Introduction

A lot of research has shown that graphic organizers have an impact on facilitating reading comprehension and recall (Merkley & Jefferies, 2001). Examples include Robinson's (1998) study on constructing a graphic organizer with the intention of helping students learn more effectively from text, Jiang and Grabe's (2007) study for proving the academic success not only in the success of academic performance but also in reading experience, and Goeden's (2002) study using comprehension frames and graphic representations of the material to assist students' reading abilities. These studies' results indicated that using graphic organizers positively impacted their reading comprehension.

The graphic organizer is an effective teaching tool to facilitate reading comprehension in narrative and expository text (Merkley & Jefferies, 2001). In recent decades, many instructors have utilized graphic organizers to promote students' learning in content area text or content-based instruction. The original concept of the graphic organizer was derived from the development of Ausubel's (1968) advance organizer (as cited in Robinson, 1998). Ausubel (1968) suggested that students needed to create a new schema or activate an existing schema before they can learn new material to facilitate their learning of expository text (as cited in Robinson, 1998). Graphic organizers play an important instructional role in providing students with a meaningful conceptual framework on one hand, and helping to form relations between new information and existing knowledge on the other (Robinson, 1998).

Content-based instruction is a curriculum that 1) focuses on a subject-matter core, 2) uses authentic content texts, and 3) is appropriate to special needs students (Stryker & Leaver, 1997). It has been widely adopted in second or foreign language learning programs, in a variety of language vocational and workplace instructional contexts, and specifically at the university level for foreign language instruction in recent years (Grabe & Stoller, 1997). As stated by Grabe and Stoller (1997), content-based language instruction has, to some extent, extended into other areas and has been incorporated in a wide range of contexts; including foreign language instruction at the undergraduate level, the various bilingual education contexts in Europe, and the English for Academic Purposes (EAP) programs together with language learning in ESL/EFL settings. Due to its popularity in ESL/EFL learning, there are many courses in Taiwan at university level, which use content-based textbooks and/or content-based materials as authentic material to improve students' English proficiency, and to

help students gain profound knowledge to be competent in their academic achievement as well.

Nevertheless, students encounter difficulties in comprehending main ideas and meaning in the content-based materials when they advance to the university level from senior high school. This situation is particularly acute in the polytechnic types of universities that concentrate on the development of business and economics, and applied sciences and technologies; conversely, content area comprehension is less of an issue in humanities such as English language proficiency in the comprehensive universities.

In order to solve the problem of comprehension difficulties, there are many content-based textbooks using "a picture, schematic diagram or important words" to make complicated text or words easily understandable (Tierney, 2005, p. 412). Graphic organizers (GO), therefore, can serve as a comprehension tool that helps connect concepts by depicting interrelationships of superordinate and subordinate ideas in texts (DiCecco & Gleason, 2002). This is accomplished by illustrating complicated texts with a diagram, outline or schema, which would make content text become clearer to understand.

Therefore, the purpose of this study is to determine if students who experience difficulties with extracting relationships from expository text could acquire and retain relational knowledge when they use graphic organizers, if constructing graphic organizers in EFL content-based material instruction can be effective in advancing EFL learners in reading instruction, and to explore whether male or female students who have great impact on the EFL content-based material instruction.

The research questions are addressed as follows: (1) Does the implementation of graphic organizers on the content-based material instruction enhance EFL learners' reading comprehension? (2) Does the gender (male vs. female student) as an independent variable have an impact upon the effectiveness of graphic organizers on the EFL content-based material instruction at university level?

Review of Literature

Theoretical Framework

The use of a graphic organizer is an ideal method of introducing and reinforcing the key concepts of a content material text. It is designed to (1) provide a pre-teaching or post-teaching strategy of a content text, (2) present students with an idea framework to show important conceptual relationships between content vocabulary, and (3) help the teacher clarify teaching goals (Tierney, 2005).

As previously stated the origin of graphic organizers was from Ausubel's (1968) advance organizer (AO). Ausubel suggested that students needed to stimulate an existing schema (e.g., the background information) and relate it to new information in order to facilitate their learning of the text (as cited in Robinson, 1998). According to schema theory, comprehending text is an interactive process between the reader's background knowledge and the text. Therefore, efficient reading comprehension requires the ability to relate one's own background knowledge to the textual material (Carrell & Eisterhold, 1983).

There are many content material area textbooks using "a picture, schematic diagram, or important words" to make complicated text or words easily understandable (Tierney, 2005, p. 412). According to Dye (2000), new information must be linked to preexisting knowledge. In the same way as Wittrock (1992) suggested students needed to activate their existing knowledge before they can learn new information and develop relationships among individual words to sentences, large amounts of text, images, and procedures to facilitate their meaningful learning of text comprehension. If students could relate prior knowledge to the new concepts that are being taught, they will organize and comprehend the information very well.

In addition, graphic organizers display a visual effort to help students learn "hierarchical and coordinate relations among concepts" (Diekhoff, 1983). Dowhower (1999) states that graphic strategies are one of the few approaches that can be applied at the preview stage before reading, during the reading process itself, and at the stage after reading (as cited in Chang, 2002). Once students learn the content tactics, they will acquire the ability to deal with the organizational patterns of the different reading materials.

The Research Literature

Many researchers have addressed the impact of graphic organizers on students' reading comprehension. Ausubel's research demonstrated the use of an advance organizer in the form of an introductory prose passage to enhance the reader's acquisition of new knowledge (as cited in Merkley & Jefferies, 2001). Ausubel (1960) concluded that when using an advance organizer on prereading a passage, it has the potential to link prereading information with a reader's prior knowledge.

Researchers such as Robinson (1998) construct graphic organizers (GOs) with the intention of helping students learn more effectively from textbooks. Consequently, the use of GOs in textbooks has increased dramatically. Moorf and Readence (1984) also used meta-analysis procedures to analyze the 23 studies. They noted that teachers who used GOs reported feeling more competent while leading students through content material. Furthermore, teachers perceived themselves as "being better organized, more in control of the learning activity, and more sensitive to the demands of the learning task."

DiCecco and Gleason (2002) have conducted an experiment of GO research with learning disabilities (LD) students. Twenty-six students with LD were chosen from three pullout resource room programs, however, two students were dropped from the study because of absence. Eventually, the GO group included 12 students and the No GO group included 12 students. A two-way ANOVA with repeated measures was performed on the pre- and posttest scores. Analysis showed that the students in both groups had significantly higher posttest scores ($p < .01$). On the 20-item test, the No GO group improved from a mean of 4.25 (22%) to a mean of 12.58 (63%), and the GO group improved from a mean of 6.08 (30%) to a mean of 13.42 (67%). It clearly verifies that students with LD benefited from GOs more than those who had no GO instructional support. The experimental group (GO group) and control group (No GO group) also had different achievement on word identification and word attack subtests standard scores. On word identification, the GO group's *Mean* = 99.42, *SD* = 1.51, and the No GO group's *Mean* = 99.67, *SD* = 0.49. On word attack, the GO group's *Mean* = 100.08, *SD* = 0.52, and the No GO group's *Mean* =103.42, *SD* = 11.52.

Overall, this study used measures that assessed the enhancement of relational knowledge and efforts made to align the content of the text, the wording in the teacher scripts, and the content in the graphic organizers. It presents compelling and quality support for the use of graphic organizers for instruction in that setting.

Methods

Subjects

The subjects recruited in the study were randomly assigned through the employment of Shavelson's (1995) table of random numbers to select samples from the first-year undergraduate students who were majoring in the Applied English Studies department at one technology and science university in Taipei City. The detailed sampling procedures (Shavelson, 1995, p. 614-615) are depicted below:

1). Each student at college level has a 10-digit identification (ID) number. In this study, the authors only used the last two digits of a student's ID number. For example, one student's ID number is 1021471031, if the random number of 31 was selected; the authors then recruited the student with this ID number in this study.

2). In accordance with Shavelson's random numbers table on page 614-615, the authors placed the index finger anywhere on any page of the table, and located any two-digit number. For example, the authors placed her finger on 88.

3). The authors found the number on the same page in the row represented by the first digit of the number located in step 2 and the column represented by the second digit of this number. For example, 88 - row 8, column 8; the authors would find the number located in the 8th row and the 8th column on the same page.

4). The authors began reading across the row until she locates a number falling in the range of numbers assigned in step 1 (with all numbers beyond the range being ignored). For example, 14, 53, 66, 27, 20, 49, 24, 77…72. The authors continued the procedure in step 5 until the desired sample size had been reached.

The total number of the population drawn from the random assignment was 58 students at the beginning of the study. Yet, while collecting data from the subjects, some subjects took only one pretest or posttest, some subjects marked the same answer for every question on the answer sheet, and some subjects missed numerous items on the answer sheet. These data were then excluded from the study. The effective subjects became 45 students.

In addition, in order to determine whether "gender difference (Green & Oxford, 1995)" has a meaningful impact on the graphic organizer approach, the researcher used gender as the

independent variable on the one-way ANOVA measure to determine whether male students or female students can benefit from the graphic organizer training on the content-based reading instruction. The remaining 45 participants included 15 males (33%) and 30 females (67%) with an age range of 18-22 years. The uneven sample size in the current study illustrates the overall ratio of male to female students in the humanities department.

Instruments & Instructional Material

Two instruments were utilized to collect data in the study: (1) pre-test, and (2) post-test. Both tests were adapted from *Barron's TOEIC Test* (Lougheed, 2006) to fit into the graphic organizer and outline format purpose. The purpose of the modified TOEIC test was to measure non-native English speakers' English skills in an international workplace environment. The scores indicated "how well people can communicate in English with others in business, commerce, and industry (Trew, 2007)." It reflects global business communication styles and emphasizes authentic language contexts. Thus, using TOEIC tests can be an effective means to test students' academic context reading and also meet the requirement of EAP and content-based materials learning.

The instructional material that was used in the study was *Reading for the Real World 1* (Second Edition) (Malarcher, Janzen, & Worcester, 2009), which was applied for the pre-intermediate level learning for the polytechnic types of university. The topics covered a wide range from various fields that could guide students to explore current world events and provide insights into diverse interests in the academic readings. In the session of experimental training, the students were given 6 units which included strange and unusual superstitions, computers and technology, health and medicine, environmental issues, social issues, language and literature, from which students can gain abundant and perceptive knowledge to improve their fluency and comprehension skills on the content-based materials instruction.

Training Procedures

Reading comprehension and proficiency involves the adaptation of many cognitive processes. To help students get involved in the development, the teacher needs to be skillful in his/her instruction enhancement. Hence, the author followed Tierney (2005)'s method and demonstrated graphic organizers to students (See an example on Appendix A made by the author) to improve their ability to learn. There are three stages of constructing Graphic

Organizers (Tierney, 2005, p. 411-416):

1. Preparation.
   a. Select words
   b. Arrange words
   c. Add previously learned key words and ideas
   d. Evaluate organizer
2. Presentation.
   a. Presented on the chalkboard or with slideshow presentation.
   b. The teacher may pose questions to check students' understanding.
   c. Both the teacher and students use the language of the subject matter and simultaneously explore the relationships of these words to each other.
3. Follow-up.
   a. The organizer is a major point of reference throughout the teaching of a particular text.
   b. New information may be added when the instructor suggests, "Let's see how this new information fits into the organizer that we have been using."
   c. The organizer may be replaced on a large piece of poster paper and put on the bulletin board. In this way, students may refer to it at any time.

Data Collection

1) The pretest was provided via the modified *Barron's TOEIC Test* (Lougheed, 2006), followed by the demographic survey.
2) The training program period extended to 8 weeks of class sessions. Each session includes 100 minutes per week; therefore, students met for 800 minutes in total.
3) The posttest was administered after the training program with the modified *Barron's TOEIC Test* (Lougheed, 2006).
4) Group discussion was opened after the posttest administration.

Data Analysis

A paired-samples *t* test and a one-way analysis of variance (ANOVA) were employed to assess whether the mean difference between the two variables of pre- graphic organizer test and post- graphic organizer test was significantly different from each other. The paired-samples *t* test is based on the repeated-measures with an intervention. Each participant took the pretest before the intervention and the posttest after the intervention. Thus, the SPSS data file contains 45 cases in total.

The one-way ANOVA was used to assess whether the gender (male vs. female student) means on the dependent variable (i.e. the mean difference of the posttest scores minus the pretest score) is significantly different from each other. A level of significance $\alpha = .05$ (p < .05) was set for the statistical analysis to limit Type I error (Shavelson, 1995).

Results

The result analyses in this session included pair samples statistics, pair samples tests, descriptive statistics, the tests of between-subjects effects, and marginal means estimates.

Research Question 1

The first research question was addressed as follows: Does the implementation of graphic organizers on the content-based material instruction enhance EFL learners' reading comprehension? The results analysis through the pair-samples *t* test was presented in Tables 1 and 2. The posttest $M = 35.80$, $SD = 11.76$ was not significantly greater than the mean for the pretest $M = 43.13$, $SD = 15.19$, which indicated that the subjects did not perform significantly better after receiving graphic organizer approaches on the content-based instruction. Standard deviation (SD) is the variability of scores about the mean of a distribution. The result stated that the greater the standard deviation, the greater the spread of scores. The pair sample *t* test, $t(44) = -3.11$, $p > .05$ also indicated that there was no positive outperformance on the students' learning on the graphic organizer instruction.

Table 1.   Pair Samples Statistics

Groups	Mean	Std. Deviation	N	Std. Error Mean
Posttest	35.80	11.76	45	1.75
Pretest	43.13	15.19	45	2.26

Table 2.   Pair Samples Tests

Paired Difference	Mean	Std. Deviation	Std. Error Mean	t	df	Sig
Posttest - Pretest	-7.33	15.85	.413	-3.11	44	.003

Research Question 2

The second research question was addressed as follows: Does the gender (male vs. female student) as an independent variable have an impact upon the effectiveness of graphic organizers on the EFL content-based materials instruction at the university level? The results of mean difference (dependent variable) and standard deviation were presented in Tables 3 and 4, which indicated that there was not a significant difference between the male student group and the female student group. The *M diff* = -4.33, *SD* = 12.29 of the male group and the *M diff* = -8.83, *SD* = 17.13 of the female group indicated that male students had greater improvement than the female students on the graphic organizer instruction though both group showed negative improvement. The tests of between-subjects effects table F (1, 43) = 7.66, p = .803 > .05, partial η^2 (Partial Eta Squared) = .018 also indicated that there was not a significant difference between the male group and the female group. The partial η^2 = .018 indicated the gender group was small in effect sizes. According to Green and Salkind (2010), partial η^2 ranges in value from 0 to 1. The conventional rule is likely .01, .06 and .14 for small, medium, and large effect sizes, respectively (p. 187).

Table 3.   Descriptive Statistics

Dependent Variable: Mean Difference

Groups	Mean	Std. Deviation	N
Male students	-4.33	12.90	15
Female student	-8.83	17.13	30

Table 4.   Tests of Between-Subjects Effects

Source of Variation	SS	df	MS	F	Sig.	partial η^2
Gender	202.50	1	202.50	.803	.375	.018
Error	10845.50	43	252.22			
Total	11048.00	44				

Table 5.   Marginal Means Estimates for Groups

Group	Mean	Std. Error
Gender	-6.58	2.51

Discussion and Conclusion

From the above results of the analyses, we can see that this research actually did not achieve a positive outcome. The subjects did not perform any better on the posttest compared to the pretest when provided with the graphic organizer intervention on the content-based materials reading instruction. Such a result may involve many indeterminate factors, yet some possible reasons were still elicited by the author. First, these subjects had just transferred to the university level of the academic English courses from the general English courses that were taught in the high school and they encountered difficulties not only on the vocabulary

recognition in the context, but also the meaning and main idea comprehension on the content-based materials instruction. Second, even though many students were able to understand some single sentences, they were unable to draw inferences across the whole passage (Robinson 1998). Third, the length of the treatment period extended for eight weeks, which might be too short to really reflect any true measure. Fourth, even supposing the graphic organizer approach had been repeatedly presented during the intervention, the subjects were not provided with any practice activity for reinforcement. Fifth, despite the fact that the pretest and posttest equivalence had been established (Fan, 2009), both tests were not standardized reading tests, which made it difficult to completely test students' reading comprehension abilities. Despite the fact that this finding was not consistent with previously-stated studies on literature, they did bring some influence to the students' learning when they took part in group discussion after the posttest administration.

Recommendation for Future Research

In view of the results presented previously, a well-designed study is recommended for future research to give more understanding of effective graphic organizer use on content-based instruction to facilitate EFL learners' learning strategy awareness and reading comprehension. To optimize the effects of future graphic organizer studies, the researcher must observe several controls. First, despite the fact that a graphic organizer in the content-based materials textbooks provides relational concepts, it must include schematic diagrams and important words to make complicated text or words easily understandable. Second, using graphic organizers with content-based materials instruction might be a far more complex process for EFL students; hence, at least a 12-week session would be recommended to reveal the real effectiveness of the study. Additionally, practice exercise is important and should be provided repeatedly to confirm and enhance students' completed learning comprehension. Overall, a well-prepared research model on both the training procedure and on the measurement should be carefully provided. In doing so, students can benefit from such an approach to facilitate their reading comprehension learning.

Conclusion

Graphic organizers have been proven to be a good teaching tool for clear explanation of expository textbooks and content-based materials instruction in many settings. Even with the

negative results of this study that did not support the use of a graphic organizer to assist students with reading instruction, students in their discussion responded that they liked the clear outline format of the presentation. In addition, the author concluded that if providing a thoughtful construction and planning for the study - including detailed graphic organizer presentation, practice activity, reliable pretest and posttest measures, and/or self-monitoring, self-regulation, an interactive presentation, and independent attitude of the key components of metacognitive strategies - students could then benefit from these potentially powerful approaches to improve their communication competence and academic achievement.
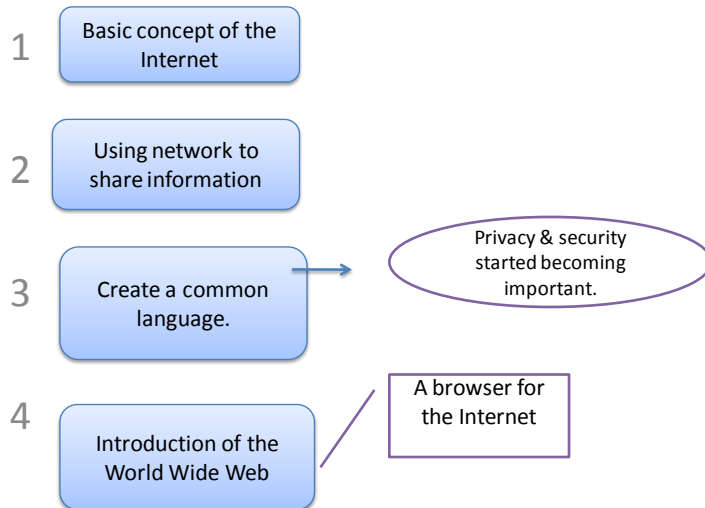
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Appendix A

Graphic organizer for "The History of the Internet"

1	Basic concept of the Internet
2	Using network to share information
3	Create a common language. → Privacy & security started becoming important.
4	Introduction of the World Wide Web — A browser for the Internet

Graphic organizer for "The History of the Internet"

5	Search engine — The first web browser
6	A consortium — Link hundreds of high-speed networks around world together
7	Cloud computing — Retrieve data through cell phones, MP3, and other portable devices