to understand text increases if they can construct their own internal mental imagery while reading (Anderson [34]; Hibbing & Rankin-Erickson [17]). Furthermore, when students are taught to generate mental images as they r

experience greater recall and improved inference and prediction abilities (Gambrell & Bales [35]). Successful readers generate verbal and imagery connections automatically. In contrast, struggling readers have difficulty associating images with meaning (Swanson [36]). Instead, they focus on decoding words, therefore placing their overall understanding at risk. Accordingly, EFL college teachers should encourage low-proficiency students to use mental imagery to improve their reading comprehension.

Limitations and Suggestions for Further Research

Although this study provides EFL teachers and textbook designers with insights regarding the facilitation of student reading comprehension through the effective use of pictures, it has one limitation that must be resolved through additional research. The fact that questionnaires were the only instrument utilized to elicit participant viewpoints on the effectiveness of visuals on reading comprehension must be addressed in the future. Interviews with the participants regarding if and how they use pictures would complement the results of the reading comprehension studies.

The researcher would like to offer suggestions for further research in this area. For example, this study analyzes the effects of pictures on low-proficiency EFL college students' comprehension. Research conducted in the future should assess the effects of other visual forms (e.g., cartoons, photos, tables, and charts). In addition, while this study uses text that involves spatial relations and belongs to the narrative genre, there are many other genres (e.g., procedural, exposition, recount, etc.) that may elicit different effects on the reading comprehension of foreign language learners. Future research on this subject should help the designers of textbooks and the developers of educational materials to make informed

decisions in their selection of visual aids to be included in language textbooks.

Appendix A

Texts

The Low-Level Text

On Monday, I was driving along a main road toward a junction with a minor road on my left. Another car was traveling along the main road coming from the opposite direction, and a motorcycle was approaching the intersection along the minor road. I realized that the motorcycle was not going to stop. He turned left onto the main road directly in front of the other car. The car swerved to avoid the motorcycle and skidded off the road into a wall at the corner of the intersection. I braked, but it was too late. My car hit the motorcycle and the rider fell off. Fortunately, the motorcycle rider was not seriously injured, but his motorcycle and my car were both badly damaged (Heaton & Dunmore, 994).

The High-Level Text

Monday morning, I traveled down a major highway in the direction of the conjunction with a minor road to my left. Another vehicle rapidly approached in the other lane of the main road, and a motorcycle advanced toward the intersection with the minor road. To my dismay, it came to my attention that the motorcycle had no intention of halting. The rider entered the highway directly into the path of the oncoming automobile. The car swerved in an attempt to avoid a collision with the motorbike, but the result of this alteration of its trajectory was that the vehicle skidded off the highway and struck a wall at the corner of the intersection. I applied my brakes, but it was to no avail. My automobile impacted the motorcycle, causing its rider to fall from the bike. Fortuitously, the operator of the motorcycle suffered no grave trauma as a result of this collision, but both his vehicle and my own experienced significant devastatic

Appendix B

Three Pictures
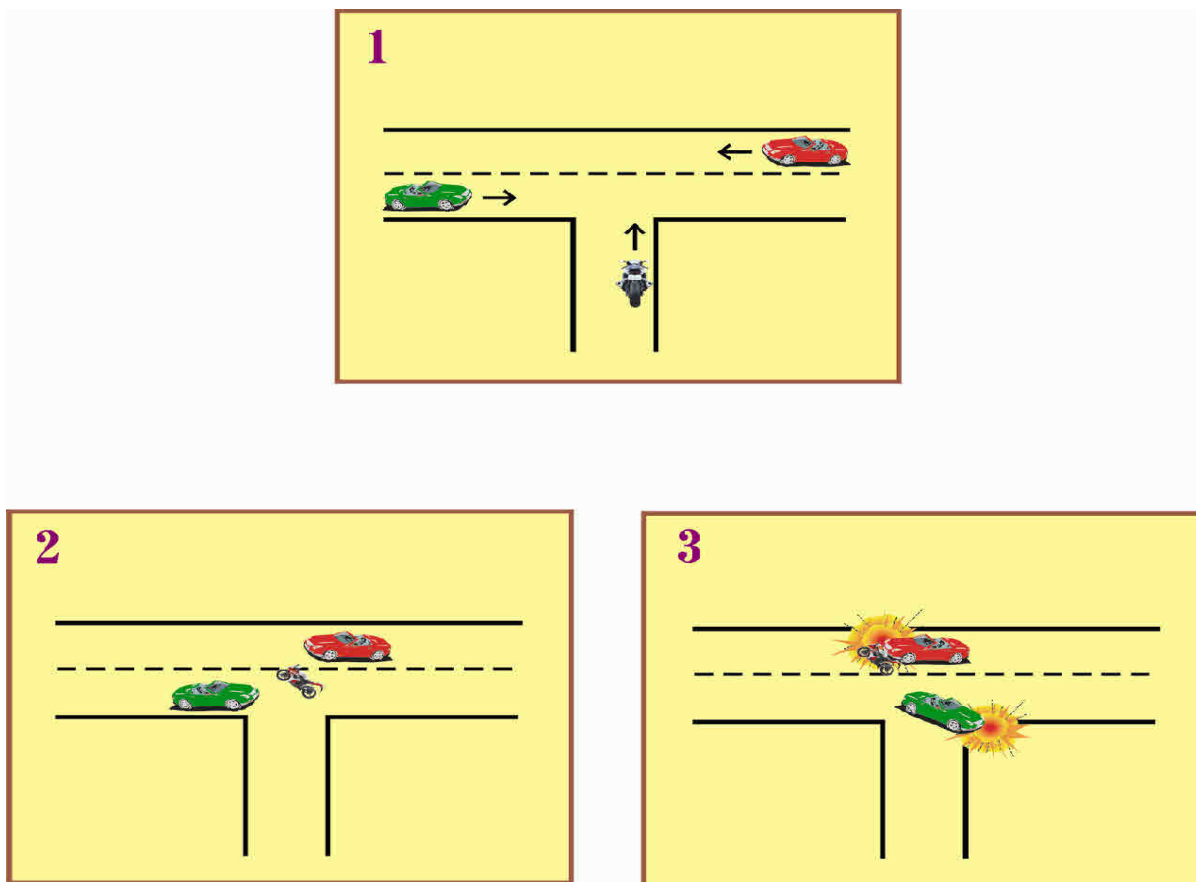
Appendix C

Questionnaire for the With-picture Groups
On a scale of 1-5, please rate the degree to which you agree with the following statements.
5=strongly agree, 4=agree, 3=neutral, 2=disagree, 1=strongly disagree

1. The pictures improved my understanding of the passage.	5 4 3 2 1
2. The pictures helped me guess the meanings of any words I did not know in this passage.	5 4 3 2 1
3. When experiencing difficulties with semantics, I used the pictures to help me understand.	5 4 3 2 1
4. The pictures helped me complete the task of translating from English to Chinese.	5 4 3 2 1

References

[1] K.L. Alesandrini, J.W. Rigney, Pictorial presentation and review strategies in science learning, *Journal of Research in Science Teaching*, 18(5) (1981) , 465.

[2] E. Daley, Expanding the concept of literacy, *Educause Review*, 38(2) (2003), 33.

[3] E. Eisner, *The arts and the creation of mind*, New Haven, CT: Yale University Press, 2002.

[4] S. Evans, Graphic organizers for Japanese readers of expository texts in English, *Language Research Bulletin*, 18 (2003), 1.

[5] V. Gyselinck, H. Tardieu, The role of illustrations in text comprehension: what, when for whom, and why? In H.Vvan Oostendorp & S.R. Goldman (Eds.), The construction of mental representations during reading (pp. 195-218), Mahwah, NJ: Lawrence Erlbaum, 1999.

[6] J. Hanley, C. Herron, S. Cole, Using video as an advance organizer to a written passage in the FLES classroom, *Modern Language Journal*, 79 (1995), 57.

[7] M.C. Liu, *The application of differential illustration on children's English learning, Master's thesis*, National Pingtung Institute of Commerce, Taiwan, 2007.

[8] M. Mackay, Researching new forms of literacy, *Reading Research Quarterly*, 38 (3) (2003), 403.

[9] N. Marcus, M. Cooper, J. Sweller, Understanding instructions, *Journal of Educational Psychology*, 88 (1996), 49.

[10] P.D. Mautone, R.E. Mayer, Signaling as a cognitive guide in multimedia learning, *Journal of Educational Psychology*, 93(2) (2001), 377.

[11] A.C. Omaggio, Pictures and second language comprehension: Do they help? *Foreign Language Annals*, 12 (2) (1979), 107.

[12] G. Rose, *Visual methodologies*, London: Sage, 2001.

[13] G. Tang, The effect of graphic representation of knowledge structures on ESL reading comprehension, *Studies in Second Language Acquisition*, 14 (1992), 177.

[14] W.H. Levie, R. Lentz, Effects of text illustrations: A review of research, *Education Communication and Technology Journal*, 30 (1982), 195.

[15] J.R. Levin, G.J. Angling, R.N. Carney, On empirically validating functions of pictures in prose, In D. M. Willows & H. A. Houghton (Eds.), *The psychology of illustration*: Vol. 1 (1987), 51. New York: Springer-Verlag.

[16] E.B. Bernhardt, *Reading development in a second language*, New Jersey: Ablex, 1991.

[17] A.N. Hibbing, J.L. Rankin-Erickson, A picture is worth a thousand words: Using visual images to improve comprehension for middle school struggling readers, *The reading teacher*, 56 (8), (2003), 758.

[18] R. Lowe, *Visual literacy and learning in science*, ERIC Digest, ED463945, 2000.

[19] E. Thomas, N. Place, C. Hillyard, Students and teachers learning to see Part I: Using visual images in the college classroom to promote students' capacities and skills, *College teaching*, 56(1) (2008), 23.

[20] P.N. Johnson-Laird, *Mental models,* Cambridge, MA: Harvard University Press, 1983.

[21] M. Siegel, How picture books work: A semiotically framed theory of text-picture relationships, *Children's literature in education*, 29 (2) (1995), 97.

[22] A. Paivio, *Imagery and verbal processes*, New York: Holt, Reinhart & Winston, 1971.

[23] A. Paivio, *Mental representations: A dual coding approach*, New York: Oxford University Press, 1986.

[24] M. Sadoski, A. Paivio, *Imagery and text: A dual coding theory of reading and writing*, Mahwah, NJ: Lawrence Erlbaum, 2001.

[25] S.L. Lai, Influence of audio-visual presentations on learning abstract concepts, *International Journal of Instructional Media*, 27 (2) (2000), 199.

[26] K.N. Purnell, R.T. Solman, The influence of technical illustrations on students' comprehension of geography, *Reading Research Quarterly*, 26 (1991), 277.

[27] R.W. Kullhavy, B.J. Lee, L.C. Caterino, Conjoint retention of maps and related discourse, *Contemporary Education Psychology*, 10 (1985), 28.

[28] L.B. Gambrell, P.B. Jawitz, Mental imagery, text illustrations, and children's story comprehension and recall, *Reading Research Quarterly*, 28 (1993), 264.

[29] R.E. Mayer, Research-based principles for the design of instructional messages: The case of multimedia explanations, *Document design*, 1 (1999), 7.

[30] T. Hudson, The effects of induced schemata on the "short circuit" in L2 reading: Non-decoding factors in L2 reading performance, *Language Learning*, 32 (1982), 1.

[31] V.C. Hall, J. Bailey, C. Tillman, Can student generated-illustrations be worth ten thousand words? *Journal of Educational Psychology*, 89 (4) (1997), 677.

[32] B. Heaton, D. Dunmore, *Topics in English*, Hong Kong: Longman Asia Limited, 1994.

[33] R. Schmidt, The role of consciousness in second language learning, *Applied Linguistics*, 11 (1990), 1299.

[34] R.C. Anderson, Encoding processes in the storage and retrieval of sentences, *Journal of Experimental Psychology*, 91 (1971), 338.

[35] L.B. Gambrell, R. Bales, Mental imagery and the comprehension monitoring performance of fourth- and fifth-grade poor readers, *Reading Research Quarterly*, 11 (1986), 454.

[36] H.L. Swanson, Verbal coding deficits in learning-disabled readers: A multiple stage model, *Educational psychology review*, 1 (1989), 235.

Hiệu quả của tranh ảnh đối với quá trình đọc hiểu của sinh viên Cao đẳng Đài Loan học tiếng Anh như một ngoại ngữ: Nghiên cứu tìm giải pháp

Phan Di Xuân, Phan Di Tịnh

Học viện Thương mại Quốc gia Pingtung, Đài Loan

Bài này bàn về những vấn đề sau:

- Ích lợi của tranh ảnh đi kèm với các bài khoá đối với sinh viên Cao đẳng Đài Loan nói tiếng Anh chưa trôi chảy

- Một số gợi ý cho các giảng viên, những người thiết kế sách giáo khoa và phát triển học liệu