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A preliminary study on effects of Graphic Organizers on reading comprehension

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A PRELIMINARY STUDY ON

EFFECTS OF GRAPHIC ORGANIZERS ON READING COMPREHENSION

A Thesis

by

TRANG PHAN

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ABSTRACT

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This study investigates whether Graphic Organizers (GOs) are effective for various groups of undergraduate students at the University of Texas-Pan American on their reading comprehension. Thirty-five research participants were classified into groups by their language background (NSE, G 1.5 and ESLLs); levels of reading proficiency (low, middle, high); and levels of graphic skills (low, middle, high). The findings are based on between- and within-group comparisons of mean scores in the pretest and the posttest taken by the students. The GO tasks scores helped to consider correlations between students' levels of graphic skills and their reading comprehension performance. Results revealed GOs benefited low skilled readers and high graphic skills ones in their reading comprehension but not learners of different language backgrounds.

DEDICATION

To Douglas Alan Young, Cindy Mason Young, my family and my friends who supported and encouraged me throughout the journey.

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CHAPTER I

INTRODUCTION

As an English second language learner, I customarily used visual aids in the early years of studying English in my native Vietnam. Upon enrolling in graduate school in the United States (U.S.), I noticed the trend of using visual aids, including concept maps in science and Graphic Organizers (GOs) in social and language studies as part of the instructional methodologies. The evident benefits of using visual aids to enhance learning in science and language by native speakers of English (NSEs) spurred my desire to find out if these tools could benefit English as a second language learners (ESLLs), whose command of the English language is assumed to be less proficient than NSEs. In particular, I felt the need to ascertain through this preliminary empirical investigation if second language learners could improve their reading comprehension through the use of GOs.

The University of Texas-Pan American (UTPA)

The following study on the effects of GOs in reading comprehension was conducted with undergraduate students in the Developmental Reading and English as a Second Language (ESL) classes at the University of Texas-Pan American (UTPA), located in the Lower Rio Grande Valley of Texas (LRGV) close to the border of Mexico. This is an interesting area to study language issues because "the LRGV is unique in Texas in that most of its permanent residents routinely use both Spanish and English in all domains for daily communication" (Mejías,

Anderson-Mejías, & Carlson, 2003, p.138) and there is almost no language demarcation between English and Spanish by domains, topics and interlocutors (Mejías, Anderson-Mejías & Carlson, 2003). According to the Census Bureau (2010), in the year 2000, 71.8% (the number varies for each county) of the population spoke a language other than English at home. In 2008 the majority (89.9%) (the number varies for each county) of the population in the LRGV was Hispanic.

This research study initially targeted ESLLs in the English Language Institute (ELI) of UTPA. These students came from countries where English is spoken as a second or foreign language. In bringing their home language and culture to the new environment, their English language acquisition was influenced by the distinctive characteristics of language use in this geographic area (the equal dominance of both English and Spanish), which made them a unique group of ESLLs. However, the research population recruitment plan was unable to be carried out because the ELI curricula were currently too intense to afford room for additional instruction. The pursuit of research population moved in a new direction by targeting the aforementioned developmental undergraduate students at UTPA because they own equally distinctive characteristics in terms of language use.

Most undergraduate students at UTPA come from the LRGV. Statistics from the UTPA Office of Institutional Research and Effectiveness on entering freshmen and graduates from 2009 reveal that 7% of UTPA students were from areas other than the LRGV, 1% from other foreign nations and a significant portion (92%) were Hispanic (Stats at glance, 2008) which includes locally-born Mexican-Americans as well as other Hispanics immigrating into the area (Mejías, Anderson-Mejías, & Carlson, 2003).

Developmental Reading and English as a Second Language

The undergraduate students in the Developmental Reading class (ENG 1310) in the Department of English were recruited as part of the research population. They were newcomers to the university who had yet to declare majors. These students had not met the entry requirements for the reading in the Texas Higher Education Assessment; the Scholastic Aptitude Test or the American College Testing (or had not taken the exams) and did not have college level reading skills. They had been placed in the Developmental Reading class until their reading proficiency improved enough to pass the course exam, which guaranteed their ability to work in other subjects at the university. Because of the mandatory nature of the course, these students were expected to stay in the course until they could earn a passing grade, ensuring their continued attendance at the university. They could receive a failing grade at the end and retake the course, but the students would not be dropped by the instructor. Since there was no powerful control mechanism available to the instructor (the threat of failure to finish the course in a prescribed period of time), this encouraged an unstable attendance rate in the class during the time the research treatment took place. There were sixty-two students enrolled in the course but only twenty-eight of them attended the classes and participated in the entire research process.

The second group within the research population was students from an ESL class in the Department of Bilingual Education who were in training to become teachers of ESL. These students were additionally recruited in order to increase the sample size for the research. There were seven students from this group who also voluntarily participated in the whole research process. The only difference between them and the Developmental Reading group was that they were given community service hours by the course instructor for their volunteer work and, of course, in a different type of learning situation.

Background of Graphic Organizers

GOs can be considered spatial representations of a linear text where ideas, concepts and the connections between them are visibly highlighted by graphic devices such as diagrams, charts and maps. GOs vary in appearance even though they all visually represent complex information in simple and meaningful displays. According to Jiang and Grabe (2007), GOs can be grouped into two major types based on their functionality: GOs that do not represent discourse structure of linear texts and GOs that do. The first type merely emphasizes the hierarchical nature of textual information. The second type draws attention to the specific rhetorical structure of the text. GOs have been used as an instructional tool in science and first language (L1) literature as well as incorporated in textbooks for young learners, though generally less commonly in second language (L2) contexts (Grabe, 2003; Mohan, 1986; & Smith & Mare, 2004).

In reading comprehension, research claims that GOs play a particularly valuable role and are recommended to teach students awareness of discourse structuring in texts, an important part of a reader's overall comprehension abilities (Pearson & Fielding, 1991; & Trabasso & Bouchard, 2002). GOs that represent text discourse structures have been more effective in facilitating comprehension and retention of content area reading material than the GOs that do not (Jiang & Grabe, 2007).

Issues in Current Studies of Graphic Organizers

Review of the available literature on GOs has revealed contradictory findings and thus raised questions about the overall effectiveness of GOs in reading instruction. The first issue is the lack of a clear distinction between the two GO types and understanding of their effectiveness

when employed for instructional or research purposes. The second issue regards students' insufficient exposure to differing types of textual discourse structures and the amount of GO training required to teach students this knowledge through visual means. The third problem lies in the lack of GO studies with learners of English as a second/foreign language. It is important to know if GOs will facilitate reading comprehension for this population of learners who potentially face more language trouble in the academic setting. And finally, previous GO research studies have not investigated the effectiveness of GOs with different groups of learners.

Addressing the Effects of Graphic Organizers to Different Groups of Learners

Given the above unexplored territory, I became interested in the effects of GOs representing textual discourse, and chose to investigate the impact of this type of GOs on groups of learners with different language backgrounds and with different reading levels (reading groups). In addition, I wanted to investigate the relationship between the participants' ability to use GOs and their reading comprehension performance after the GO training.

Language Groups. The purpose of classifying the research population based on their English language background was to investigate possible effects of GOs on learners whose English language competence is different from one another in their reading comprehension. The three groups are: Native speakers of English (NSE); Generation 1.5 (G 1.5) and English as a Second Language Learners (ESLLs).

Native Speakers of English (NSE). For this investigation, these students are primarily defined as those who were born in the U.S., speak English as their first language and use only English in academic and social conversations.

Generation 1.5 (G 1.5). Following Harklau, Siegal, and Losey (1999), G1.5 in this study refers to bilinguals who were born to immigrant parents, speak a non-English language at home and completed a high school education in the U.S. before entering college. The Hispanic community in the LRGV includes locally-born first generation Mexican-Americans and other Hispanic immigrants (Mejías, Anderson-Mejías, & Carlson, 2003). One commonality of these two groups, who are early immigrants into the U.S. before or during their high school or children of the immigrants, is that their members grow up speaking Spanish at home or in their community but acquire English skills in public education. They share characteristics of both first-and second-generation immigrants (Rumbaut & Ima, 1988). Resulting from their immersion into U.S. culture as school children, G1.5 usually has higher English language proficiency than their ESL counterparts, but not as high as NSE's.

Regarding language use, members of G 1.5 appear to be as strong in conversational and social English but less proficient in academic fields and schooling compared to NSE's (Harklau & Linda, 2003).

English as a Second Language Learners (ESLLs). The ESLL students as defined for this study are from countries where English is not typically spoken. These students finished high school in their homeland countries, learned English in an academic setting, and then came to the U.S. for college or higher education. Regarding academic language skills, ESLLs are more comfortable with the formal English language and often lack the conversational nuance of idiomatic English and English slang.

I hypothesized that the above language backgrounds might affect learning from GOs.

Reading Groups. The purpose of this classification is to compare the effects of GOs on students of various levels of natural reading skills. The theoretical rationale for this examination is based on the research by Geva (1983), who claimed that the use of GOs representing discourse structures of texts benefits less skilled readers. This work is aimed to test Geva's finding and take the next step in examining the possible effects of GOs on higher skilled readers.

Students' reading proficiency in this context is measured by a multiple choice reading test which was offered to them before the GO training. The grouping was based on percentile ranking among participants on the pretest since most were selected because of their low levels of reading proficiency as they were in the developmental reading program.

Graphic Organizer Groups. Research participants will be groups based on their graphic skills measured by GO tasks. Graphic skills in this context are defined as the ability to use GOs as visual aids after the training. Research studies on types of language learners reveal some people are more visually oriented than the others (Brown, 2007). One question is whether being visual learners, as defined in this investigation by greater skills using GOs after the training, affects the individual's reading comprehension performance. Jiang and Grabe (2007) in their review of research studies on GOs claimed the importance of transferring reading content from linear texts to GO representations in promoting reading comprehension. However, absent in the review of literature on GOs were particular methods to measure the ability to transfer in such a manner. A further question is, in terms of aiding reading comprehension, how can the skills of transferring content from linear to GO formats be measured?

To answer the question, an assessment method called GO tasks was designed for this study to measure the students' ability to use GOs after they received GO training. The

measurement was indicated by their creation of GOs representing the content of the linear texts. The tasks, which were provided on the post treatment test after the GO training; included fifty-nine possible links drawn among pairs of sixty-eight identified concepts. These sixty-eight concepts from the reading passages in the posttest were put into seven separate boxes. Students were asked to draw one GO for each box of concepts. While doing that, they were able to refer the linear passages.

The division into graphic skills groups was based on percentile ranking of the GO tasks scores in which 33% used most of the correct links (GO-high); 33% used the least correct links (GO-low) and 33% were in the middle (GO-mid). The purpose of this grouping was to find out if GOs affect the transferring skills, or graphic skills as termed in this study, of students using different linear-GO formats for their reading comprehension.

I believed that checking for a potential GO ability difference could shed important information on success using GOs to enhance reading comprehension.

Research Questions

The central research question of this investigation is:

Do Graphic Organizers affect reading comprehension?

To examine the effects of GOs on different groups of learners, the following three questions were developed:

RQ 1: Does training in the use of Graphic Organizers affect reading comprehension differently for different language background groups?

RQ 2: Does training in the use of Graphic Organizers affect reading comprehension differently for different reading groups?

RQ 3: Is there a relationship between the students' ability to use GOs after the training and their reading comprehension performance?

To answer these questions, a quasi-experimental research was carried out, including a pretest, a GO training, GO tasks and posttest, and a survey. The pretest helped to rank students' reading levels. The training on use of GOs provided knowledge of and practice on using GOs to the participants. The posttest revealed the students' reading performance after the GO training. The GO tasks divided the group by graphic skills and together with the posttest helped illuminate the relationship between their reading levels and ability to use GOs after training. The survey provided information concerning students' language group identities and their feedback on the GO training.

Thus, the primary goal of this study was to seek evidence on the effectiveness of using GOs in reading comprehension for learners of diverse language backgrounds and skills. One added advantage of this study is that, potentially, the research population could benefit from the treatment.

CHAPTER II

LITERATURE REVIEW

Cognitive theories consider reading as an internal psycholinguistic process. Content and background knowledge play an important role in reading comprehension (Anderson & Pearson, 1984). Content and background knowledge can be seen as prerequisite to reading a text by facilitating comprehension of new information (Bransford, Stein, & Shelton, 1984; Wilson & Anderson, 1986). According to Eskey (2005), "the reader's brain is not an empty container to be filled with meaning from the text" (p.569). In order for a reader to acquire knowledge from a reading text, the reader must have background knowledge of the textual discourse (networks of related notions or schemata) that will facilitate the understanding of the text and allow the processing of new information. The cognitive approach stresses that the learning process does not consist of repetitive activities but associative processes in which human brain looks for associations between related elements to create neural links (Mitchell & Myles, 2004). In those association processes, reasoning skills and image associations hold a crucial position.

Reading Comprehension in L2

Regarding L2 reading, theorists advocating reading as a psycholinguistic process put a priority on the correlation between L2 proficiency and the success of L2 reading (Birch, 2002). Sharing the same thought, Clarke (1980) proposed a "language proficiency threshold" theory

emphasizing the language interdependence between L1 and L2, and stressing the need for the readers to reach the cutting edge level to achieve L1 proficiency in L2 readers. Pienemann (1998) also predicted that morphological acquisition is the driving force in English as a second language (ESL) development**,** and varies by the learners' orientation.

Dekeyser and Juffs (2004) noticed the influential power of the first language into the second language development. In their view, language is a composition of individualistic components. Processing strategies in first language are a source of second language performance even though each language is different and distinctive in its own syntactic and semantic systems. Dekeyser and Juffs (2004) noticed the individual differences in second language learning such as aptitude, age, the capacity of storage**,** and the learners' ability to process information. These cognitive considerations have helped to show multiple facets of how learners come to know elements of L2**,** and to what extent L2 performance is individually different (Dekeyser & Juffs, 2004).

Research studies on the combination between students' background knowledge and interpretation practice in language learning showed that in a learning task, learners are expected not only to transfer input language but also associate the knowledge into the related field that they have already learned. In order for the association to happen, learners need to possess well-developed schemas. In second language learning, learners need to master the mother tongue and the target language and become deeply aware of different aspects of the two cultures. However, differences in skills, dialects, and accents between individual learners create discrepancies in assessing their linguistic proficiency. Moreover, characteristics of the target language also create obstacles for comprehension. These linguistic obstacles need to be carefully considered in

second language learning. In addition, constant practice in using visual aids can also help learners overcome counteracting factors of the target language (Liu, Yu, & Lin, 2007).

The Role of Nonlinguistic Representations in Reading Comprehension

Schema theory has played an important role in reading comprehension development for two decades because it presents the constructive nature of comprehension, and the critical role of reader's prior knowledge in that construction (Sadoski, Paivio, & Goetz, 1991). Sadoski, Paivio, and Goetz, however; have criticized schema theory for neglecting the roles of imagery response in reading, and provided an alternative dual coding theory incorporating imagery and affective response. Their cognition theory claims cognition represents two mental subsystems. The first one processes information using nonverbal objects, and the second one using language. The second system, the nonverbal subsystem, also called imagery system, functions to analyze scenes and generate visual images. The two systems are separate but interconnected and work in an integrated manner. The verbal system favors sequential and syntactic processing and corresponds to phoneme, morpheme, word, phrase or sentence while nonlinguistic system is organized in a holistic, synchronous or parallel manner and can represent sound, a natural object, or part of the object. The two subsystems work together and integrate with each other because language can evoke images and vice versa and they both can make associations through learning and experience with other associated language components or images. Bransford, Barclay and Franks (1972), in their investigation of how students semantically interpret sentences, discovered that in interpreting the sentences semantically, "subjects had constructed holistic situational representations that went beyond the deep-structure interpretation of sentences" and "these representations might be visual images of the situations that schema theory had disregarded" (Sadoski, Paivio, & Goetz, 1991, p.475).

Bransford and Johnson (1972) also claimed imagery to have an important role in the comprehension of literature by disambiguating the titles or improving comprehension of the reading passages through the use of pictures. Nelson and Castano (1984) have stated that visual images may be represented differently in memory than verbal information, and thus the use of pictures has facilitated the retention of verbal information in certain situations.

According to Sadoski, Paivio, and Goetz (1991), visual images can be what are imagined by the readers based on the clarifying verbal elaborations. The use of visual imagery is necessary especially when readers face ambiguous reading texts as it helps avoid the tendency to rely on personal background and situational cues for interpretation of the text, and encourages the formation of images. The images, evoked by the language in the text, can be used as referent for the language, and guide the encoding of the passage.

Issues in Reading Comprehension Research Studies

Reading is a fundamental skill for all academic disciplines (White, 2004). Good comprehenders are usually knowledgeable and strategic readers (Anmarkrud & Braten, 2009). However, college students are not necessarily good readers though they are required to read advanced materials at college levels. This presents a problem that while the volume of required reading for college students is overwhelming; most of them pay little attention to reading comprehension. Moreover, while reading instruction ends in the fifth or sixth grade in most public schools, college instructors believe that the students already possess skills needed to comprehend advanced materials at college levels and the students' reading comprehension deficit is therefore neglected (Lei, Rhinehart, Howard, & Cho, 2010).

Of the seven major strategies of improving reading comprehension among college students, as presented by Lei, Rhinehart, Howard and Cho (2010), outlining and concept mapping of textual information in a linear format have been viewed as the two major techniques in improving the encoding process by interrelating existing relevant knowledge in the mental structure to the acquisition of new knowledge in a visual manner. The use of an outline presents textual information in a visual format that functions by preparing readers for the identification of main ideas and details in a reading text. This identification leads to meaningful restructuring and storage of new information in long-term memory (Glynn & Divesta, 1977).

Concept mapping graphically draws a main concept then connects it to other general concepts in a text by directional links across-the-board (Hill, 2004). The ideas and concepts include several branches that reveal the hierarchical structure of the text. The network of concepts**,** from the most general to the most specific**,** has helped students distinguish main concepts from more specific ones**,** and demonstrates the relationships among them (Choiu, 2008). Since it helps integrate new information to more inclusive concepts in a person's cognitive structure (Hill, 2004), concept mapping enhances meaningful storage of information in their long-term cognitive structures. By enabling students to organize their ideas, retain information and relate course material to other knowledge, concept mapping engages students and empowers an in-depth level of understanding (Hill, 2004).

In their research, Chall and Stahl (1985) discussed three important factors in reading comprehension: knowledge, structure and reasoning skills. Reader's knowledge, termed "schema", is concerned with "knowledge on a topic that the reader has acquired and how that prior knowledge affects what is recalled and comprehended in reading" (Chall & Stahl, 1985, p. 95).Thus, reader's schema plays an inarguably important role in reading comprehension.

Structure refers to the reader's knowledge about structural organization of expository prose. Reasoning skills reflects the strategies the reader uses to monitor understanding of the text while reading (Chall & Stahl, 1985). These monitoring strategies known as metacognitive skills or "actions which go beyond purely cognitive devices, and which provide a way for learners to coordinate their own learning process" (Oxford, 1990, p. 136) and include improvement in arranging and planning strategy sets.

In reviewing research studies on reading comprehension, Trabasso and Bouchard (2002), Grabe (2004), and Kintsch and Rawson (2005) discovered that comprehending textual discourse structures is an important attribute to the reader's overall reading abilities. In a subsequent investigation, Jiang and Grabe (2007) claimed that one of the efficient ways to teach the awareness of text structures to students is through the training of GOs, spatial representations of linear texts to visually display the ideas and concepts as well as the relationships between them.

Graphic Organizers

Graphic Organizers (GOs), concept maps, and mind maps can be understood as spatial representations of linear textual knowledge into graphics, pictures, and diagrams. GOs visualize internal thoughts and organize knowledge as they provide the reader a whole picture of the concepts as well as the relationships between the concepts. The hierarchical relationships between concepts in a graphic display not only help avoid rote learning and pure memorization but also prompt ideas and prepare the reader to articulate ideas in composition from major to minor points to synthesize newly acquired knowledge. GOs have long been applied as a learning tool in the science fields and have increasingly proved their usefulness in the area of second language learning (Jiang & Grabe, 2007).

Types of Special Displays and their Use to Empower Social Studies Students and Teachers

Graphic display of a text shows a clear whole neat picture of that text where students can see all concepts and the relationships between them without many word blocks. Studies have shown that student use of spatial format for note taking results in better comprehension and increased test scores compared to linear format (Wallace, West, Ware, & Dansereau, 1998). Studies by Robinson and Skinner (1996) have found that by searching in GOs instead of texts, students are able to track data to answer factual and inferential questions faster. Other studies showed that GOs aid the assimilation of chapter-length text if having them read, review after delay and apply the concepts and the relations in new contexts (Robinson et al., 1998). Equally important, the use of GOs has increased students' comprehension, retention and retrieval of knowledge (e.g., encoding, note-taking) (Kulhavy, Stock, Woodard, & Haygood, 1993). Nevertheless, there are concerns that GOs might detract from student linguistic development in the form of encoding (the opposite process of decoding) because of their graphic-based formats. However, it is possible for the students to read a linear text and then transfer the information to a GO thereby not losing the chance to develop their linguistic competence.

Effects of Graphic Organizers on Reading Comprehension

Studies by Pearson and Fielding (1991), and Trabasso and Bouchard (2002) have shown that awareness of text organization is an important part of a reader's overall comprehension abilities**,** and the use of visual representations of information in the text - GOs - is one of the major ways to train students about textual discourse structure recognition.

Recommendations to use GOs as an instructional method in L1 reading literature (Blachowicz & Ogle, 2001) and inclusively incorporated in textbook for young L1 learners (Gunning, 2003; & Threster, 2004) are frequently found, though they are less common in L2

contexts (Grabe, 2003; & Mohan, 1986). Jones, Pierce and Hunter (1988-1989) pointed out that "a good graphic representation can show at glance the key parts of a whole and their relations, thereby allowing a holistic understanding that words alone cannot convey" (p.21). However, Jiang and Grable (2007) have raised four major questions about whether claims on the effectiveness of GOs are supported by sufficiently specific empirical research. The first issue is about the discrepant findings concerning the overall effectiveness of GOs in reading instruction. The second issue regards what a GO is and how it should be designed for research or instructional purpose (i.e. what types of GOs are most effective for students learning purposes). The third issue is the lack of GO research in L2 contexts. The fourth issue regards the GO training time in most studies.

Jiang and Grable (2007) stressed the importance of GOs in reading comprehension by stating the role of knowledge on text structure in reading research. Text structure can be understood as "knowledge structures or basic rhetorical patterns in texts" (Grable, 2003, p.1) or "the organization of ideas in text" (Taylor, 1992, p. 21) or the way text ideas "are interrelated to convey a message to the reader" (Meyer & Rice, 1984, p. 319). Text structure can be used interchangeably with other terms such as discourse structure, discourse pattern, text type, rhetorical organization, and top-level structure (Jiang & Grable, 2007, p. 36). Research findings by Carrell (1984), Coiro (2001), and Collins (1994) proved that text following conventional organizational patterns is easier to comprehend and remember than texts that do not. Coiro (2001), Koda (2005), and Taylor (1992) found that awareness of text structural discourse helps to improve reading comprehension and retention. Well-structured expository text promotes comprehension of main ideas (Kintsch & Yarbrough, 1982). Jiang and Grabe (2007) reviewed the research findings of Ghaith, Harkouss (2003), and Martinez (2002), agreeing that textual

awareness can enhance comprehension and that students can be trained to improve their text structure awareness.

Given the importance of reader's textual knowledge to reading comprehension, Jiang and Grabe (2007) presented a research review of two trends: The first research trend was regarding the effectiveness of GOs which did not represent discourse structures of a text (General GOs), and the second trend involved GOs representing the textual discourse. The effectiveness of general GOs in reading research and instruction is challenged in empirical studies, while GOs with textual structures appear to promote reading comprehension for less skilled readers.

Alvermann and Boothby (1986) investigated the transfer effects of GO instruction in L1 students who use top-level structure to comprehend and recall content information. The students were asked to use key concepts from the text to fill in the empty slots of the diagram. The study was conducted on 3 groups of participants with three different training treatment amounts: GO instruction for 14 class periods (treatment 1); GO instruction for 7 class periods (treatment 2), and the control group with no GO instruction. Significantly different performances were found between treatment 1 and the control group but not between treatment 2 and the control group. The finding showed the importance of the length of treatment in classroom training studies.

Research by Armbruster et al. (1987) on the effect of text structure training on L1 reading comprehension showed the treatment group who received direct instruction in recognizing and summarizing a problem-solution text along with schematic representation exceeded the control group by 50% more of macrostructure ideas.

Guri-Rosenblit (1989) investigated the effects of tree diagrams in Israeli L1 college students' comprehension of main ideas and hierarchical organization of social science expository text structures. The result showed that students who received texts with tree diagrams performed

significantly better on comprehension of main ideas and recalling of the relations between various elements in the texts than those who got either original or elaborated texts without diagrams.

Spiegel and Barufaldi (1994) investigated the cumulative effect of text structure awareness and GOs by dividing 120 participants into four groups each with different treatments in a 16-hour treatment each. The four treatments were: (1) texts with explicitly stated structure; (2) texts without explicit text structure; (3) text structure explicitly stated and explicitly outlined as a GO; (4) text structure and construction of GOs both determined by the student. The result showed only the forth treatment group retained the information significantly better. The finding suggests the GO instruction of should encourage self-regulated learning strategies with active involvement of the students.

Findings of the studies on GOs representing the discourse structure of the text can be summarized into the following five major effects: First, GOs have consistently shown the impact of GOs in facilitating comprehension of macrostructures and recall of main ideas (Armbuster et al., 1987; & Guri-Rosenblit, 1989). Second, Jiang and Grabe (2007) claimed that "comprehension questions, recognition probes, or recall of factual details did not always seem sensitive enough to measure GO facilitation" (p. 42). Third, previous studies asserted the conductors of the GOs also influenced comprehension. Specifically, GOs constructed by students were found more effective than those provided for them (Moore & Readence, 1984; & Spiegel & Barufaldi, 1994). The students' active engagement in creating a GO, "even simply finishing a completed graph, provides them an opportunity for deeper processing of the material than studying organizers produced by others" (Jiang & Grabe, 2007, p. 42). Forth, GOs can be used in pre-reading or post-reading tasks, but graphic post-organizers produced greater effects than the

graphic advance organizers (Griffin & Tulbert, 1995). The final effect regards the length of GO training and the educational level of participants. The group who received fourteen days of GO training comprehended and recalled significantly better than the control group while there was no significant difference between the seven-day GO treatment and the control group (Alvermann & Boothby, 1986).

In their review, Jiang and Grabe (2007) summarized three major concerns about the current research on GO effects. The first regards the design of GOs that consistently represent the text structure of the reading. In developing GOs, there should be sufficient amount of practice to arrive at the best construction of GOs illustrating the relationships of concepts and patterns of organization in a simple, effective manner. The second issue concerns insufficient GO research regarding the L2 students' use of GOs in reading development. GOs have the potential to assist in acquiring and expanding content-area knowledge, thereby achieving academic success (Grabe & Stoller, 2002). Moreover, L2 readers face the challenge of reading increasingly dense and complex material with different rhetorical convention than in L1 (Jiang & Grabe, 2007). The third matter is the length of the instructional training period. Previous GO studies employing short training periods, ranging from only a few hours to a few weeks, covering two to eight passages, revealed a very small overall effect of GO use (Jiang & Grabe, 2007). Bean et al. (1986) suggested GO instruction should last at least a semester with consistent exposure to and practice with GOs.

GOs have been highly recommended for use in the contemporary classroom as an instructional tool (Jiang & Grabe, 2007). However, claims for the effectiveness of GOs have been debated over the past decade due to concerns regarding inconsistent research results in reference to student improvements, limitation in generalizability from research studies, and

extension of instructional exposure time to GOs. It is argued that the accumulation of knowledge on discourse structures of the texts and the extended instruction of GOs, and the use of graphic formats representing discourse structures of the texts are better evidence for the effectiveness of GOs' use (Jiang & Grabe, 2007).

In sum, given the important roles of GOs and nonlinguistic representations in reading comprehension, this study is aimed to examine the effects of GO use as a tool to transfer a text from a linear to a spatial format in reading comprehension. The effectiveness of this graphic tool is assumed to be determined by levels of language proficiency, reading proficiency and learners' ability to use visual aids. The following chapter will provide great details on the design of this research and present the methods of addressing the research questions.

CHAPTER III

METHODOLOGY

This research aimed to examine whether GOs are effective for different groups of students in terms of their language background as identified by the survey. Likewise subjects were divided by their reading comprehension as measured by the pretest. Finally, the correlation between students' GO performance and the multiple choice test performance on the post test was considered.

In specific, the study investigated the following research questions and their hypotheses. The null hypotheses are those used for statistical analysis where significance is set at $p \leq .05$ for this investigation.

RQ: Do Graphic Organizers affect reading comprehension?

Null hypothesis: Graphic Organizers do not affect students' reading comprehension.

Hypothesis 1: Graphic Organizers affect students' reading comprehension.

To examine the difference in the effects of GOs on different groups of learners, the following three questions and their hypotheses were developed:

RQ 1: Does training in the use of Graphic Organizers affect reading comprehension differently for different language background groups?

Null hypothesis 1: Training in the use of Graphic Organizers does not affect reading comprehension for different language background groups.

Hypothesis 1.1: Training in the use of Graphic Organizers affects reading comprehension differently for groups of different language backgrounds.

RQ 2: Does training in the use of Graphic Organizers affect reading comprehension differently for different reading groups?

Null hypothesis 2: Training in the use of Graphic Organizers does not affect reading comprehension for different reading groups.

Hypothesis 2.1: Training in the use of Graphic Organizers affects reading comprehension for different reading groups.

RQ 3: Is there a relationship between the students' ability to use Graphic Organizers after the training and their reading comprehension performance?

Null hypothesis 3: There is no relationship between the students' ability to use Graphic Organizers after training and their reading comprehension performance.

Hypothesis 3.1: There exists a correlation between the levels of students' ability to use Graphic Organizers after training and their reading comprehension performance.

Hypothesis 3.1.a: Higher ability to use Graphic Organizers after the training will facilitate students in their reading comprehension resulting in higher reading comprehension scores.

Hypothesis 3.1.b: Less ability to use Graphic Organizers after the training will result in lower reading comprehension scores.

The investigation included two tasks. First, student reading comprehension performances before and after the GO training were observed. Second, correlation between the students' use of GOs after the training and their reading comprehension performances were correlated. Data were collected through reading comprehension tests, a specially designed exercise called GO tasks, and surveys. All instruments and data collection procedures were presented to and approved by the UTPA Institutional Review Board (IRB) for use of human subjects in research (see Appendix A).

Instrument

To collect data for this study, four instruments were developed: the reading comprehension test prior to the treatment (pretest), the post treatment test (posttest), the GO tasks, and the survey. Data on a student participant was valid only when she participated in all stages of the study.

Pretest

Scores on the reading comprehension test prior to GO training were one of the primary sources of data for this investigation. They were also used to differentiate students' natural reading proficiencies in answering the second research question. The pretest was taken by thirty-five students in total. It included twenty-six multiple choice items for three reading passages. These passages were selected from retired TOEFL practice test books of Rogers (2002), Gear (2002), and Phillips (2004). The passages were diverse in topics and almost of the same length and number of test items. The purpose of giving a variety of reading subjects was to avoid topic-

bias and topic familiarity. Time allotment for the pretest was forty-five minutes. In assessment, one point was awarded for a correct item. The 26-point scale was converted into a 100-point scale for a consistent assessment system.

Post test

Results of the post treatment test were compared with those of the pretest in order to make inferences on the effectiveness of the GO training through the change in students' reading comprehension performances. The posttest was taken by the thirty-five students who had gone through the pretest and the GO training. The posttest was of a parallel construct as the pretest and used the same sources for its content construction. It also adopted the same scoring method as the pretest's. The time allotment for this test was sixty minutes since there were extra tasks of creating GOs for the reading passages: subjects were asked to draw GOs before answering the multiple choice items.

GO Tasks

GO tasks were used as a quantified indicator to measure students' use of GOs after the training. Student's performance results on these tasks were used to examine a possible correlation between their skills using GOs and their reading comprehension to answer the third research question. The tasks were administered after the GO training and before answering each set of multiple choice questions on the posttest. They included seven subtasks which required students to draw seven GOs for seven provided concept boxes. In total these concept boxes contained sixty-eight concepts taken from the three reading passages on the posttest. Each of the student GOs was scored by points given to directional links made between two concepts. Correct links were the ones connecting pairs of concepts as shown in the models given by the trainer. Each correct directional link earned one point. The total number of directional links in the seven

graphics was fifty nine. The 59- point-scale was converted into a 100-point scale to maintain consistency among testing instruments.

Survey

The fourth research instrument of this study was a survey of the participants. The survey consisted of three parts. The first part assisted characterization of participants' language identities and included questions about gender, age, native language, years of learning English and places of high school graduation of the participants. The second part included eleven items (1-11) asking about the participants' understandings of GOs on reading comprehension. The third part (12-14) was to collect feedback on the GO training.

Validity and Reliability of Instruments

The two sets of reading comprehension tests have construct validity. They have presented various topics ranging from astronomy to technology, agriculture, environment, and literature as well as tested a full range of reading micro skills such as recognition of main ideas and details, vocabulary, drawing inferences, identifying purposes, etc. (Rogers, 2002) . Face validity of the tests is considered high because the multiple choice format is among at most familiar to students. The new testing format section on the posttest was the GO tasks in which participants were required to draw graphics within given concept boxes from the reading passages. However, this new testing format did not necessarily decrease participants' performance on the tasks since they had used these procedures and practiced them as part of the GO training. Besides, the validity of the treatment was concluded base on participants' feedback on the training, which would be presented in details in chapter 4. The Pearson correlation coefficient between the pretest and the

posttest (r (33) = .67), which is large or larger than typical, shows the reliability of the pretest and posttest to be very strong and positive. (Cohen's, 1988).

Participants

The research population for this study, as earlier described, included thirty-five undergraduate students (seventeen males; eighteen females) whose ages ranged from eighteen to thirty-nine and were enrolled in Developmental Reading (twenty-eight students) or ESL (seven students) classes at UTPA. The entire population of developmental language students was used, although not all completed the entire research process. When it was discovered that few true ESLLs were among that population, volunteers were solicited (who received community service credit) from the ESL teacher training course in the college of Education.

To answer the three research questions, the participants in this study were classified into groups based on their language background as ascertained by the survey; their reading proficiency as seen by results on the pretest; and their ability using GOs after the training as seen by results on the GO tasks from the posttest.

Language Groups

The survey questions asked students which language was their native language, how many years they had been studying English and whether they graduated from a U.S. high school or elsewhere.

In terms of English language background, the participants were divided into three different language groups: Native Speakers of English (NSE) (n = 10); Generation 1.5 (G 1.5) (n = 19) and English as a Second Language learners (ESLLs) (n = 6). Students who claimed to have

learned English for their whole lives and spoke it as their first language were labeled as NSE. Criteria used to label student participants as G 1.5 were proposed by Harklau, Siegal, and Losey (1999). Accordingly, these G 1.5 students were early immigrants or children of first generation immigrants into the U.S. who completed their high school education in the country. Their English language command, therefore, may not be as efficient as that of NSE because of the influence of their first language, which was Spanish in all cases. The third group of participants was ESLLs who finished high school in Mexico, and now live in the U.S. for their college education.

Reading Groups

In this regard, the participants were categorized into three different groups based on their scores on the pretest: reading-low (n = 10); reading-mid (n = 13); and reading-high (n = 12). This categorization method was based on the percentile ranks (33% for each subgroup) of the multiple choice questions correctly answered. Accordingly, the 33% upper group was considered to have the highest reading skills among the three groups. The second 33% was the reading-mid group who ranked in the middle. The final 33% was the reading-low group that was of the lowest reading skills. It was considered necessary to group reading skills in this manner because all students were relatively similar since they were grouped in the developmental class based on their reading proficiency.

Graphic Organizer Groups

Graphic Organizer (GO) groups were likewise identified by percentile ranks (33% for each group) based on the participants' performance on the GO tasks after the training. Participants were classified into three groups of GO-low (n = 11), GO-mid (n = 12) and GO-high

(n = 12) according to their GO tasks scores. Accordingly, the GO-low group had the fewest correct links on the tasks. The GO-mid group ranked between high and low in their graphic understanding and performance. GO-high group showed the best performance in correctly identifying connections for the concepts in the posttest reading passages.

The Treatment – The Training to Use Graphic Organizers

The GO training package was created by following Concept Mapping teaching by Zeili (2009). The training activity lasted for 100 minutes and took place after the pre-test (see Appendix C). Participants' capacity to create their own graphic for a reading passage was the goal and focus of this training. The presentation of GO concepts and the practice activities were therefore to instill this skill. The training materials included an entire graphic lesson plan and readings for instruction, as well as practice activities. The training content was constructed in four sequential parts: a warm up activity, presentation of GOs, instruction on how to create a graphic, and the practice. The training lasted for three consecutive days of Monday-Wednesday-Friday for the Developmental English classes; and on a consecutive Thursday and Friday for the ESL class. Following is the detailed description of each part of the training.

The warm up activity lasting in ten minutes was to introduce the participants to the concept of GOs in order to show how they may utilize the tool and how this tool could be helpful to their reading comprehension. The participants read a one-page passage in three minutes and then read the same passage in a graphic representation in three more minutes. Participants could take notes at any time during their reading of the linear text as well as the graphic one. After the reading, they responded to eight questions about the content of the passage. The questions asked about general information as well as details of the reading. At the end of the warm-up, the

instructor asked the participants individually whether the content information they used to answer the questions was primarily gathered during their reading of the linear text or the graphic one.

The presentation of GOs which came afterwards took approximately twenty minutes. It was conducted in a lecture mode and the participants had handouts of the power point lesson. The lesson components included a description of GOs and their benefits for reading and writing. It also presented examples of GO models and their use for four types of reading and writing: analysis, brainstorming, comparison- contrast, and sequencing. Each mode was followed by the definition from Webster's dictionary and a demonstration of possible graphic models.

During the instruction, participants were provided with a reading and guided steps on how to develop a GO for that reading. They received a single reading passage and one box containing 16 words or phrases from the reading passage. After the trainer read through the passage and the concepts in class, the participants ranked the concepts in a hierarchical order from the most general to the most specific and created directional links connecting each pair of concepts that had been ranked above. After that, participants developed an entire hierarchical branch by increasing the numbers of directional links and expanding the relationships among them. Finally they connected all the hierarchical branches to build up an entire graphic tree. Participants were given twelve minutes to finish the task and eight minutes to check their graphic trees in class with the trainer.

The practice creating GOs included two activities: graphic fill-in tasks (seventeen minutes) and graphic creation tasks (twenty five minutes). In the first activity, participants read a given passage in five minutes before filling in the gaps of the graphic provided for that reading. There were fifteen gaps to be filled in and they had seven minutes to perform the task. The

trainer gave the class time to check their answers and correct them at the end of activity sections. There was time for the whole class to check and correct on the task at the end. For the second activity, participants read another passage and drew a GO for each box of concepts. Participants were divided into four groups and there were four boxes of concepts provided for the reading. Each group could choose any two boxes of concepts to draw GOs in twelve minutes. The only condition was that each box of concepts could only be chosen twice. The purpose of this arrangement was to make sure every box was being worked on by two groups and also to allow them to compare their GOs at the end. During the task, participants were reminded that a graphic was a distinctive representation of their understanding about the passage so the format they came up with could vary. Each correct link among concepts counted for one point. Groups were asked to put the four graphics for four boxes of concepts on the board so the whole class could check and make corrections if needed.

Procedure

The design of the research was chronologically sequenced into three separate stages: pretest (45 minutes); Training to use GOs (100 minutes); GO tasks and post test (60 minutes). Participation was voluntary but only those who completed all four steps were considered for the data. The pretest, training, and posttest took place in a classroom setting during regular class time. The students from the developmental reading courses took the pretest in one class session and received the training in next two class sessions. The posttest took place in the following class meeting after the training, and it completed the treatment process. Thus, the whole procedure took four successive 60-minutes class meetings (the first class meeting was for the pretest; the second and third were for the training; the last one was for the GO tasks, the posttest and the survey) for the developmental reading class.

The schedule for participants from the ESL class, on the other hand, was within two class meetings because this group had different class time periods. The first meeting lasted for forty-five minutes when participants did the pretest. The second one lasted for three hours when participants were trained for a hundred minutes, took a break for twenty minutes and did the GO tasks and posttest for sixty minutes.

The GO training lessons were incorporated into the regular coursework by the class instructor to benefit the students' reading. Participation was voluntary Participation was voluntary and could withdraw at any time during the experiment.

Before the pretest, participants were required to code their papers so that they would be identified individually yet their privacy be protected. The code included five items. The first two items were the first two letters of the street name where the participant lives. The next two items were the last two digits of their cell phone number. The last item was the initial of their first name. Participants were given coding instructions and a demonstration. The examiner checked to make sure all the participants put down codes on their test papers before starting the pretest. The examination was monitored so as to assure there would be no discussion during the test. Test papers were collected upon the completion of the test. All the test papers were sealed in envelopes and locked in the advisor's office for confidentiality.

Data Analysis

For this research study, the training on GOs is the independent variable because it may have impacted the reading comprehension performance on the posttest. The dependent variable is the reading comprehension performance measured by the posttest scores after the GO training. Language background, reading skills, and graphic skills are moderator variables which result

through the interaction between the treatment and reading comprehension performance (Mackay & Gass, 2005). The analysis would use two methods to answer the research questions: the Paired Sample *t* Test and One-way analysis of variance (ANOVA).

Paired Sample *t* Tests

The Paired Sample *t* Tests compare the mean scores of the pretest and the posttest to determine whether or not there exists significant difference between groups. Statistical significance was set at $p = .05$ for this study. To see change in reading comprehension for the different language groups, the pretest and posttest mean scores were compared for NSE, G 1.5 and ESLLs groups. Similarly, the pretest and posttest mean scores were compared for each of the low, mid, and high reading groups to see change in their reading comprehension after the GO training. Finally, the method was used to investigate possible correlation between the use of GOs and reading performance.

The effect size *r* was reported for the Paired Sample *t* Tests to measure the strength of associations between the pretest and posttest performance within each subgroup using Pearson correlation coefficients. The effect size *r* is always less than |1.0|. Effect size varies from -1.0 to +1.0 where 0 represents no effect and ±1.0 represents maximum effect (Leech, Barrett, & Morgan, 2008).

One-Way Analysis Of Variance (ANOVA)

A One-way ANOVA, including Post Hoc Tests, was conducted to see between group relationships. To see the difference among the language subgroups, the posttest mean scores were compared among groups of NSE, G 1.5 and the ESLLs. To seek for the posttest significant difference among the three reading subgroups, the posttest mean scores of reading-low, reading-

mid and reading-high groups were compared. Finally, for the GO subgroups' differences, the posttest mean scores of GO-low, GO-mid and GO-high groups were examined. If there were significant differences found on the posttest performance among the subgroups, the Post-Hoc Tests would be used to make a multiple comparison among the means of three variances. The effect size η (eta) was used in the One-way ANOVA to accredit the significant p values among the subgroups on the posttest performance.

The following chapter presents the results of the central and the three research questions found through the combined data analysis procedure.

CHAPTER IV

RESULTS

This research study aimed to investigate the effects of Graphic Organizers (GOs) on reading comprehension for various groups of college students at the University of Texas-Pan American. In order to compare the improvement from pretest to posttest, I used the Paired Sample *t* Tests and One-way analysis of variances (ANOVAs) including Post Hoc Tests. The Paired Sample *t* Tests compared the means of pretest and posttest for each group. One-way ANOVAs were used to compare the posttest mean scores of subgroups classified by the criteria: English language background, reading skills, and graphic skills. Once the posttest mean scores among the subgroups were significantly different, Post Hoc Tests took the analysis a step further by making multiple comparisons of the scores of each pair in the subgroups. The purpose of the Post Hoc Tests was to find out more specifically between which pair the significant difference had occurred.

The results of the descriptive analysis showed how the participants performed on the pretest and the posttest as well as the dispersion of the scores on the two tests. The mean scores of the pretest and the posttest were $M = 59.9$ ($N = 35$, $SD = 16.9$) and $M = 61.8$ ($N = 35$, $SD = 14.1$) respectively. The small difference between the two mean scores and the standard deviation indicated the whole research group performed relatively homogeneously.

Overall Effectiveness of Graphic Organizers in Reading Comprehension

Table 1 shows comparisons between the pretest and the posttest mean scores for the entire group. The purpose of this comparison is to find out whether the participants made changes in their reading comprehension performance after the GO training. However there is no statistically significant difference between the pretest and posttest performance of the participants (p>.05). This means participants did not significantly improve their reading comprehension after the treatment. There was no statistical evidence found to reject the null hypothesis that GO instruction did not affect students' reading performance. This, however, does not necessarily indicate that the instruction was ineffective, as will be seen by further classification into group differences.

Table 1 *Overall Comparison between Pretest and Posttest*

Group	*N*	*M*	*SD*	*t*	*Df*	*p*
Pretest	35	59.89	16.9	-.863	34	.394
Posttest		61.76	14.1			

Results of the English Language Background Groups

The purpose of this grouping by language background was to examine if language background was a factor that influenced reading performance after the GO training. The research participants had been divided into three groups by the survey responses as previously noted in chapter 3: native speakers of English (NSE), Generation 1.5 (G. 1.5) and English as a second language learners (ESLLs). NSEs were those who spoke English as their first language for their whole lives. G 1.5 was the ones who spoke Spanish as their mother tongue and English as their

second language. They were either among a first immigrant generation to the United States (U.S.) or born in the country of immigrant parents. Both NSE and G 1.5 had U.S. high school education. On the other hand, ESLL students were those who came to the U.S. after their high school education from countries that speak a language other than English (in this study—Spanish).

The results of Paired Sample *t* Tests showed no statistically significant differences between the pretest and the post tests mean scores for the NSE group, $t(9) = 0.741$, $p > .05$; the G 1.5 group $t(18) = 0.385$, $p > .05$; or the ESLL group, $t(5) = 0.542$, $p > .05$ (see Table 2).

Table 2 *Comparison of Pretest and Posttest Performance of NSE, G 1.5 and ESLLs*

Variable		*M*	*SD*	*T*	*df*	*p*
NSE	Pretest	58.9	21.6	-.741	9	.478
	Posttest	62.3	16.5			
G 1.5	Pretest	58.5	16.0	-.385	18	.705
	Posttest	59.7	12.5			
ESLL	Pretest	66.0	11.3	-.542	5	.611
	Posttest	67.3	15.5			

Inspection of the two means of the NSE group indicated that the average scores for the posttest ($M = 62.3$) were not significantly higher than the scores ($M = 58.9$) for the pretest. The effect size *d* was approximately .18, which was small or smaller than typical (Cohen, 1988). The pretest-posttest mean differences for the G 1.5 and the ESLL groups were not significant either.

The correlation coefficient between the pretest and posttest of the language groups was $r(10) = .73$ for NSE, $r(19) = .56$ for G 1.5 and $r(6) = .96$, for ESLLs. According to Brown (1998),

these strong correlation coefficients indicate that in the three language background groups, those who scored highly on the pretest also did well on the posttest (see table 3).

Table 3 *Results of Pearson-product Correlations between Pretest and Posttest*

Group	*n*	Correlation
NSE	10	.73
G 1.5	19	.56
ESLL	6	.96

The correlation between the pretest and posttest appear strong for the three language groups. This could indicate a stable reading performance pattern of each of these subgroups before and after the GO training. From this result, it may be inferred that including the GO tasks on the posttest, which was seen as a time consuming activity, did not change reading performance for these learners as separated by language background.

A One-way ANOVA was also used to compare the posttest mean scores of the three language background groups to find out whether one group improved over the others after the GO training. The results showed no statistically significant differences among the three language groups on the pretest, F (2, 32) = .463, p = .633; posttest, F (2, 32) = .660, p = .524 (see table 4). This result indicates the three language background groups were not different in their reading comprehension before and after the GO training.

Table 4 *Results of One-way ANOVA between-group: Language Groups*

Language groups		*df*	*F*	*P*	*η (eta)*
pretest	Between	2	.463	.633	.167
	Within	32			
	Total	34			
posttest	Between	2	.660	.524	.200
	Within	32			
	Total	34			

Results of the Reading Groups

The criterion to classify participants into different reading groups was their performance on the pretest as divided by percentile ranking: 33% upper group high, 33% mid and 33% low. The purpose of grouping the participants by their reading was to investigate the posttest performance of the originally different reading groups after training on GOs. This was to find out whether learners of different reading groups performed differently on the posttest after the GO training.

The results of Paired Sample *t* Tests showed statistically significant differences between the pretest and the posttest scores for the reading-low group, t (9) = -3.07, $p < .05$ and the reading-high group, t (11) = 2.97, $p < .05$ but not the reading-mid group t (12) = -1.00, $p > .05$, (see table 5).

Table 5 *Within-group Comparison: Paired Sample t Test*

Group		*M*	*SD*	*t*	*Df*	*p*
R-low	Pretest	38.9	7.13	-3.07	9	.013*
	Posttest	51.5	15.4			
R-mid	Pretest	58.9	4.55	-1.00	12	.337
	Posttest	61.2	8.67			
R- high	Pretest	78.5	6.02	2.97	11	.013*
	Posttest	70.8	12.3			

Inspection of mean scores of the reading-low group indicated that the average score for the posttest (M = 51.5) was significantly higher than the average score (M = 38.9) for the pretest. According to Cohen (1988), the effect size d was approximately 1.05, which was much larger than typical. Therefore this difference is not only significant but also meaningful. The pretest mean of the reading-high group was significantly higher than the posttest mean and the effect size was d = .80, which was large or larger than typical (Cohen, 1988). This meant the magnitude of the difference between the pretest and the posttest of both reading-low and reading-high groups was not only significant but also large.

The strong correlation coefficient between the pretest and posttest for the reading-low group showed these students who performed low on the pretest performed significantly differently on the posttest after the GO training. The correlation coefficient between both tests of the reading-high group revealed a reverse trend: the students who performed highly on the pretest significantly decreased their performance on the posttest after the GO training. This

implies that the use of GOs was a positive factor associated with the performance improvement of the reading-low group but not for the reading-high group.

The correlation in this Paired Sample *t* Test measured the strength of the association between the independent variable (the training on GOs) and dependent variable (the posttest reading comprehension performance). The correlation was larger or much larger than typical between the pretest and posttest for reading-high and reading-low groups respectively. Meanwhile, below medium correlation for the reading-mid group indicates ineffectual association between the GO training and the posttest reading comprehension performance (Cohen, 1988) (see table 6).

Table 6 *Results of Pearson-product Correlations between Pretest and Posttest*

Group	*n*	Correlation
R-low	10	.53
R-mid	13	.29
R-high	12	.72

A One-way ANOVA was used to further examine the posttest mean differences between the reading-low, reading-mid and reading-high groups. The results showed statistically significant differences among the three groups for the pretest, F (2, 32) = 124.9, p = .000; and for the posttest, F (2, 32) = 6.92, p = .003 (see table 7). The three reading groups performed significantly differently on the pretest from one another as well as on the posttest after the GO training. The effect size eta (η) of these three reading group differences on the pretest and the posttest was respectively η = .942 and η = .550; both are much larger than typical (Cohen, 1988).

This indicates the association between the three reading groups in their reading comprehension after the GO instruction occurred remained meaningfully strong.

Table 7 *Results of One-Way ANOVA between Reading Proficiency Groups*

Reading Proficiency Groups		*df*	*F*	*P*	*η*
Pretest	Between	2	124.9	.000	.942
	Within	32			
	Total	34			
Post	Between	2	6.92	.003	.550
	Within	32			
	Total	34			

Since there are significant differences on test performance among the groups, an LSD Post Hoc test was employed to conduct a multiple comparison among the posttest mean scores. On the pretest, there are statistically significant differences between the reading-low and the reading-high (p = .000), reading-low and reading-mid (p = .000) and reading-mid and reading-high (p = .000). On the posttest, however, the Post Hoc tests reveal statistically significant differences only between the reading-low and the reading-high groups ($p < .05$) but no significant difference between the reading-low and the reading-mid ($p > .05$) nor between the reading-mid and reading-high ($p > .05$) (see table 8). This indicated that the statistical gaps between the reading-low and the reading-mid groups as well as between the reading-mid and the reading-high were narrowed.

Table 8 *Results of Post Hoc Tests*: LSD

		Mean Difference	*SE*	*p*
Pretest				
R-low	R-mid	-20.03	2.47	.000*
	R-high	-39.7	2.51	.000*
R-mid	R-high	-19.7	2.35	.000*
Posttest				
R-low	R-mid	-9.70	5.10	.066
	R-high	-19.3	5.19	.001*
R-mid	R-high	-9.60	4.86	.057

Results of the GO Groups

For this portion of the research question, GO groups were labeled by the participants' performance on the GO tasks on the posttest. The participants were classified into three groups of GO-low, GO-mid and GO-high according to their GO tasks scores. The purpose of this grouping by participants' graphic skills was to examine the relationship of the reading performance to level of GO implementation after the GO training.

The results of Paired Sample *t* Tests show no statistically significant differences between scores on the pretest and the posttest for the GO-low, t (10) = -.505, $p > .05$, GO-mid, t (11) = -.309, $p > .05$, and GO-high group, t (11) = -.625, $p > .05$ (see table 9). This means the study did not gather enough evidence to reject the null hypothesis that said there was no relationship between the students' ability to use GOs after training and their reading comprehension performance. Inspection of the two means of the GO-low group indicates that the average score

for the posttest (M = 58.4) was not significantly higher than the average score (M = 55.9) for the pretest. The pretest-posttest mean differences of the GO-mid and GO-high groups were respectively 1 and 2.2 points on a 100-point test. Neither was significant. The effect sizes η of the GO-low, GO-mid and GO-high groups on the pretest and the posttest were respectively η = .624, η = .763, and η = .545, which were much larger than typical (Cohen, 1988). This supports the strong association between the pretest and posttest performance of each GO group.

Table 9 *Comparison of Pretest and Posttest Performance of Three GO Groups*

		n	*M*	*SD*	*t*	*Df*	*p*
GO-low	Pretest	11	55.9	20.9	-.505	10	.624
	Posttest		58.4	14.9			
GO-mid	Pretest	12	55.1	12.5	-.309	11	.763
	Posttest		56.1	10.6			
GO-high	Pretest	12	68.3	14.6	-.625	11	.545
	Posttest		70.5	13.1			

The correlation coefficient between the pretest and posttest for the GO groups was respectively r (11) =.64, p =.033 for GO-low, r (12) =.58, p = .050 for GO-mid and r (12) = .60, p = .039 for GO-high. According to Brown (1998), these correlation coefficients between the pretest and posttest of the three GO groups are strong: GO groups who scored highly on the pretest also did well on the posttest and vice versa (see table 10).

The high correlation coefficient between the pretest and posttest for the three GO groups revealed consistency in reading comprehension performance before and after GO training despite some participants being more adept at using GOs correctly after the training.

Table 10 *Results of Pearson-product Correlations between Pretest and Posttest*

Group	*n*	Correlation
GO-low	11	.64
GO-mid	12	.58
GO-high	12	.60

A One-way ANOVA was used to compare the mean differences among the three groups of GO-low, GO-mid and GO-high in their performance on the pretest and the posttest. The results showed no statistically significant differences among the three GO groups for the pretests, F (2, 32) = 2.44, p = .10 (>.05). However, there was statistically significant difference among these three groups on the posttest, F (2, 32) = 4.31, p = .02 (< .05) (see table 11). This supports the hypothesis 3.1 that there exists a correlation between the levels of students' ability to use GOs after training and their reading comprehension performance. The effect sizes η of these GO groups on the pretest and the posttest were respectively η = .363 and η = .460, which were respectively large or larger than typical and much larger than typical (Cohen, 1988). This indicates the group difference in reading comprehension was strong after the GO training.

Table 11 *Results of ANOVA between-group Comparisons: GO Groups*

		df	*F*	*P*	*η*
Pretest	Between group	2	2.44	.103	.363
	Within group	32			
	Total	34			
Posttest	Between group	2	4.31	.022	.460
	Within group	32			
	Total	34			

Since there were significant differences on the posttest performance among the three GO groups, the LSD Post Hoc test was used to make a multiple comparison among the posttest mean scores. The results showed a statistically significant difference in posttest performance between the GO-low group and the GO-high one ($p < .05$) as well as between the GO-mid and the GO-high group ($p < .05$). The significant differences suggest that the GO-high group had improved their reading performance over the other two GO groups by the posttest after the GO training. However, there was no statistically significant difference between the GO-low group and the GO-mid posttest performance ($p > .05$) (see table 12).

Table 12 *Results of Post Hoc Tests:* LSD

Posttest		*Mean Difference*	*SE*	*p*
GO-low	GO-mid	3.20	5.38	.672
	GO-high	-12.1	5.38	.031*
GO-mid	GO-high	-14.4	5.26	.010*

Survey Results

As indicated earlier, the survey included the first part to gather descriptive data, the second part (questions 1-11) to investigate participants' knowledge of GO effectiveness for reading comprehension, and the third part (questions 12-14) to collect feedback on the GO training. Results can be seen as an assessment tool towards the effectiveness of the training. The overall results are used in discussion of the research findings.

Regarding the second part (questions 1-11), table 13 shows a high percentage of participants who agreed that GOs are effective for reading comprehension (91.4%). This figure reveals participants' appreciative attitude towards this learning tool.

Interestingly, participants varied in understanding the roles of GOs in developing reading comprehension skills as shown in table 14. In general however, the figures indicate that participants had a fairly good understanding of the specific effects of GOs.

Table 14: *Effectiveness of GOs in developing micro & macro skills*

	Agree	Disagree	Missing
Overall content comprehension	88.6%	14.3%	0%
Main ideas recognition	85.7%	14.3%	0%
Navigation for main idea	74.3%	14.3%	11.4%
Hierarchicalization of ideas	82.8%	5.8%	11.4%
Information recalling	71.4%	17.2%	11.4%
Story retelling	65.7%	22.7%	11.4%
Categorization of ideas	77.1%	11.4%	11.4%
Topic generation	74.3%	14.3%	11.4%
Topic development	68.6%	20%	11.4%

However, the GO training was not as highly perceived by the participants as I had expected. It appears that a portion of participants (22.9%) did not find the training and the GO demonstration easy to understand. A larger part of the participants (37.2%) did not find creating GOs for the linear reading passages helpful for answering on multiple choice tests (see table 15). One participant stated that he/she liked reading without the visual components better.

Table 15: *Students' Feedback on the GO Training*

	Agree	Disagree	Missing
Comprehensive GO demonstrations	65.7%	22.9%	11.4%
Comprehensive training content	62.9%	22.9%	14.3%
Helpful practice for the posttest	51.5%	37.2%	11.4%

Those who appreciated this visually preliminary activity in reading comprehension have provided the following valuable insights on how drawing GOs helped them on the tests.

Table 16: *Students' Opinions on the Effects of GOs on Reading Comprehension*

Students' comments on GO training	Number of responses
It was an interesting topic	1
GOs can be considered like an assistant in making the best decision	1
They helped me remember better what the passage was about	3
It breaks down the reading to smaller ideas, easier to find the answers	2
It helped to focus when reading	1
I get the main points of the passage and explained them at a faster pace	2

In sum, in answering the central research question whether GOs affect reading comprehension, there was not sufficient statistic evidence to reject the null hypothesis that GOs do not affect students' reading comprehension. Similarly, concerning the language background, statistics did not found evidence to support the effect of GOs for different English language background groups. However, among the reading groups, paired sample *t* tests revealed statistically significant improvement of the reading-low group. One-way ANOVAs provided statistical evidence of reducing gaps between the reading-low and the reading-mid groups, as well as between the reading-mid and the reading-high group scores. However, this study also saw a decrease in performance of the reading-high group on their reading comprehension after the GO training. This finding may be a result of time management during the posttest. Regarding GO groups, the data analysis result supported that the GO-high group had significantly exceeded the other two GO groups on reading comprehension after the GO training.

CHAPTER V

DISCUSSION AND CONCLUSION

Overview of the Study

This research study was to investigate the effects of Graphic Organizers (GOs) on reading comprehension of the entire research group of thirty five undergraduate students at UTPA and whether the training in the use of GOs would affect reading comprehension differently for various clusters within that group of thirty five: those with different language backgrounds and those with varying reading levels. It also considered any possible correlations between the graphic skills of the participants and their reading comprehension performance. All research participants were given the GO training. The research instrument included the pretest, the posttest, the GO Tasks and the survey. The participants took part in these four steps of the research procedure: the pretest, the GO training, the GO tasks and posttest, and the survey. The GO tasks were designed to consider the correlation between the individuals' graphic skills and any increase in reading comprehension. Paired Sample *t* Tests and One-way ANOVA were the two methods used to analyze the data.

Findings and Discussion

Overall Effectiveness of Graphic Organizers for Reading Comprehension

The data analysis did not find statistical evidence to support the effectiveness of GOs in reading comprehension of the entire participant group. The overall insignificant result of GO training might be explained by the short term training period. Jiang and Grabe (2007) said "the instructional use of GOs for reading development purposes is a collective process which benefits from long-term, consistent exposure" (p. 35). The short term GO training possibly did not allow students sufficient exposure to relate textual discourse to GO visuals nor to train students in the use of GOs as a long-term process with a lot of practice identifying GO representations for textual discourse and creating their own GOs. Bean et al. (1986) suggested GO instruction should take at least a semester and the students need consistent exposure to and practice with GOs.

Robinson and Kiewra (1995) also found that delayed review is necessary for GOs to be effective. Given the time limit, an extended GO training was not possible. Instead, with the current research, I was aiming to investigate the immediate effect of GOs on reading comprehension and thus provide students a short and speedy GO training.

Graphic Organizers and Language Background

The data analysis did not find statistical evidience to accept the alternative hypothesis that GOs are effective for reading comprehension of learners from different language backgrounds. The non-significant differences on the reading test performance among the three language groups revealed the advancement of the English as a second language learner (ESLL) and the Generation 1.5 (G 1.5) groups as well as the homogeneity in students' linguistic

proficiency in the course setting. Unlike the ESLLs enrolled in ESL courses, the ESLLs of this study were enrolled in regular university courses and their English were proficient enough to pass university entrance requirement tests. Had the study been conducted with lower skilled ESLL students at English language institutes, there might have been some significant differences found between language background groups.

In terms of the schema theory, the finding indicated that these students may share homogeneous content schemata (Li, Wu & Wang, 2007). Also, the quality of comprehension of the language groups as revealed by the test performances have indicated the amount of linguistic schemata for these students from different language backgrounds might be essentially equivalent.

It is necessary to point out that the choice of the term "Generation 1.5" was used because of the unique characteristics of the population in the geographic area in which the research was done. This term arises from the intertwinement of the linguistic and cultural interactions between English and Spanish people in the LRGV. The identification of G1.5 demonstrated the uniqueness of this group of learners whose English language command is not as high as native speakers yet better than non-native speakers, who are traditionally categorized as ESLLs. However, students who completed high school in the U. S. might not always display better English proficiency than ESLLs. This ill-defined demarcation between G1.5 people and ESLL individuals is illustrated by the fact that a G 1.5 student can easily find other Spanish speakers and thus diminish his or her English proficiency.

Graphic Organizers and Reading

The improvement made by the reading-low group on the posttest after the GO training suggests that the treatment has positively affected this group's reading comprehension performance. This finding supports the previous study of Geva (1983). She found that GOs used with structured discourse were helpful for learners of low reading proficiency. Geva's research construct is similar to the present one in the amount of training time and research subjects (1^{st}-year college students) although her participants were all L1 and were enrolled in a community college program. Geva used node-relation flowcharts to train these less skilled readers. Her research finding was that learning to recognize text structure through flowcharting transferred to more careful reading of expository texts by less skilled learners (Geva, 1983). This finding suggests the usefulness of having students low in reading proficiency use GOs as a metacognitive strategy.

In this study, the decrease in posttest performance by the reading-high group is troubling. Perhaps this group did not find GOs an effective learning and/or test performance strategy because of their higher reading skills. It might be necessary to conduct further research on the usefulness of GOs which takes levels of natural reading proficiency into consideration.

In the between-group comparison, this study found insignificant differences between the reading-low and -mid groups as well as between the reading-mid and -high groups in the posttest. This means, the reading-low group improved to reach the lower margin of the reading-mid group, while the reading-mid group reached to the lower margin of the reading-high group. This may reflect an immediate effect of GOs on the reading-low and reading-mid groups in the posttest. Specifically, GO use has helped low and mid groups improve their reading performance

and allowed them to reduce the gaps with a higher group prior to the GO training. At the same time, the reading-high group decreased their performance on the posttest from the pretest and descended to the high margin of the reading-mid group.

Graphic Skills and Reading Comprehension

In order to inspect the relationship between students who have different graphic skills and their reading comprehension, the students were categorized into GO-low, GO-mid and GO-high groups based on their GO task performance on the posttest. Within-group comparisons revealed no significant improvement between the pretest and the posttest in the three GO groups. This result contradicts my hypothesis that those who are good at GOs would also be good in reading comprehension. The reason for this contradiction might be the time effect for the GO task and the posttest. Specifically, all of the GO groups might have spent so much time on the GO task that they did not have sufficient remaining time for the posttest.

However, for the group differences, this study found statistically significant differences of posttest scores between GO-low and -high and between GO-mid and -high groups. Specifically, students with high graphic skills (GO-high) did better than both lower groups of graphic skills (GO-low and GO-mid). These differences did not exist on the pretest comparisons. The newly emerging group difference on the posttest may suggest that the greater ability to use GOs after the training might have assisted students to improve their reading comprehension significantly.

The better performance of the GO-high group over the other two GO groups may also indicate that the GO tasks had facilitated text comprehension and retention among students who were more able to correctly use GOs after the training. In this regard, the finding is aligned with

those in the previous research by Fountas and Pinnell (2001) that indicated GOs helped students better see the organization of ideas within a text and apply this structure to their own ideas. Students will better understand relationships among complex ideas and rearrange information to facilitate retention and recall (Baxendell, 2003). This finding also supports Winn's (1990) claim that students may extract more information from a quick glance at a visual display than they can from a longer viewing of a linear display. Robinson and Skinner (1996) also said that when students searched GOs, they found information needed to answer factual and inferential questions faster than when they searched outlines or texts. This may be because GOs are mentally stored in an efficient, a spatial format which makes the internal information search easier.

Moreover, the better performance of the GO-high group over the other two GO groups could be the result of lower GO competence of the two groups. These students who were speculated not to have very high graphic skills might have found the tasks a big challenge and spent too much time on them, yet resulted in low performance on GO tasks and overall test. Students' graphic skills, defined as the ability to comprehend the text content and convert it from a linear form to a spatial one, could increase the chance to perform better in the multiple choice tests because of their close reading to create the GOs. Accordingly, the more graphic skills the students have, the more likely the opportunity to improve reading comprehension is to happen. On the other hand, students with lower graphic skills may have found the GO tasks challenging and failed to make use of the potential helpfulness of GOs in the comprehension tasks.

Conclusion

This study has found evidence that GOs are effective for some groups. Specifically, GO use has been statistically seen as effective for low skilled readers. This finding could support previous claims concerning the use of visual aids in helping these readers recognize text structures and transferring linear text to a visual format. Based on the findings, I would like to encourage teachers to use GOs as an instructional strategy, especially in reading comprehension classes. However, teachers need to consider the length of the GO instructions as well as the types of GOs for effective instructional results. They also need to select the types of discourse structures of reading texts with care and consider the amount of practice.

The second discovery of the study was that the group with higher graphic skills performed better than the lower ones in reading comprehension. This finding also supported previous studies that stated GOs assisted students in extracting information and answering factual and inferential questions faster due to their spatial representation (Robinson & Skinner, 1996). Throughout the finding, I would like to suggest that in implementing GOs into instructional use, students' graphic abilities should probably be considered. The question about how to assess students' graphic skills in the first place may be worth empirical research prior to the teaching of GOs.

However, the study did not find statistical evidence to support the overall effectiveness of GO use in reading comprehension. The reason for this may have been the short GO training time. The insufficient amount of time teaching the awareness of discourse structures and implementing the GO types representing those structures of the texts was another reason for the lack of the GO effectiveness. Moreover, due to the time limit, students may not have had a sufficient amount of

practice and consistent exposure to different types of reading texts in the GO training. This may lead to knowledge holes and the absence of delayed review necessary for GO use to be effective.

The study also showed insignificant effectiveness of the GO use in reading comprehension for students of different language backgrounds. In other words, the wide divergence of language proficiency among the multilingual study group did not seem to have any influence on reading comprehension. This suggests GOs could be used without concern for the diversity of languages used in the community. It might be necessary to pursue further studies of GO effectiveness in reading comprehension that take diverse linguistic proficiencies into account.

Limitations and Future Research

The research has been conducted with a limited amount of time. This disadvantage impeded the opportunity to carry out a long term GO training composing of teaching textual structure discourses and implementing GOs representing text structures. The small research sample size was a second factor which limited the strength of the arguments for GO effectiveness for the subgroups. In particular, the small sample size of ESLLs did not allow for an examination of GO usefulness on ESL reading. However, the major limitation of the study was the desegregation of GO tasks from the posttest multiple choice tasks. This desegregation made it impossible to track the time spent on GO and posttest multiple choices tasks by the participants. There remain unanswered questions about the effects of GO use in the overall population and among the graphic groups and language groups for reading comprehension.

Given the aforementioned limitations of the research study, I would propose that future studies of this topic might need to take into greater consideration the amount of training, the

posttest design and a separate time scale for the GO tasks. The amount of training might need to be greatly increased. It would be worth experimenting with the suggestions of Bean et al. (1986) to design the GO instruction lasting for a semester. This ensures sufficient exposure of textual discourses and the GOs demonstrating those discourses to the students. It is also necessary to have a plan to promote students' involvement in the tests and training period.

In sum, in this investigation of mine, the potential of GOs for improving reading comprehension was explored. Unfortunately statistical significance was not seen for many of the parameters, but students of lower reading ability did improve after GO training a statistically significant amount. The contribution of the study is the description of a means of evaluating students' ability to use GOs in reading, the GO tasks, and the examination on the relationships between levels of students' ability to use GOs and reading comprehension performance. The investigation suggests additional areas for research on in the future which takes diverse linguistic proficiencies into account. Studies on the effectiveness of GOs to higher skilled readers are also suggested.

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APPENDIX A

IRB APPROVAL

INSTITUTIONAL REVIEW BOARD FOR HUMAN SUBJECTS IN RESEARCH

THE UNIVERSITY OF TEXAS - PAN AMERICAN

UTPA

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NOTICE OF APPROVAL
Institutional Review Board for Human Subjects (IRB)
FWA#00000805

TO: **Trang Phan**
REIN 1.106

FROM: **Institutional Review Board for Human Subjects in Research**

DATE: March 8, 2010

RE: **IRB#2010-009-02 "The Effects of Graphic Organizers in Reading Comprehension of ESL Students in Comparison with the Students Who Speak English as their First Language"**

The IRB protocol referenced above has been reviewed and APPROVED.

Basis for approval: Exempt review #1

Approval expiration date: NA

Recruitment and Informed Consent: You must follow the recruitment and consent procedures that were approved. If your study uses an informed consent form or study information handout, you will receive an IRB-approval stamped PDF of the document(s) for distribution to subjects.

Modifications to the approved protocol: Modifications to the approved protocol (including recruitment methods, study procedures, survey/interview questions, personnel, consent form, or subject population), must be submitted in writing to the IRB at irb@utpa.edu for review. **Changes must not be implemented until approved by the IRB.**

Approval expiration and renewal: Your study approval expires on the date noted above. You will receive a continuing review (renewal) form from the IRB approximately 2-4 weeks before approval expiration, which should be completed and returned immediately. If you will be interacting with subjects or working with individually identifiable private information, you need to have active IRB approval. Failure to return the form will result in your study file being closed on the approval expiration date.

Data retention: All research data and signed informed consent documents should be retained for a *minimum* of 3 years after *completion* of the study.

Approved by: [signature] for Date: 3.9.10

Dr. Stephanie Brickman
Chair, Institutional Review Board

cc: **Dr. Wendy A. Lawrence-Fowler, V.P. for Research**

Dr. Minhee Eom (CAS 211)

APPENDIX B

PRETEST

PRETEST

Code: _____

Passage 1

The U.S. manned space flight program of the 1960s and 1970s consisted of three distinct phases: Mercury, Gemini, and Apollo. Each of these distinct phases of the space flight program served a very different purpose.

Mercury was the first phase of the manned space flight program. Its purpose was to get a person into orbital flight. The tiny Mercury capsule carried only a single astronaut. Alan Shepard and Virgil Grissom piloted the first two Mercury flights, which were suborbital flights, in 1961. John Glenn, in the next Mercury flight, orbited the Earth in 1962. Three more Mercury flights followed.

The next phase of the manned space flight program was Gemini. The purpose of the ten crewed Gemini flights in 1965 and 1966 was to conduct training tests necessary for longer space flights. Gemini, for example, carried out training in orbital clocking techniques and tests of the effects of long-term weightlessness on astronauts. Unlike Mercury capsules, which held only one astronaut, the Gemini capsules were designed to carry two astronauts. The name Gemini was taken from the name of the constellation, which means "twins".

The Apollo flights followed the Gemini flights with the goal of landing astronauts on the Moon. The Apollo spacecraft consisted of three modules. The command module carried three astronauts to and from the Moon, the service module housed the propulsion and environmental systems, and the lunar module separated from the command module to land two astronauts on the Moon. There were seventeen total Apollo flights, of which the first six carried no crew. The seventh through tenth Apollo flights (1968-1969) circumnavigated the Moon without landing and then returned to Earth. The next seven Apollo flights (1969-1972) were intended to land on the Moon. All of them did, except Apollo 13, which developed serious problems and had to abort the intended landing but still managed to return safely to Earth.

Direction: Determine the best answer choice for each of the following sentence according to the reading passage.

1. The subject of this passage is

A. lunar landings
B. the Gemini flights

C. phases of the U.S. space flight program
D. space exploration through the decades

2. According to the passage, the Mercury flights

A. were all suborbital flights
B. did not include any orbital flights
C. were all orbital flights
D. included suborbital and orbital flights

3. It is implied in the passage that there were how many total Mercury flights?

A. Three
B. four
C. Five
D. Six

4. The word “crewed” in line 8 is closest in meaning to

A. endangered
B. manned
C. organized
D. tested

5. The purpose of the Gemini flights was

A. to prepare for longer space flights
B. to attempt suborbital flights
C. to circumnavigate the Moon
D. to land on the Moon

6. It is NOT stated in the passage

A. how many astronauts a Mercury flight carried
B. how many astronauts a Gemini flight carried
C. how the Mercury flights were named
D. how the Gemini flights were named

7. It can be referred from the passage that how many of the Apollo flights carried astronauts?

A. 6
B. 11
C. 16
D. 17

8. The word “circumnavigated” in line 19 is closest in meaning to

A. traveled around
B. returned from
C. studied about
D. headed toward

9. It can be determined from the passage that how many Apollo flights landed on the moon?

A. 1
B. 6
C. 11
D. 17

10. It can be determined from the passage that the manned space flight program discussed in the passage lasted for

A. two years
B. just over 6 years
C. almost 12 years
D. three decades

Passage 2

Quite different from storm surges are the giant sea waves called *tsunamis,* which derive their name from the Japanese expression for "high water in a harbor." These waves are also referred to by the general public as tidal waves, although they have relatively little to do with tides. Scientists often refer to them as seismic sea waves, far more appropriate in that they do result from undersea seismic activity.

Tsunamis are caused when the sea bottom suddenly moves, during an underwater earthquake or volcano for example, and the water above the moving earth is suddenly displaced. This sudden shift of water sets off a series of waves. These waves can travel great distances at speeds close to 700 kilometers per hour. In the open ocean, tsunamis have little noticeable amplitude, often no more than one or two meters. It is when they hit the shallow waters near the coast that they increase in height, possibly up to 40 meters.

Tsunamis often occur in the Pacific because the Pacific is an area of heavy seismic activity. Two areas of the Pacific well accustomed to the threat of tsunamis are Japan and Hawaii. Because the seismic activity that causes tsunamis in Japan often occurs on the ocean bottom quite close to the islands, the tsunamis that hit Japan often come with little warning and can therefore prove disastrous. Most of the tsunamis that hit the Hawaiian Islands, however, originate thousands of miles away near the coast of Alaska, so these tsunamis have a much greater distance to travel and the inhabitants of Hawaii generally have time for warning of their imminent arrival.

Tsunamis are certainly not limited to Japan and Hawaii. In 1755, Europe experienced a calamitous tsunami, when movement along the fault lines near the Azores caused a massive tsunami to sweep onto the Portuguese coast and flood the heavily populated area around Lisbon. The greatest tsunami on record occurred on the other side of the world in 1883 when the Krakatoa volcano underwent a massive explosion, sending waves more than 30 meters high onto nearby Indonesian islands; the tsunami from this volcano actually travelled around the world and was witnessed as far away as the English Channel.

Direction: Determine the best answer choice for each of the following sentence according to the reading passage.

11. The paragraph preceding this passage most probably discusses

A. tidal waves
B. tides
C. storm surges
D. underwater earthquakes

12. According to the passage, all of the following are true about tidal waves EXCEPT that

A. they are the same as tsunamis
B. they are caused by sudden changes in high and low tides
C. this terminology is not used by the scientific community
D. they refer to the same phenomenon as seismic sea waves

13. The word “displaced” in line 7 is closest in meaning to

A. located
B. not pleased
C. filtered
D. moved

14. It can be inferred from the passage that tsunamis

A. cause severe damage in the middle of the ocean
B. generally reach heights greater than 40 meters
C. are far more dangerous on the coast than in the open ocean
D. are often identified by ships on the ocean

15. A main difference between tsunamis in Japan and in Hawaii is that tsunamis is Japan are more likely to

A. arrive without warning
B. come from greater distances
C. be less of a problem
D. originate in Alaska

16. The possessive “their” in line 18 refers to

A. the Hawaiian Islands
B. thousands of miles
C. these tsunamis
D. the inhabitants of Hawaii

17. A “calamitous” tsunami, in line 20, is one that is

A. expected
B. extremely calm
C. a fault
D. disastrous

18. From the expression “on record” in line 22, it can be referred that the tsunami that accompanied the Krakatoa volcano

A. occurred before efficient records were kept
B. was not as strong as the tsunami in Lisbon
C. was filmed as it was happening
D. might not be the greatest tsunami ever

19. The passage suggests that the tsunamis resulting from the Krakatoa volcano

A. caused volcanic explosions in the English Channel
B. was far more destructive close to the source than far away
C. was unobserved outside of the Indonesian islands
D. resulted in little damage

Passage 3

West Side Story is a musical tragedy based on William Shakespeare's timeless love story, Romeo and Juliet. It is set in the early 1950s, when gang warfare in big cities led to injuries and even death. West Side Story transformed the Montagues and Capulets of Shakespeare's play into rival street gangs, the Jets and the Sharks. The Sharks were newly arrived Puerto Ricans, the Jets nativeborn New Yorkers. The plot tells the story of Maria, a Puerto Rican whose brother Bernando is the leader of the Sharks, and of Tony, a member of the Jets. As the opposing gangs battle in the streets of New York, these two fall in love. While attempting to stop a street fight, Tony inadvertently kills maria's brother Bernando and is ultimately killed himself.

West Side Story featured the talents of a trio of theatrical legends. Leonard Bernstein, who composed the brilliant score, was a classical composer and the conductor of the New York Philharmonic. Stephen Sondheim, making his Broadway debut, revealed a remarkable talent for writing lyrics. Among the hit songs of the play are "Tonight," "Maria," "America," "Gee Officer Krupke," and "I Feel Pretty." Jerome Robbins' electrifying choreography broke new ground for musical theatre in the 1950s. Before West Side Story, no one thought that dance could be as integral to a narrative as the music and the lyrics. But the dances in West Side Story are among the most thrilling elements of the play.

The play opened on September 26, 1957. It ran for 734 performances, toured for 10 months, and then returned to New York for an additional 246 performances. The classic motion picture starting Natalie Wood was released in 1961. It garnered ten Academy Awards, including ones for Best Picture and Best Director. The play was also successfully revived in New York in 1980 and then again in 1995, almost forty years after its premier performance.

Direction: Determine the best answer choice for each of the following sentence according to the reading passage.

20. The author's attitude toward the play is generally

A. favorable
B. critical
C. emotional
D. regretful

21. According to the passage, when does the action of the play West Side Story take place?

A. In Shakespeare's time
B. In the early 1950s
C. In 1957
D. In 1980

22. It can be referred from the passage that the Capulets and Montagues

A. were families in Shakespeare's play.
B. were 1950s street gangs.
C. fought against the Jets and Sharks.

D. were groups of actors, dancers, and singers.

23. According to the article, the words to the songs of West Side Story were written by

A. Jerome Robbins
B. Leonard Bernstein
C. William Shakespeare.
D. Stephen Sondheim.

24. The word score in paragraph 2 could be best replaced by which of the following?

A. Talent
B. Music
C. Performance
D. Dialogue

25. What can be inferred from the passage about musical plays produced before West Side Story?

A. They involved fewer songs.
B. Dance was not such an important feature in them.
C. They depended on dance and song more than on plot.
D. Legendary talents did not help create them.

26. During its initial appearance in New York, how many times was west Side Story performed?

A. 10
B. 26
C. 246
D. 734

APPENDIX C

GRAPHIC ORGANIZER TRAINING

GRAPHIC ORGANIZER TRAINING

I. Warm up **10 minutes**

Handout 1: Written and GO representation of the reading text "the US Census"

- Participants read the "US Census" in 3 minutes; take note
- Show GO representation of "US Census" in 3 minutes; take note

Questions to be asked

1. What's the reading about? What about the census?

   The US Census: its purpose, its usefulness, time &frequency, operationalization, confidentiality policy

2. What're the purposes of the US census?

   To allocate seats in the American Congress

   To distribute Government money

3. What are the benefits of a census?

   Education Health care for old people Public projects

   Community developing funds Business openings

4. How often does a US census take place?

   April 1st on the year ending with 0.

5. When was the first US census?

   1790

6. When was the latest one?

   2000

7. How long is information about individuals kept?

   72 years

8. What happens to him/her if a person violates the confidentiality rules?

   $5,000.00 + 5 years sentence

II. GO presentation **20 minutes**

1. Introduction – PowerPoint presentation – 7 minutes

   Handout 2: Introduction to GOs

2. Examples and Use of GO – 13 minutes.

   Handout 3 – Examples and use of GOs

III. Instruction - Steps-by-steps on how to develop a GO **20 minutes**

   Handout 4 – "Cell"

- Introduce each concept individually. There should be about 16 concepts

- Ask students to rank the concepts from the most general/important to the least general/specific

- Guide students in creating their own concept maps by:

+ Connect each pair of concepts that are already ranked by using directional links

+ Develop an entirely hierarchical branch by increasing the number of concepts and expanding the relationships among them.

+ Build up a whole graphic by finishing up each and every complete hierarchical branch.

- Working time: 12 minutes

- Open checking of students' GOs on board: 8 minutes

IV. Practice **45 minutes**

<u>Activity 1</u>: ***Fill-in spots GO*: *individual work –*** ***17 minutes***

Handout 5 - "Muir"- written text & GO with blanks

- Linear text: Students are given 5 minutes to read the passage.
- Fill-in spots GO- Students fill in 15 spots with concepts taken from the reading text.
- Working time: 7 minutes
- Open checking of students' GOs on board: 5 minutes

<u>Activity 2</u>: ***Create your own GOs: group work -*** ***25 minutes***

Handout 6 - "Pollution"- written text and 4 boxes of concepts

- Students work in groups of 4
- Each group has 5 minutes to read the text.
- After reading, students will be given a sheet containing 4 boxes of concepts (each box builds a set of a complete hierarchical branch) found in the text.
- Students will draw a GO for each box of concepts
- GO creation: 12 minutes
- Open checking of students' GOs on board: 8 minutes

Handout 7 – 4 GOs for 4 boxes

Handout 1

THE U.S. CENSUS

Every ten years, in years ending with a zero, the U.S. Bureau counts all the people in the United States. The creation of a census is a process required by the U.S Constitution. The results of the census are used to distribute government money and to allocate seats in Congress. The seats in the House of Representatives are allocated according to population. The population of your state determines how many seats your state has.

The first census of the United Stated was taken in 1790. At that time, there were an estimated 3,929,214 people in the United States. This estimate is low because the census records for five states were missing. In addition, slaves and Indians were not counted. At that time, the census was intended to show how many men were available for military service. By the time of the tenth census in 1890, the population was estimated to be 50,189,209. In 1920, at the time of the fourteenth census, the population first topped 100 million. The 1920 population was estimated to be 106,021,537. 1950 was the first time a computer was used for the census. The new room-sized computer was named ENIAC was used for parts for the count. In fact, the Census Bureau acquired its own computer, named UNIVAC, during that era. By the year 2000, there were 281,421,906 people in the United States. That information was gathered using high-speed supercomputers, quite a difference from the 200 men who traveled throughout the country on horseback gathering information for the first census!

The census is important because the results are used to decide how federal money will be distributed throughout the country. Money for education, health care for older people, and funds for community development and housing is sent to the states according to the number of people in each state. Local and state governments use the results of the census to help them decide where to build schools, libraries, bridges, highways, and other public projects. Businesses use the numbers to help them determine where to open new business.

It is completely safe to give information to the U.S. Census Bureau. The law does not allow the Census Bureau to give out information about individuals. There is a 72-year waiting period. The waiting period is enforced so that people will feel free to tell the truth on the census questionnaires. The last census for which information is available is the 1930 census. Census workers may not give out personal information about people. If they break this law, they can go to prison for five years and pay $5,000 in fines.

The official census is taken on April 1 of each census year. During March of the census year, the U.S. government count people who do not live in a specific address. It counts students

in dormitories, people in nursing homes, prisons and other places where transient people stay. It sends out questionnaires to most residents. The census enumerators - people who count people - go from door to door to count on people who do not respond to the questionnaires. Census workers must count migrant workers, seasonal farm workers, and people who live outdoors or in vehicles. They must also count people who live on ships, military bases, or in remote areas. The Census Bureau sets up held centers and toll-free phone numbers to help people fill out the census forms. The Census Bureau really wants to get accurate information about the people living in the U.S. The Bureau spends years preparing each census. It now costs billions of dollars to conduct a U.S.Census. The total cost of the 2010 census will be about 14 million dollars!

Figure 1. *Graphic representation of "The US Census"*

Handout 2

INTRODUCTION TO GRAPHIC ORGANIZERS

Definition

- Graphic Organizers (GOs) are visual representations of texts or groups of related ideas, words or thoughts.
- A GO is a diagram of nodes, each containing concept labels, which are linked together with directional lines. The concept nodes are arranged in hierarchical levels that move from general to specific concepts.

What includes in a GO?

- Nodes
- Concept labels in boxes or ovals
- Series of label linking lines
- Pictures/symbols/non-linguistic representation forms

Effects of Graphic Organizers

- Participate actively and process ideas by constructing/creating one own GOs (Naughton, 1993-94).
- Systematize your knowledge and develop your visual learning ability
- Brainstorm ideas in a reading
- Develop ideas before writing

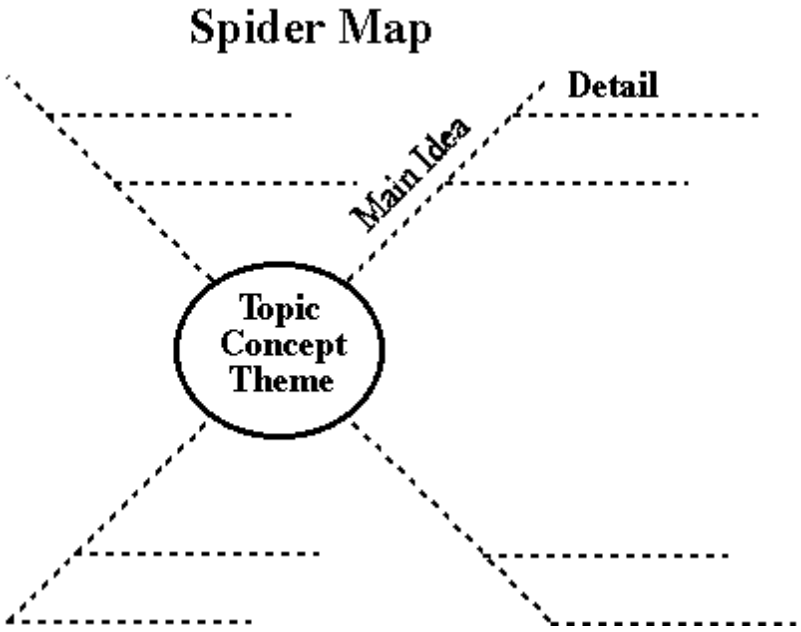
Handout 3

EXAMPLES OF GRAPHIC ORGANIZERS AND THEIR USE

(adapted from Write Design – Graphic Organizers)

a. Analysis

- To separate (a material or abstract entity) into constituent parts or elements; determine the elements or essential features of (opposed to synthesize): to analyze an argument.
- To examine critically, so as to bring out the essential elements or give the essence of: to analyze a poem.
- To examine carefully and in detail so as to identify causes, key factors, possible results, etc. (Webster's. p 74).



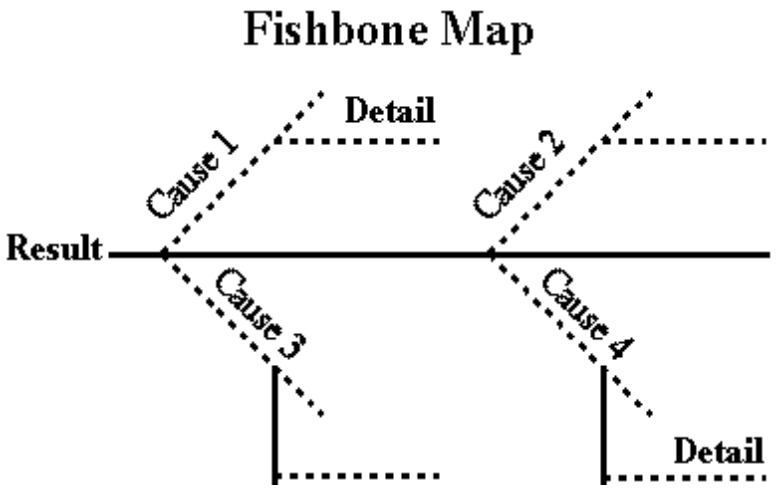
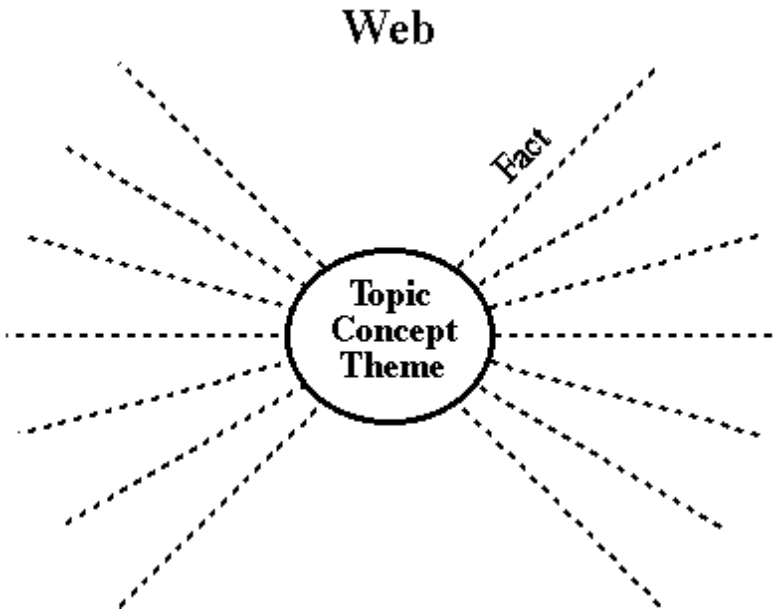


Figure 2. *Graphic Representation for Analysing.*

b. Brainstorm

- A sudden impulse, idea, etc.: brainstorming - a conference technique of solving specific problems, amassing information, stimulating creative thinking, developing new ideas, etc., by unrestrained and spontaneous participation in discussion (Webster's. p 253).



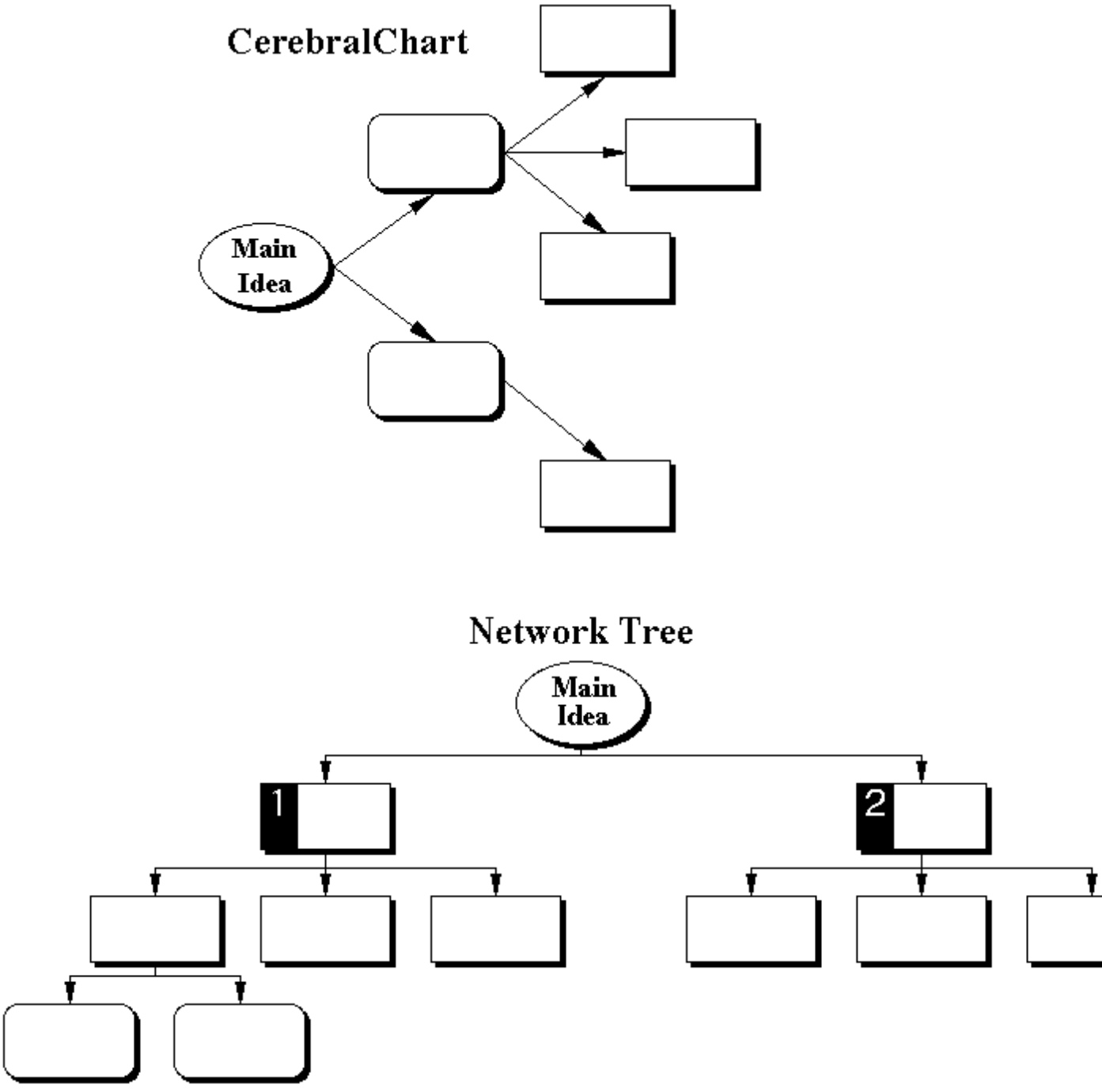


Figure 3. *Graphic Representation for Brainstorming.*

c. Compare

- To examine (two or more objects, ideas, people, etc.) in order to note similarities and differences; to compare two pieces of literary work (Webster's. p 416)

Contrast

- To compare in order to show unlikeness or differences; note the opposite natures, purposes, etc., of: Contrast the political rights of Romans and Greeks (Webster's. p 442).

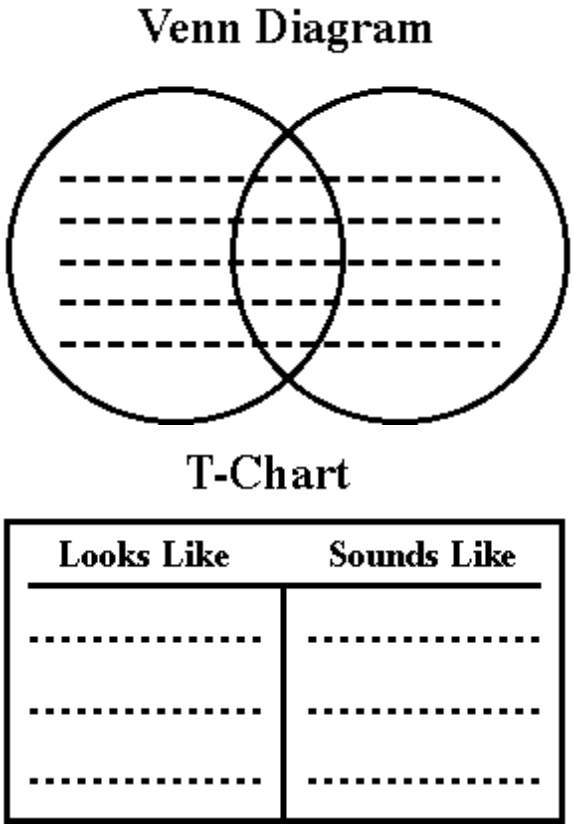


Figure 4. *Graphic Representation of Comparison-Contrast.*

d. Sequence

- The following of one thing after another; succession.

Order of succession: a list of books in alphabetical sequence.

A continuous or connected series: a sonnet sequence.

Something that follows; a subsequent event; result; consequence (Webster's. 1747).

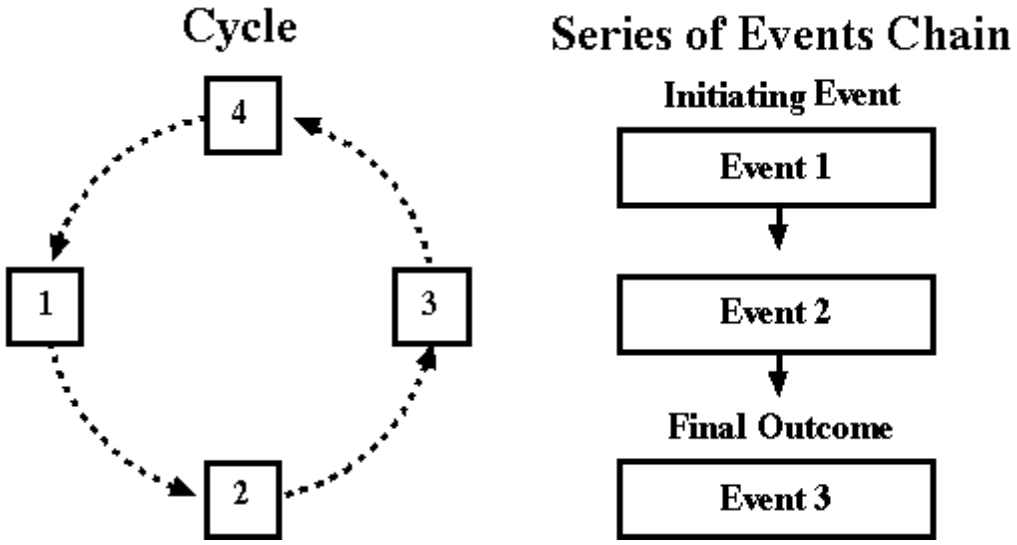


Figure 5. *Graphic Representation for Sequence.*

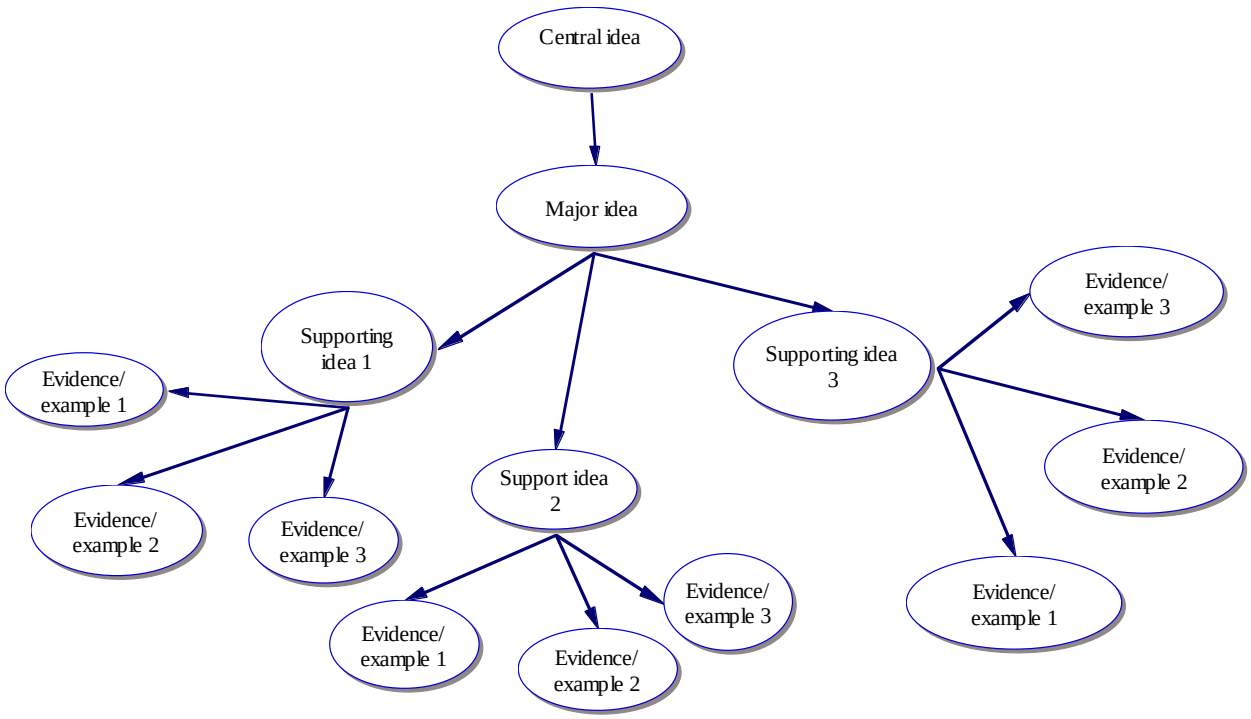


Figure 6. *A Generalized Representation of Graphic Organizers*

Handout 4

INSTRUCTION - STEPS-BY-STEPS ON HOW TO DEVELOP A GO

Concepts from the reading

- Tissues
- Shape
- Size
- Function

I. Neurons

II. Red blood cells

III. White blood cells

IV. Bone cells

V. Skin cells

VI. Liver cells

VII. Fat cells

Store energy

VIII. Muscle cells

Heart muscles

Smooth muscles

CELLS

Your body is made of trillions of tiny living things. They are called cells. There are 210 different kinds of cells in your body. Each kind of cells has a different shape. Each kind of cells is a different size. Each kind of cells has a different job. The same types of cells usually work together in groups. The groups are called tissues. More cells can be made when cells split. They form more cells that are just like the parents.

Some of your cells are nerve cells. They are also called neurons. They carry signals through your body. The signals are messages that tell your body to move. Your brain has about 100 billion neurons! The connections between neurons are called synapses. Each neuron has between 1,000 and 10,000 synapses. There are about one quadrillion synapses in your brain. That's 1,000,000,000,000,000 synapses in your brain! There are about one billion neurons in your spinal cord, the bundle of nerves that goes from your brain all the way down your back.

Some of your cells are red blood cells. They carry oxygen (O) through your body. They pick up carbon dioxide (CO2) and help your body get rid of it. Your body wants to eliminate CO2 because it is a waste product. Blood also helps your body stay warm. Conversely, blood cools off your brain, because it gets very hot.

Some of your cells are white blood cells. The white blood cells help your body fight sickness. Some of the white blood cells, called T-cells, fight viruses and other cells that do not belong in your body. T-cells work with B-cells to fight off the disease cells. They tell your brain to give you a fever so the disease cells will not be able to grow. Many diseases cannot grow when your body is hot. And some white cells eat disease cells! Go white blood cells!

Some of your cells are bone cells. They are also called osteocytes. Osteocytes make bone. The bone grows to form all around them. The osteocytes get food through tiny strings that go to nearby blood vessels. Blood vessels are the tubes that carry blood in your body.

Some of your cells are skin cells. They care also called epithelial cells. They grow your skin. Your skin keeps dirt off your tissues. Your skin forms the outside of some organs, like your stomach and lungs. An adult has about 9 pounds of skin on his or her body.

Some of your cells are liver cells. They are also called hepatocytes. These cells check your blood. They make sure your blood has the right amount of sugars in it. They also help clean poisons from your body. They help make substances that help your blood to clot, or stick together. They clean alcohol from your body if you drink alcohol or take medicine with alcohol in it.

Some of your cells are fat cells. Their job is to store fat. The fat is a place where your body keeps or stores energy. The fat pads the organs in your body. The layers of fat also help to keep your

body warm. Your body weight depends on how fast your body stores fat compared to how fast your body uses up energy.

Some of your cells are muscle cells. Your muscles are made of these cells. They are also called myocytes. Your neurons send the messages to move muscles that are connected to your bones and your skeletal muscles. However, your nerve cells do not tell your heart muscles when to beat. Your heart muscles and smooth muscles have inner signals that tell them to move. Smooth muscles are muscles that you do not have to think about, like the muscles that work in the digestion of food.

Your cells are busy all the time. Even while you are sleeping, your cells are working hard to keep your body alive and healthy.

Handout 5

MUIR

In 1892 the Sierra Club was formed. In 1908 an area of coastal redwood trees north of San Francisco was established as Muir Woods National Monument. In the Sierra Nevada Mountains, a walking trail from Yosemite Valley to Mount Whitney was dedicated in 1938. It is called John Muir Trail.

John Muir was born in 1838 in Scotland. His family name means “moor,” which is a meadow full of flowers and animals. John loved nature from the time he was small. He also liked to climb rocky cliffs and walls.

When John was eleven, his family moved to the United States and settled in Wisconsin. John was good with tools and soon became an inventor. He first invented a model of a sawmill. Later he invented an alarm clock that would cause the sleeping person to be tipped out of bed when the timer sounded.

Muir left home at an early age. He took a thousand-mile walk south to the Gulf of Mexico in 1867and 1868. Then he sailed for San Francisco. The city was too noisy and crowded for Muir, so he headed inland for the Sierra Nevadas.

When Muir discovered the Yosemite Valley in the Sierra Nevadas, it was as if he had come home. He loved the mountains, the wildlife, and the trees. He climbed the mountains and even climbed trees during thunderstorms in order to get closer to the wind. He put forth the theory in the late 1860's that the Yosemite Valley had been formed through the action of glaciers. People ridiculed him. Not until 1930 was Muir's theory proven correct.

Muir began to write articles about the Yosemite Valley to tell readers about its beauty. His writing also warned people that Yosemite was in danger from timber mining and sheep ranching interests. In 1901 Theodore Roosevelt became president of the United States. He was interested in conservation. Muir took the president through Yosemite, and Roosevelt helped get legislation passed to create Yosemite National Park in 1906.
Although Muir won many conservation battles, he lost a major one. He fought to save the Hetch Valley, which people wanted to dam in order to provide water for San Francisco. In the late 1913 a bill was signed to dam the valley. Muir died in 1914. Some people say losing the fight to protect the valley killed Muir.

Figure7: *Graphic Representation of "Muir"*

Handout 6

CREATE YOUR OWN GRAPHIC ORGANIZERS

Read the text and create a Graphic Organizer for each of the following box of concepts from the reading:

1.

Pollution water obvious Air Soil Less obvious radioactive noise greenhouse gas artificial lights

2.

Radioactive Birth defects Genetic problems drinking Medical sources Less obvious Eating touching Radioactive material lab nuclear power plants

3.

Less obvious human animals communication reproductive High blood pressure hearing problems navigation sleep disturbances noise

4

Artificial lights Animals O3 Increasing global temperature high blood pressure Greenhouse gas immunity humans navigation water vapor CO2 CH4 Reproduction less obvious

POLLUTION

Thick black smoke curling out of smokestacks, horrible-tasting chemicals in your drinking water, pesticides in your food-these are examples of pollution. Pollution is any contamination of the environment which causes harm to the environment or the inhabitants of the environment. There are many kinds of pollution, and there are many pollutants. Some of obvious kinds of pollution are pollution of the air, soil, and water. Some less obvious, or less **salient**, kinds of pollution are radioactive, noise, light pollution, and green-house gases.

Air pollution can be caused by particles, liquids, or gases that make the air harmful to breathe. There are two main types of air pollution: primary and secondary. Primary pollutants enter the air directly, like smoke from factories and car **exhaust**. Secondary pollutants are chemicals that mix together to pollute the air, like mixture of emissions, or waste output, from vehicles and factory smoke that change to form more dangerous pollutants in the air and sunlight.

Soil pollution can be caused by pesticides leakage from chemical tanks, oil spills, and other chemicals which get into the soil by dumping or accidental contamination. Soil pollution can also cause water pollution when underground water becomes contaminated by coming into contact with the polluted soil.

Water pollution can be caused by waste products, sewage, oil spills, and litter in streams, rivers, lakes, and oceans. Some scientists believe that water pollution is the largest cause of death and disease in the world, causing about 14,000 deaths in the world each day.

Radioactive pollution can be caused by leaks or spills of radioactive materials. These materials can come from medical sources, nuclear power plants, or laboratories which handle radioactive materials. Air, soil, and water can be polluted by radioactivity. It can cause damage to animals, both internally and externally, by eating, drinking, or touching it. It can cause birth defect and genetic problems. It can cause certain cancers and other deadly diseases.

Noise pollution can be caused by vehicle, aircraft, and industrial noise. It can also be caused by military or experimental sonar. Noise has health effects on people and animals. In people, it can cause high blood pressure, heart problems, sleep disturbances, and hearing problems. In animals, it can cause communication, reproductive and navigation problems-they have difficulty finding their direction. Sonar has even caused whales to beach themselves because they respond to the sonar as if it were another whale.

Light pollution can be caused by advertising signs, stadium and city lighting, and other artificial lighting (like the light caused by night traffic. Artificial lighting has health effects on humans and animals. In people, it can cause high blood pressure and affect sleeping and waking

rhythms and immunity. It might be a factor in some cancers such as breast cancer. In animals, it can affect sleeping waking rhythms, navigation, and reproduction.

In addition, greenhouse gases have caused a warning effect on the earth climate. The greenhouse gases are water vapor, carbon dioxide, methane and ozone. They are naturally-occurring gases in the atmosphere, but human activity has increased their concentration in the atmosphere. For example, the level of carbon dioxide (CO2) in the atmosphere have recent due to the burning of fossil fuels. The effect is a rise in global temperature. The higher temperature causes, the melting of glaciers a rise in the water level of ocean, and the disruption of both land and marine life, including that of humans. Although carbon dioxide is necessary for plants to survive, it is also considered to be a kind of pollution because high levels of carbon dioxide have caused the oceans to become more acidic.

It is not possible for anyone to predict the exact timing and effects of global pollution and global climate change brought about by pollution. There is general agreement by scientists that the global climate will continue to change, that the intensity of whether effects will continue to increase and that some species of animals will become extinct. There is also general agreement, or consensus, that humans need to take steps to reduce emission of waste products and greenhouse gases into the atmosphere, make adaptation to the changes that are occurring, and figure out ways of reversing the trends of pollution and global warming.

Handout 7

FOUR GRAPHIC ORGANIZERS FOR FOUR BOXES OF CONCEPTS

1.

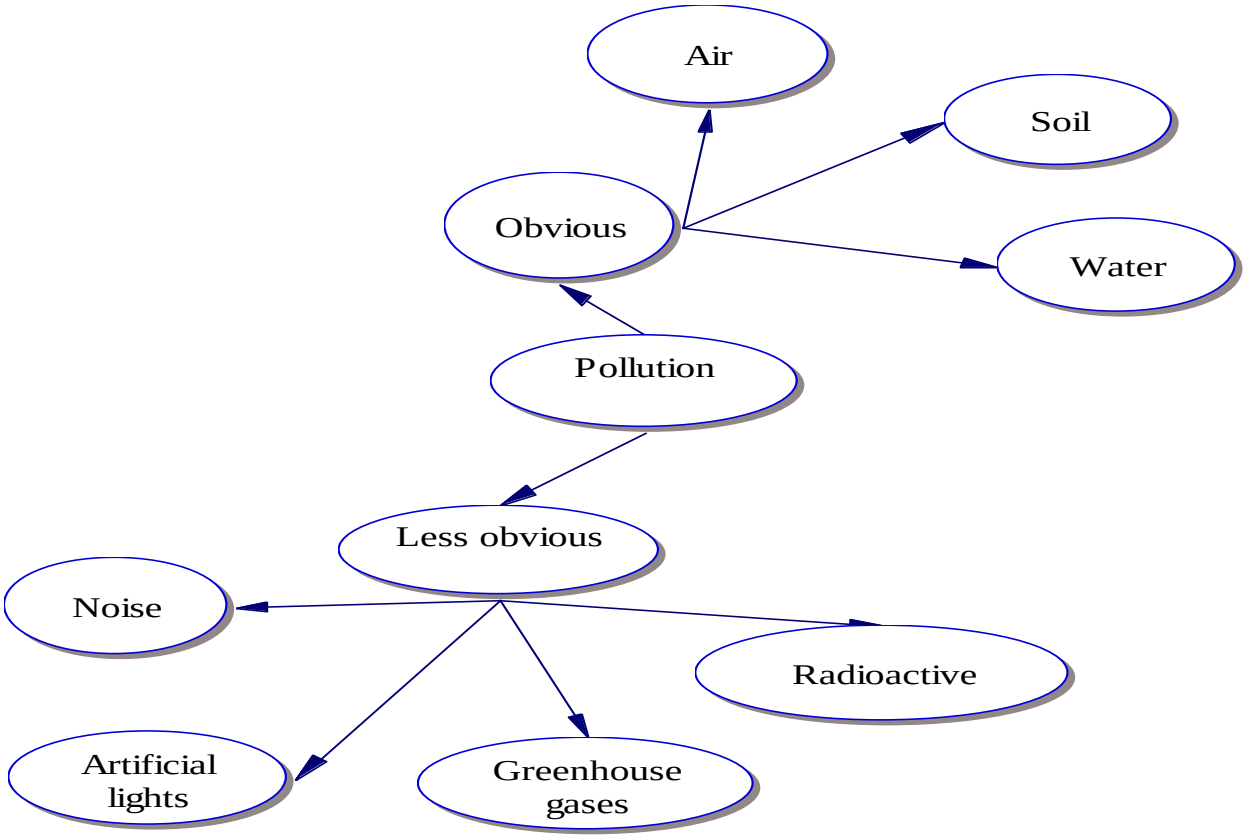


Figure 8: *Graphic representation of Pollution (1)*

Pollution

I. Obvious
   A. Water
   B. Soil
   C. Air

II. Less obvious
   A. Radioactive
   B. Greenhouse gases
   C. Artificial lights
   D. Noise

2.

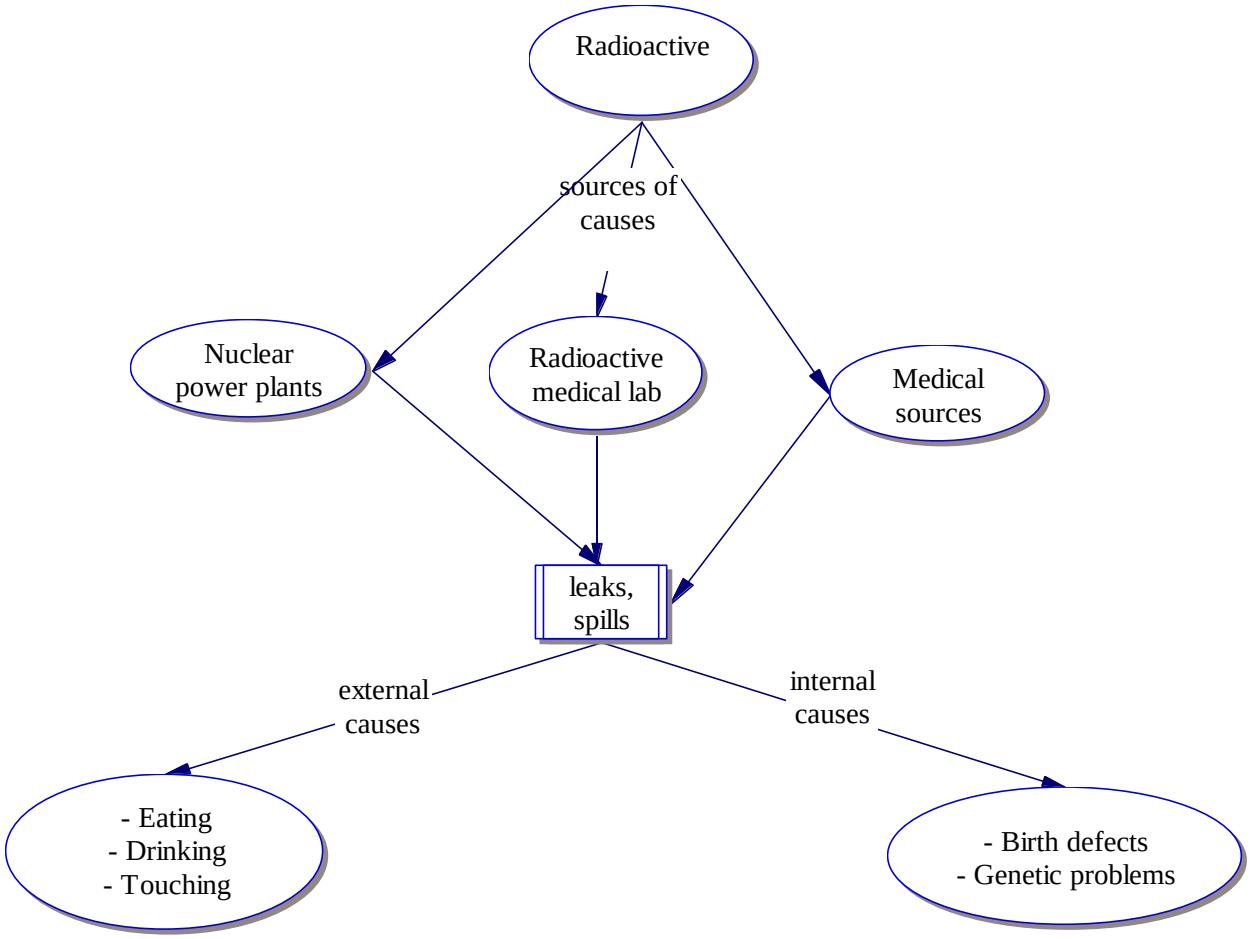


Figure 9: *Graphic representation of Pollution (2)*

Radioactive

I. Medical sources

Leaks, spills

1. - Birth defects
   - Genetic problems
2. - Eating
   - Drinking
   - Touching

II. Radioactive medical lab

III. Nuclear power plants

3.

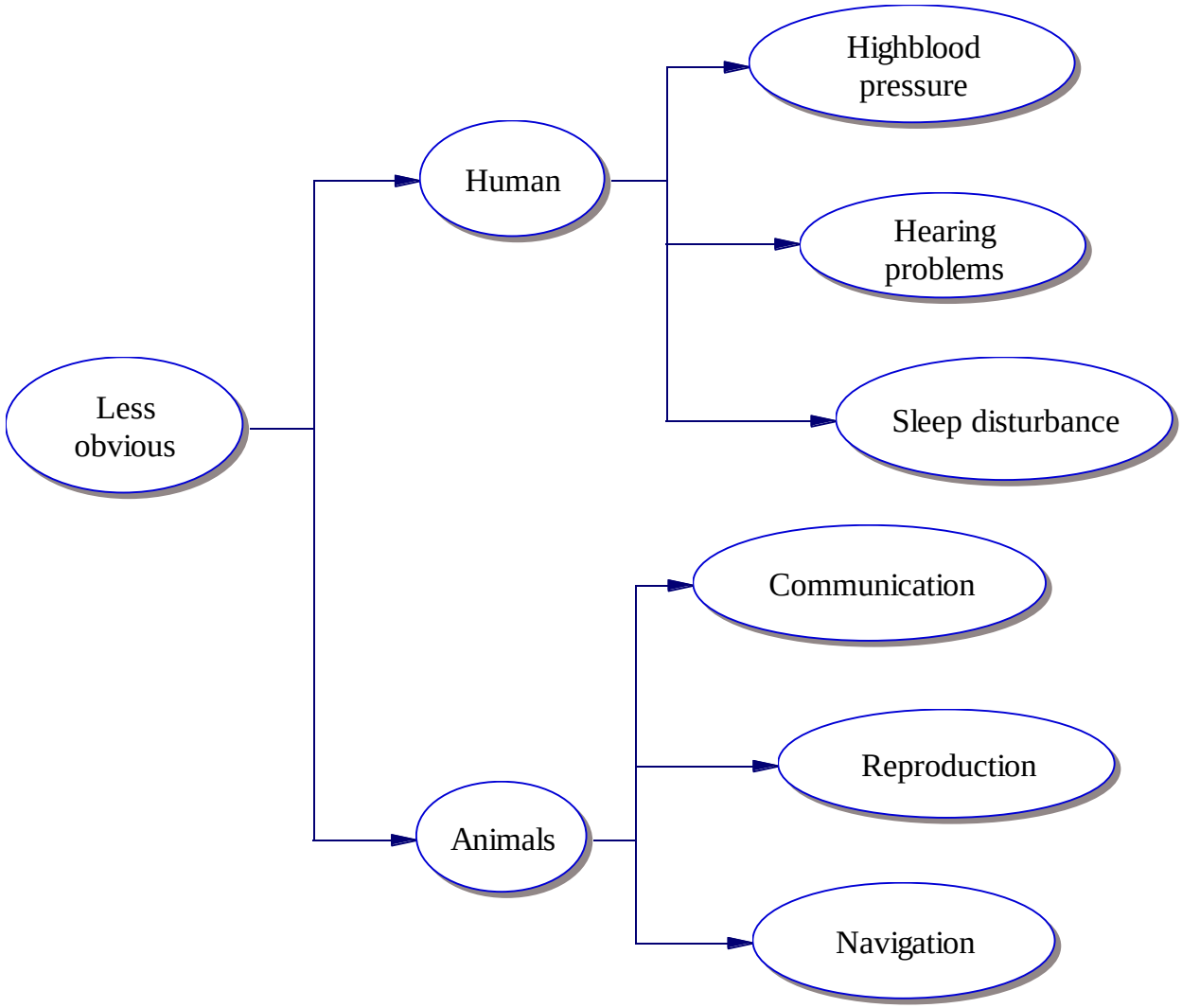


Figure 10: *Graphic representation of Pollution (3)*

Less Obvious

I. Human
   A. highblood pressure
   B. Hearing problems
   C. Sleep disturbance

II. Animals
   A. communication
   B. reproduction
   C. Navigation

4.

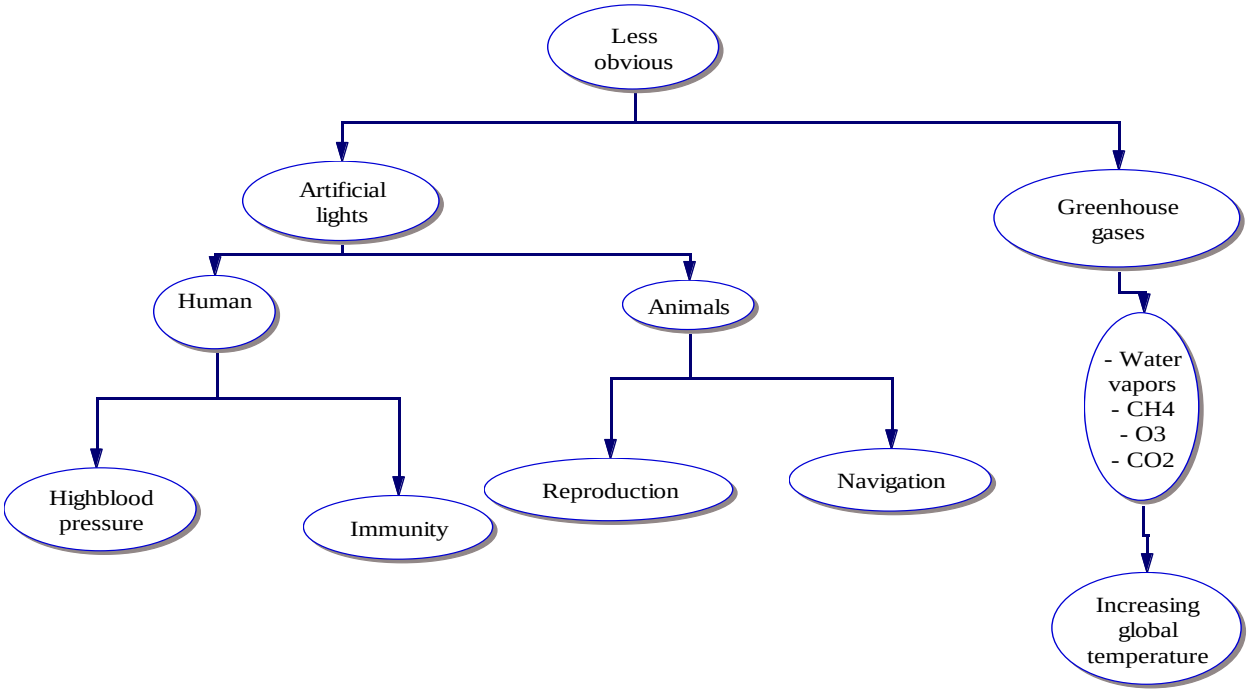


Figure 11: *Graphic representation of Pollution (4)*

Less Obvious

I. Artificial Lights
   A. Human
      1. highblood pressure
      2. immunity
   B. Animals
      1. reproduction
      2. navigation

II. Greenhouse gases
   A. - Water vapor
      - CH4
      - O3
      - CO2
      1. Increasing global temperature

APPENDIX D

POSTTEST

POSTTEST

Code _____

Passage 1:

According to the best evidence gathered by space probes and astronomers, Mars is an inhospitable planet, more similar to Earth's Moon than to Earth itself-a dry, stark, seemingly lifeless world. Mars' air pressure is equal to Earth's at an attitude of 100,000 feet. The air there is 95 percent carbon dioxide. Mars has no ozone layer to screen out the sun's lethal radiation. Daytime temperatures may reach above freezing, but because the planet is blanketed by the mere wisp of an atmosphere, the heat radiates back into space. Even at the equator, the temperature drops to -50ºC (-60ºF) at night. Today there is no liquid water, although valleys and channels on the surface show evidence of having been carved by running water. The polar ice caps are made of frozen water and carbon dioxide, and water may be frozen in the ground as permafrost.

Despite these difficult conditions, certain scientists believe that there is a possibility of transforming Mars into a more Earth-like planet. Nuclear reactors might be used to melt frozen gases and eventually build up the atmosphere. This in turn could create a greenhouse effect that would stop heat from radiating back into space. Liquid water could be thawed to form a polar ocean. Once enough ice has melted, suitable plants could be introduced to build up the level of oxygen in the atmosphere so that, in time, the planet would support animal life from Earth and even permanent human colonies. "This was once thought to be so far in the future as to be irrelevant," said Christopher McKay, a research scientist at the National Aeronautics and Space Administration. "But now it's starting to look practical. We could begin work in four or five decades."

The idea of "terra-forming" Mars, as enthusiasts call it, has its roots in science fiction. But as researchers develop a more profound understanding of how Earth's ecology supports life, they have begun to see how it may be possible to create similar conditions on Mars. Don't plan on homesteading on Mars any time soon, though. The process could take hundreds or even thousands of years to complete, and the cost would be staggering.

<u>Task 1</u>: Draw a graphic organizer for each of the following boxes below:

Box 1.

1. Mars	6. No ozone layer	7. Daytime: freezing	10. Dry	11. stark
2. Air pressure	4. Inhospitable	5. Lifeless	12. Earth's 100,000 feet	
3. Temperature	8. At night: -50ºC	9. 95%CO2		

Box 2.

1. Transforming possibility	3. Nuclear reactors	4. Build up atmosphere	7. Polar ocean	
8. Plants	9. Greenhouse effect	10. animals		
2. Ice melt	5. Melt frozen gases	6. Thawing water	11. Human colonies	

Task 2: Multiple Choices

Direction: Determine the best answer choice for each of the following sentence according to the reading passage.

1. With which of the following is the passage mainly concerned?

A. The possibility of changing the Martian environment
B. The challenge of interplanetary travel
C. The advantages of establishing colonies on Mars
D. The need to study the Martian ecology

2. The word ***stark*** in the first paragraph is closest in meaning to

A. harsh
B. unknown
C. dark
D. distant

3. The word there in the first paragraph refers to

A. a point 100 miles above the Earth.
B. the Earth's Moon.
C. Mars.
D. Outer space.

4. According to the passage, the Martian atmosphere today consists mainly of

A. carbon dioxide.
B. oxygen.
C. ozone.
D. water vapor.

5. Which of the following does the author NOT list as a characteristic of the planet Marc that would make colonization difficult?

A. There is little liquid water.
B. Daytime temperatures are dangerously high
C. The sun's rays are deadly.
D. Nighttime temperatures are extremely low.

6. It can be inferred from the passage that the greenhouse effect mentioned in the second paragraph is

A. the direct result of nuclear reactions.
B. the cause of low temperatures on Mars.

C. caused by the introduction of green plants.
D. a possible means of warming Mars.

7. According to Christopher McKay, the possibility of transforming Mars

A. could only occur in science fiction stories.
B. will not begin for hundreds, even thousands of years.
C. is completely impractical.
D. could be started in forty or fifty years.

8. According to the article, the basic knowledge needed to transform Mars come from

A. the science of astronomy
B. a knowledge of Earth's ecology.
C. data from space probes.
D. science fiction stories.

9. The word staggering in the third paragraph is closest in meaning to

A. astonishing
B. restrictive
C. increasing
D. unpredictable

Passage 2:

The technology of the North American Colonies did not differ strikingly from that of Europe, but in one respect, the colonists enjoyed a great advantage. Especially by comparison with Britain, Americans had a wonderfully plentiful supply of wood.

The first colonists did not, as many people imagine, find an entire continent covered by a climax forest. Even along the Atlantic seaboard, the forest was broken at many points. Nevertheless, all sorts of fine trees abounded, and through the early colonial period, those who pushed westward encountered new forests. By the end of the Colonial era, the price of wood had risen slightly in eastern cities, but wood was still extremely abundant.

The availability of wood brought advantages that have seldom been appreciated. Wood was a foundation of the economy. Houses and all manner of buildings were made of wood to a degree unknown in Britain. Secondly, wood was used as a fuel for heating and cooking. Thirdly, it was used as the source of important industrial compounds, such as potash, an industrial alkali; charcoal, a component of gunpowder; and tannic acid, used for tanning leather.

The supply of wood conferred advantages, but had some negative aspects as well. Iron at that time was produced by heating iron ore with charcoal. Because Britain was so stripped of trees, she was unable to exploit her rich iron mines. But the American Colonies had both iron ore and wood; iron production was encouraged and became successful. However, when Britain developed coke smelting, the Colonies did not follow suit because they had plenty of wood and besides, charcoal iron was stronger than coke iron. Coke smelting led to technological innovations and was linked to the emergence of the Industrial Revolution. In the early nineteenth century, the former Colonies lagged behind Britain in industrial development because their supply of wood led them to cling to charcoal iron.

<u>Task 1</u>: Draw a graphic organizer for each of the following boxes below:

Box 3.

1. Supply of wood 2. Gun powder 3. House/buildings 4. Charcoal 5. Alkali 6. Potash 7. Heating/cooking 8. Advantages 9. Tanic acid 10. Industrial compounds

Box 4.

1. Disadvantages 2. Charcoal 3. Coke smelting 4. Tech innovation 5. Britain 6. Unsuccessful iron production 7. Successful iron production 8. Charcoal 9. Sufficient 10. lack 11. American Colonies 12. Industrial revolution

Task 2: Multiple Choices

Direction: Determine the best answer choice for each of the following sentence according to the reading passage.

10. What does the passage mainly discuss?

A. The advantages of using wood in the colonies
B. The effects of an abundance of wood on the colonies
C. The roots of the Industrial Revolution
D. The difference between charcoal iron and coke iron

11. The word ***strikingly*** in the first paragraph is closest in meaning to

A. realistically
B. dramatically
C. completely
D. immediately

12. Which of the following is a common assumption about the forests of North America during the Colonial period?

A. They contained only a few types of trees.
B. They existed only along the Atlantic seaboard.
C. They had little or no economic value.
D. They covered the entire continent.

13. According to the passage, by the end of the Colonial period, the price of wood in eastern cities

A. rose quickly because wood was becoming so scarce.
B. was much higher than it was in Britain.
C. was slightly higher than in previous years.
D. decreased rapidly because of lower demand for wood.

14. What can be inferred about houses in Britain during the period written about in the passage?

A. They were more expensive than American houses.
B. They were generally built with important materials.
C. They were typically smaller than homes in North America.
D. They were usually built from materials other than wood.

15. Why does the author mention ***gunpowder*** in paragraph 3?

A. To illustrate the negative aspects of some industrial processes

B. To give an example of a product made with wood compounds
C. To remind readers that the Colonial era ended in warfare
D. To suggest that wood was not the only important product of the Colonies

16. The phrase follow suit in paragraph 4 means

A. do the same thing
B. make an attempt
C. have the opportunity
D. take a risk

17. According to the passage, why was the use of coke smelting advantageous?

A. It led to advances in technology.
B. It was less expensive than wood smelting.
C. It produced a stronger type of iron than wood smelting.
D. It stimulated the demand for wood.

18. Put an X next to the paragraph that outlines the main disadvantage of an abundance of wood.

Passage 3:

Humans have struggled against weeds since the beginnings of agriculture. Marring our garden is among the milder effects of weeds-any plants that thrive where there are unwanted. They destroy wildlife habitats and impede farming. Their spread eliminates grazing areas and accounts for one-third of all crop loss. They compete for sunlight, nutrients, and water with useful plants. They may also hamper harvesting.

The global need for weed control has been answered mainly by the chemical industry. Its herbicides are effective and sometimes necessary, but some pose serious problems, particularly if they are misused. Toxic compounds may injure animals, especially birds and fish. They threaten the public health when they accumulate in food plants, ground water, and drinking water. They also directly harm workers who apply them.

In recent years, the chemical industry has introduced several herbicides that are most ecologically sound than those of the past. Yet new chemicals alone cannot solve the world's weed problems. Hence, an increasing number of scientists are exploring biological alternatives that harness the innate weed-killing powers of living organisms, primarily insects and microorganisms.

The biological agents now used to control weeds are environmentally benign and offer the benefit of specificity. They can be chosen for their ability to attack selected targets and leaves crops and other plants untouched, including plants that might be related to the target weeds. They spare only those that are naturally resistant or those that have been genetically modified for resistance. Furthermore, a number of biological agents can be administered only once, after which no added applications are needed. Chemicals typically must be used several times per growing season.

Biological approaches may never supplant standard herbicides altogether, but they should sharply limit the use of dangerous chemicals and reduce the associated risks. They might also make it possible to conquer weeds that defy management by conventional means.

<u>Task 1</u>: Draw a graphic organizer for each of the following boxes below:

Box 5.

1. Harms caused by weeds 2. Mar garden 3. Eliminate grazing areas 4. Crop loss 5. Hamper harvesting 6. Impede farming 7. Destroy wildlife habitats 8. Compete for sunlight, nutrients, water with useful plants

Box 6.

1. Herbicides 2. Injure animals 3. Harm workers 4. Threaten public health 5. Accumulate in food plants, water 6. Chemical industry

Box 7.

1. Biological alternatives 2. Microorganisms 3. Administered once 6. Benefit 4. Attack selected targets 5. Leave crops untouched 7. Specificity 8. Insects 9. no added applications

Task 2: Multiple Choices

Direction: Determine the best answer choice for each of the following sentence according to the reading passage.

19. With what topic does this passage mainly deal?

A. The importance of the chemical industry
B. The dangers of toxic chemicals
C. Advantages of biological agents over chemical ones
D. A proposal to ban the use of all herbicides

20. The word marring in paragraph 1 is closest in meaning to

A. spoiling
B. dividing
C. replacing
D. planting

21. Which of the following terms does the author define in paragraph 1?

A. Nutrients
B. Grazing areas
C. Weeds
D. Wildlife habitats

22. With which of the following statements about the use of chemical agents as herbicides would the author most likely agree?

A. It should be increased.
B. It has become more dangerous recently.
C. It is safe but inefficient.
D. It is occasionally required.

23. Which of the following is NOT given as an advantage of using biological agents over chemical herbicides?

A. They are less likely to destroy desirable plants.
B. They are safer for workers.
C. They are more easily available.
D. They do not have to be used as often.

24. According to the passage, biological agents consist of

A. insects and microorganisms
B. useful plants

C. weeds
D. herbicides

25. The word ***applications*** in paragraph 4 could best be replaced by which of the following?

A. Requests
B. Special purposes
C. Treatments
D. Qualifications

26. Which of the following best describes the organization of the passage?

A. A general idea is introduced and several specific examples are given.
B. A recommendation is analyzed and rejected.
C. a problem is described and possible solutions are compared.
D. Two possible causes for a phenomenon are compared

APPENDIX E

ANSWER KEY

ANSWER KEY

PRETEST

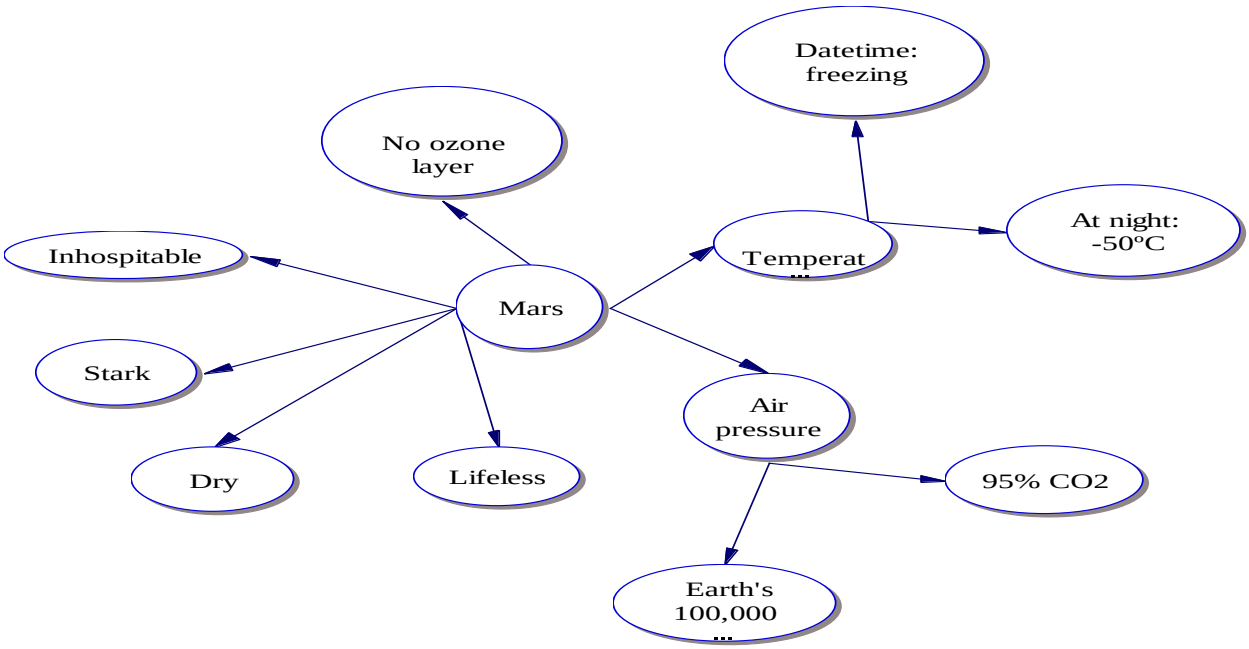
1.	C	6.	C	11.	C	16.	C	21.	B	26.	D
2.	D	7.	B	12.	B	17.	D	22.	A		
3.	D	8.	A	13.	D	18.	D	23.	D		
4.	B	9.	B	14.	C	19.	B	24.	B		
5.	A	10.	C	15.	A	20.	A	25.	B		

POST TEST

1.	A	6.	D	11.	B	16.	A	21.	C	26.	C
2.	A	7.	D	12.	D	17.	A	22.	D		
3.	C	8.	B	13.	C	18.	Paragraph 4	23.	C		
4.	A	9.	A	14.	B	19.	C	24.	A		
5.	B	10.	B	15.	B	20.	A	25.	C		

GO TASKS

Box 1.



Mars

I. Temperature
   A. At night:
      -50ºC
   B. Datetime: freezing

II. No ozone layer

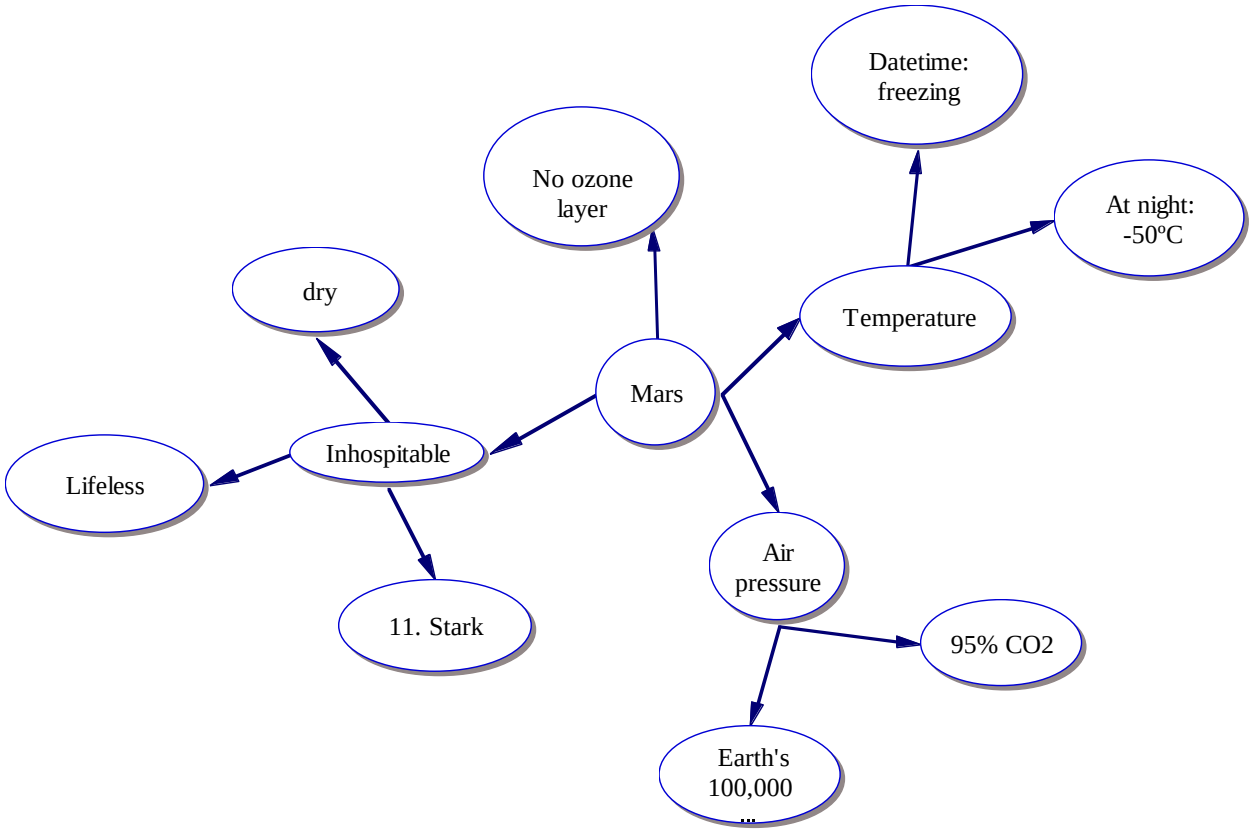
III. Inhospitable

IV. Air pressure
   A. Earth's 100,000 feet
   B. 95% CO2

V. Dry

VI. Stark

VII. Lifeless



Mars

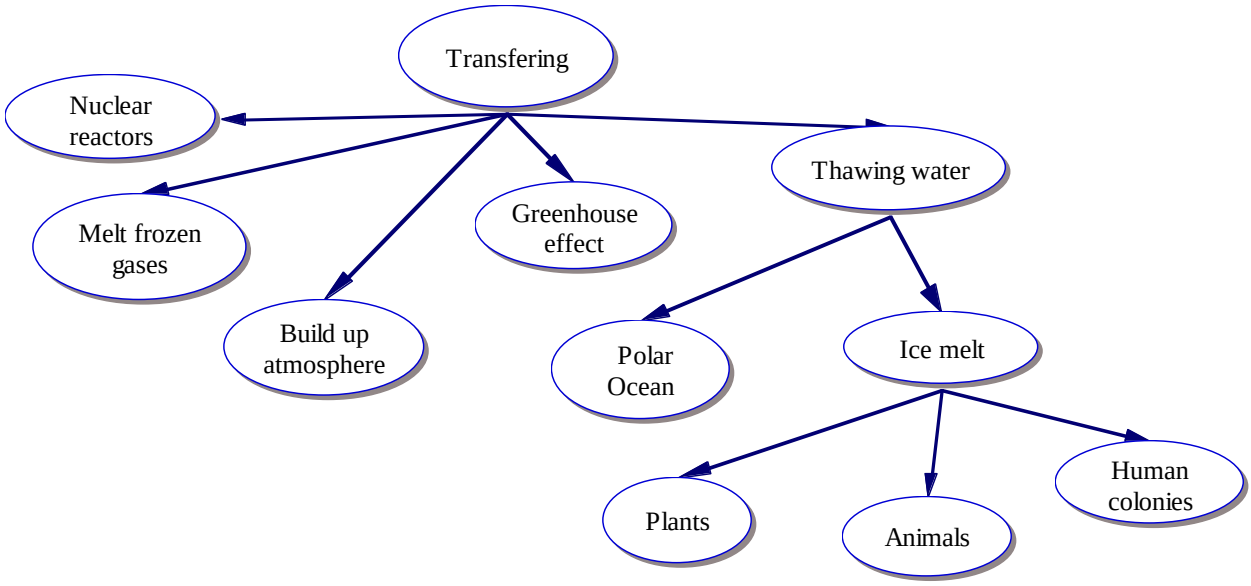
I. Temperature
   A. At night:
      -50ºC
   B. Datetime: freezing

II.
   No ozone layer

III. Inhospitable
   A. dry
   B. Lifeless
   C. 11. Stark

IV. Air pressure
   A. Earth's 100,000 feet
   B. 95% CO2

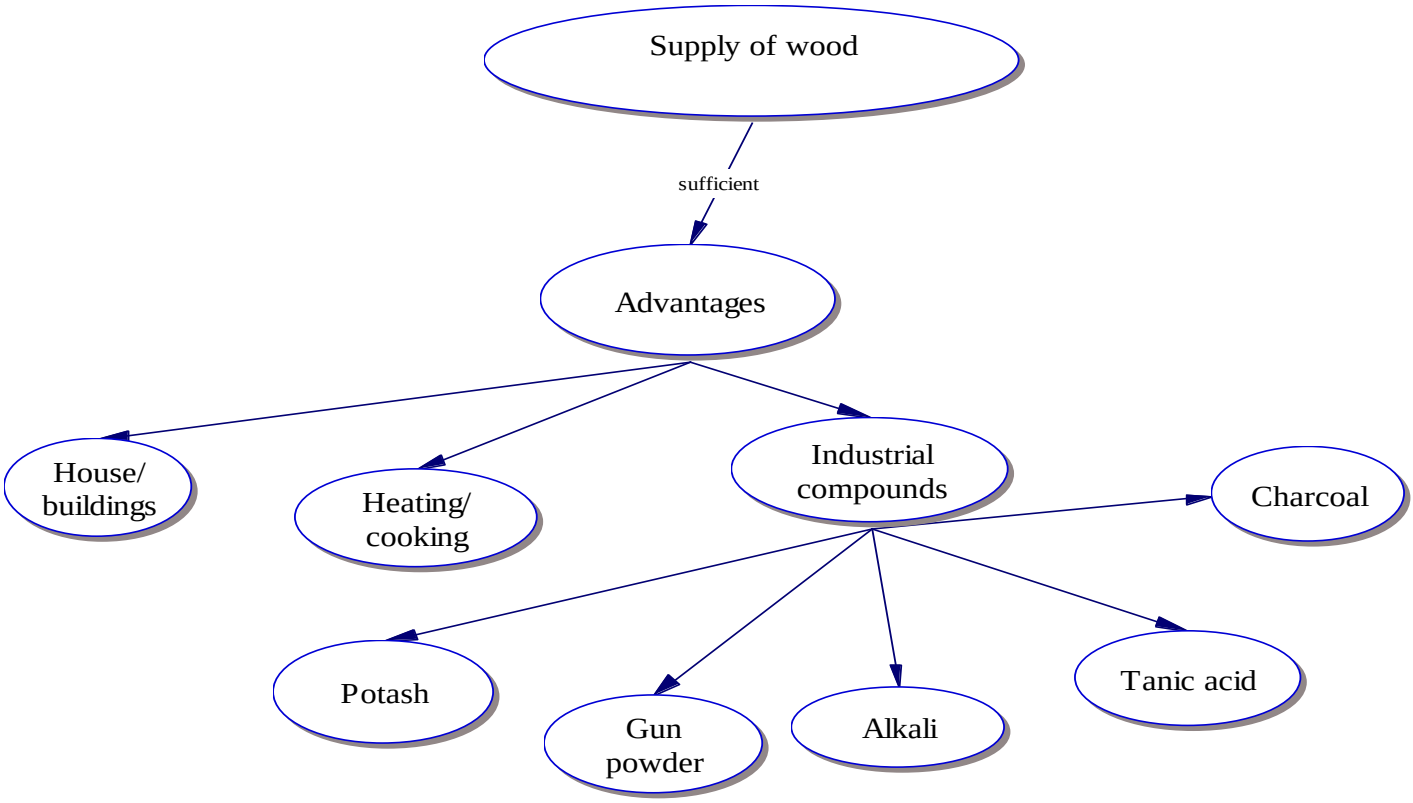
Box 2.



Transfering

I. Nuclear reactors
II. Melt frozen gases
III. Build up atmosphere
IV. Greenhouse effect
V. Thawing water
    A. Polar Ocean
    B. Ice melt
        1. Plants
        2. Animals
        3. Human colonies

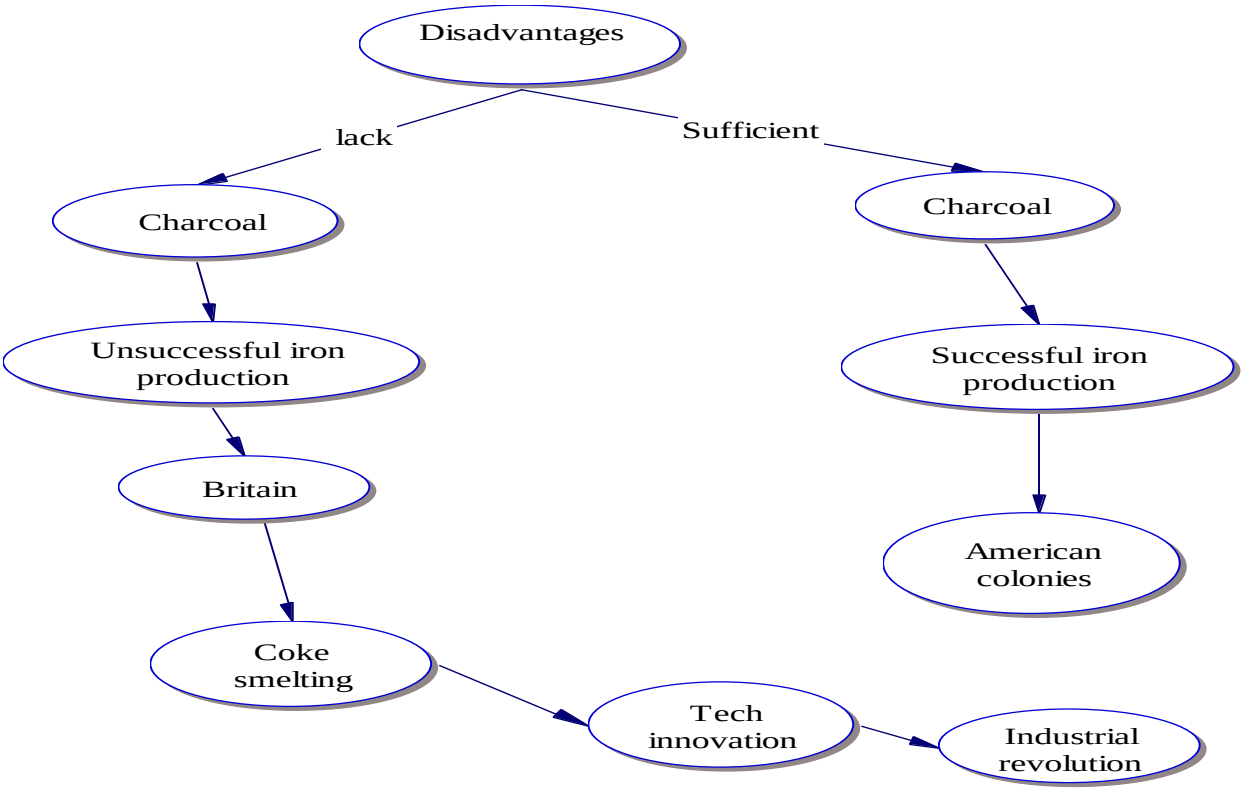
Box 3.



Supply of wood

I. Advantages
   A. House/buildings
   B. Heating/cooking
   C. Industrial compounds
      1. Potash
      2. Gun powder
      3. Alkali
      4. Tanic acid
      5. Charcoal

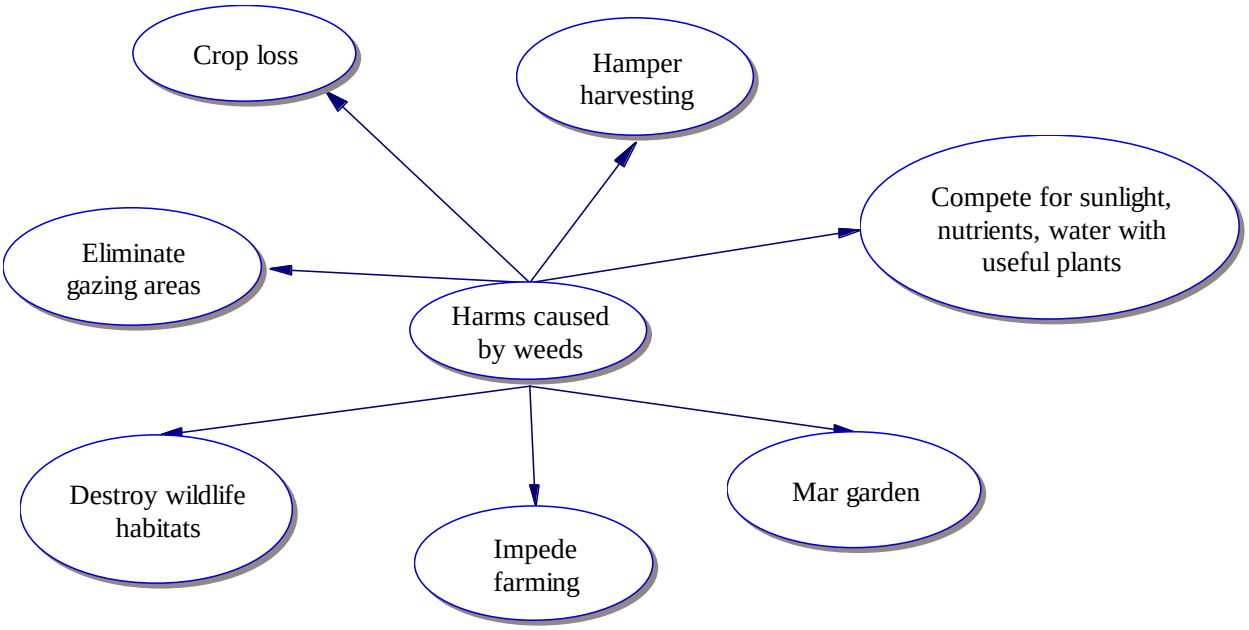
Box 4.



Disadvantages

I. Charcoal
   A. Unsuccessful iron production
      1. Britain
         a. Coke smelting
            (1) Tech innovation
               (a) Industrial revolution
II. Charcoal
   A. Successful iron production
      1. American colonies

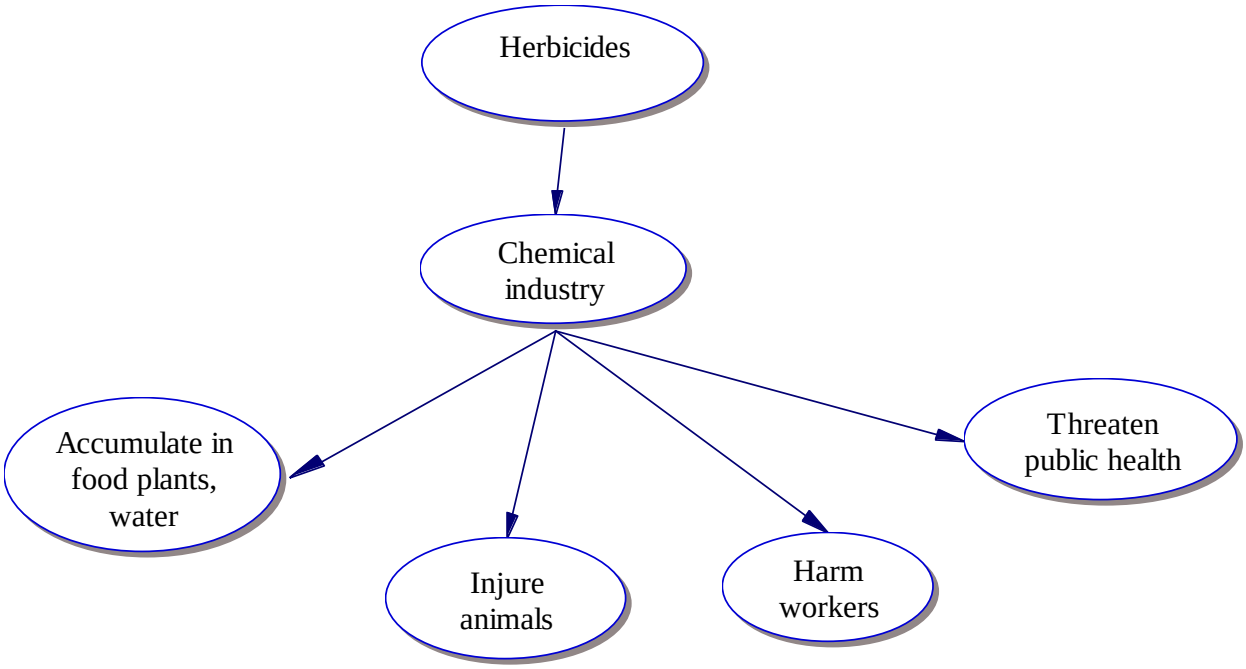
Box 5.



Harms caused by weeds

I. Mar garden
II. Eliminate gazing areas
III. Crop loss
IV. Hamper harvesting
V. Impede farming
VI. Destroy wildlife habitats
VII. Compete for sunlight, nutrients, water with useful plants

Box 6.

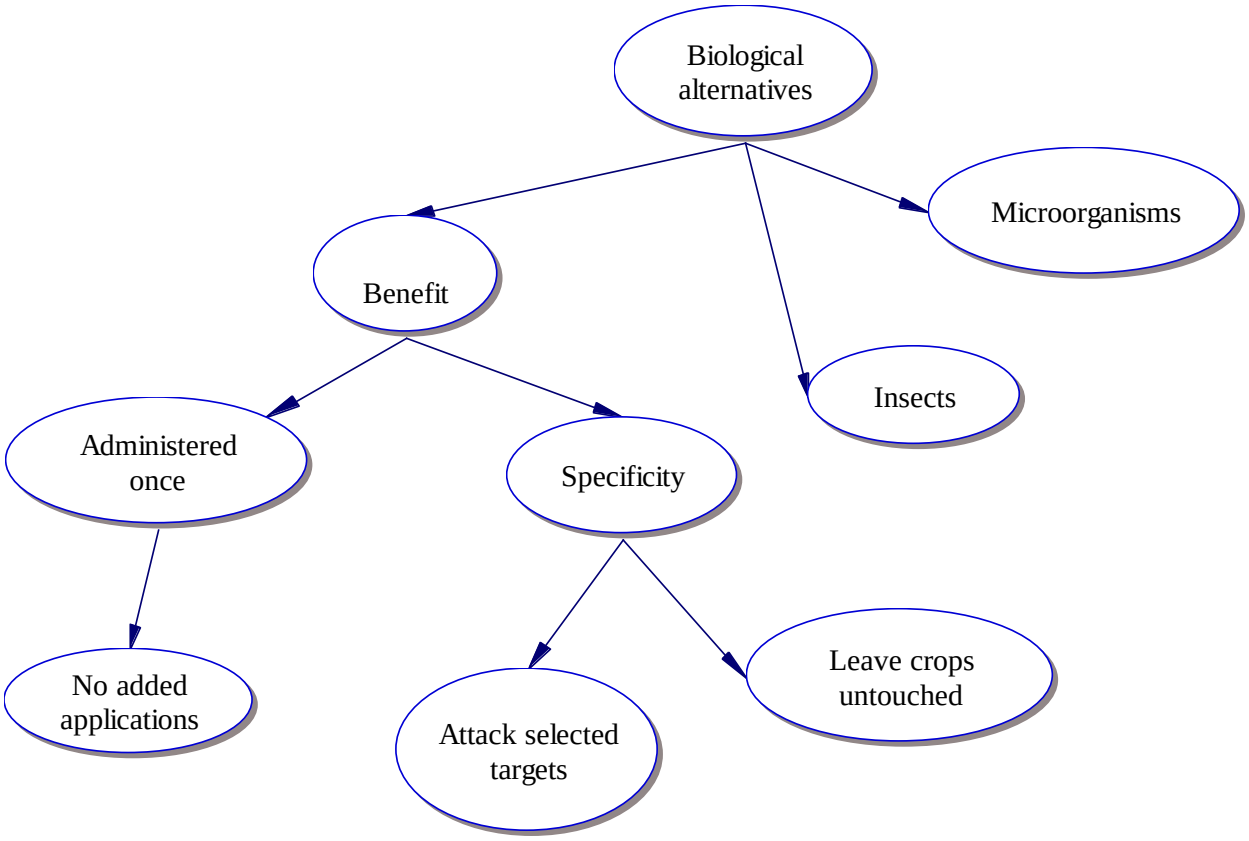


Herbicides

I. Chemical industry

A. Injure animals
B. Harm workers
C. Threaten public health
D. Accumulate in food plants, water

Box 7.



Biological alternatives

I. Insects

II. Microorganisms

III. Benefit

A. Administered once

1. No added applications

B. Specificity

1. Attack selected targets

2. Leave crops untouched

APPENDIX F

SURVEY

SURVEY

Code: _____

The survey is for those who have participated in the Pretest, the training and the Posttest. It is aimed to ask for the participants' perceptions on the role of Graphic Organizers in reading comprehension and their feedback on the training of GOs. All the responses are highly appreciated.

Gender

O Male O Female

Age: _____

What is your native language?

O English

O Spanish

O Other_____

How many years have you been studying English? _____

Did you graduate from high school in the US? O Yes O No

If no, can you state where? _____

1. I find Graphic Organizers a helpful tool in my reading comprehension activities?

O Strongly agree O Agree O Slightly agree

O Slightly disagree O Disagree O Strongly disagree

2. Select all that apply

(Note: 1= strongly agree 2 = agree 3 = disagree

4 = strongly disagree)

Select all that apply	1	2	3	4
GO is helpful in understanding the overall content of a passage				
GO helps to recognize the main ideas of a passage				
GO helps to better comprehend the vocabulary in a passage				
GO helps to locate the ideas in a passage faster				
GO helps distinguish main ideas from details				
GO helps recall the reading passage				
GO enables readers to re-tell the story				
GO is helpful for categorizing the ideas into major/supporting/minor ones				
GO is helpful in putting ideas together to generate a topic				
GO is helpful in developing a topic further into details				

3. I find the demonstrations of Graphic Organizers in the training very comprehensive

O Strongly agree O Agree O Slightly agree

O Slightly disagree O Disagree O Strongly disagree

4. I find the content of the Graphic Organizers training easy to understand

O Strongly agree O Agree O Slightly agree

O Slightly disagree O Disagree O Strongly disagree

5. I find drawing Graphic Organizers for the reading passages helpful in doing the Multiple Choice questions in the Post-Test?

O Strongly agree O Agree O Slightly agree

O Slightly disagree O Disagree O Strongly disagree

If so, in what way

_____

_____

_____

THE END

Thank you very much for your cooperation

BIOGRAPHICAL SKETCH

Trang Phan earned her undergraduate studies in her home country of Vietnam, where she graduated in 2006 with a Bachelor of Arts with a major in English Language and Literature.

In August 2010 she earned her Master's degree in English as a Second Language from the University of Texas-Pan American (UTPA). Her research interests include second language acquisition, second language teaching, and language learning strategies.

Trang gained her teaching experience in Vietnam, where she taught English as a foreign language to Senior-High school students. While studying at UTPA, she was working as a student, a research assistant and a teaching assistant teaching Rhetorical and Composition classes to freshmen students.