

USING INSPIRATION® SOFTWARE
TO FACILITATE INFORMATION TRANSFER
FOR ENGLISH LANGUAGE LEARNERS

by

Mary Warpeha

A Capstone submitted in partial fulfillment of the requirements
for the degree of Master of Arts in English as a Second Language

Hamline University

St. Paul, Minnesota

June, 2005

Capstone Committee:
Kathryn Heinze, Committee Chair
Audrae Coury, Expert Reader
Marge Avoles, Peer Reader

To my instructors, readers, family and friends

in appreciation of your

Kindness

Patience

Loving support

Tell me, and I forget.

Show me, and I remember.

Involve me, and I learn.

Author unknown

TABLE OF CONTENTS

LIST OF TABLES	iv
PREFACE	vii
CHAPTER ONE: INTRODUCTION	
Personal Midlife Challenge.....	1
Education Experience In China	1
A Private High School In Minnesota	3
Questions Formed And A Capstone Topic Began Taking Shape	9
CHAPTER TWO: LITERATURE REVIEW	
TESOL Standards	11
The Challenges To ELL Students In Grade-Level Classrooms	12
The Support Strategies For Grade-Level Courses	16
Teaching Academic Language Functions – ALFs	22
Understanding Physical Science Curriculum	24
Considering Action Research	26
Exploring Computer Software As An Instructional Tool	27
Using Information From The Literature Review In Capstone Project	30
CHAPTER THREE: METHODOLOGY	
Topic Statement	32
Duration And Site	32
Participants	32
Action Research And Inspiration® Software	34
Methodology in the Classroom	37
CHAPTER FOUR: RESULTS AND DISCUSSION	
Results.....	42
Measurement of Success	43

Discussion	46
CHAPTER FIVE: CONCLUSIONS	
Suggestions For Further Study	56
Final Comment	57
APPENDICES	
APPENDIX 1. Capstone topic statement	58
APPENDIX 2. Sample Capstone Methodology Chapter	60
APPENDIX 3. Inspiration® Information Sheet	62
APPENDIX 4. Jigsaw Activity for Partners	63
APPENDIX 5. Description of electricity by Pedro	64
APPENDIX 6. Definition of Fossil Fuels by Leona	65
APPENDIX 7. Vocabulary for Magnetism by Regina	66
APPENDIX 8. Compare and Contrast by Phao.....	67
APPENDIX 9. Minneapolis 2104	69
APPENDIX 10. Researcher’s Reflection Questions	71
REFERENCES	74

LIST OF TABLES

Table 1. <i>Research Findings Related to Effective Teaching</i>	16
Table 2. <i>Graphic Organizers Support Learning</i>	29
Table 3: <i>Information on the Participants</i>	34
Table 4. <i>Graphic Presentation of the Topic Statement using Inspiration® Diagram</i> ..	37
Table 5. <i>Directives for Student Preparation and Document Entries</i>	38
Table 6. <i>Assessment Criteria and Group Success Ratings</i>	45
Table 7. <i>Graphic Presentation of the Conclusion using Inspiration® software</i>	56

PREFACE

For several years, my project investigating the use of Academic Language Functions (ALFs) to transfer information from a textbook to computer software had been taking shape in my mind and journals. Following completion of the required coursework and the prerequisite requirements, permission was granted to proceed with implementation of the action research project and data collection.

March 1, 2004, the first day of Trimester 3 at the high school was the official start date for data collection. I began the morning auditing a grade-level physical science class. During the class, an emergency message arrived informing me that my sister was seriously ill. Ultimately, I took a six week leave of absence to act as caregiver and mourner.

Upon returning to school, I found that the collaborating physical science teacher was on leave caring for her dying mother. Six of thirteen weeks for data collection were gone. My classroom was in a disrupted, agitated state with learning at a standstill.

At first, I considered aborting the project but decided that this was not necessary. I had been committed to the intent of the research for quite some time and needed to strategize how to make “lemonade out of lemons”. Adaptability is reality for an effective educator, and my situation was a larger-than-life example of the need for adaptability,

creativity, and patience – with others and myself. I was committed to bringing back an orderly, on-task classroom regime to support students during their final days of the school year. Academically, my English Language Learners (ELLs) would benefit from the strategies and practice proposed in the research project. It was feasible to continue with my plans.

A restructuring of the original plan began immediately. The two original students began as planned. I recruited three students out of the ninth grade population and received agreement from students and parents for cooperation in the project.

In the first trimester, I had visited with all three physical science teachers soliciting their suggestions for my focus in Learning Enrichment Class (LEC). I had input from these teachers early on, but, unfortunately, at this point there were no physical science teachers committed to partnering with my project. The original teacher was gone and the two remaining teachers were disgruntled over academically challenged ELLs being scheduled into their grade-level classes. Nonetheless, the project was rejuvenated, and I carried on with modifications.

In retrospect, the only significant loss in the restructuring was the active participation of the physical science teachers. To balance this loss is the overwhelming importance of participation by the more proficient language learners.

I will be forever grateful to all who encouraged and supported me through this stressful time. Life goes on, and students need committed and engaged teachers to assist them in learning how to learn. In a most unanticipated way, my research truly was action research, forcing me to create, change, observe, consider, reconsider, individualize, and

try again. The project changed dramatically from initial conception and throughout the process gave me new and lifelong insights into assisting ELL students to survive and succeed in the grade-level academic environment of high school content classes.

CHAPTER ONE: INTRODUCTION

Personal Mid-life Challenge

In 1997, I had opportunity to teach English language in the Peoples Republic of China. My personal life and my perspective on learning were changed forever as I grappled with the ambition and needs of students who committed themselves to attaining proficiency in my native English language. After several teaching missions in China, I made a “midlife decision” and entered Hamline University’s Teaching English as a Foreign Language Course (TEFL), which gave me training and credentials to teach abroad. In a short time, I enrolled in the more extensive post- baccalaureate English as a Second Language Program (ESL) through which I earned a Minnesota teaching license and ESL certificate. Thus began my professional opportunities to meet the challenges afforded a credentialed teacher of English Language Learners (ELLs) - in the United States and abroad.

Education Experience In China

Throughout my short ESL career, I have experienced a variety of instructional opportunities in which I faced the challenges of using English - the students’ second language - as the language of content instruction. In a teaching assignment at Kai Lian College in Xi-An, Shaanxi Province, PRC, I instructed post-secondary students in business and computer-related English language. This was the first year of operation of

this private college owned jointly by highly respected Jiatong University and a Singapore firm. Students arrived from Western China to study computer technology and business through oral and written instruction in English. Unfortunately, instructors and students lacked the English proficiency necessary to manipulate difficult technical content in their second language. At the conclusion of the teaching assignment, I was requested to prepare an evaluation of the fledgling college's efforts and make suggestions for progress of the college and the students. In this strained situation where expectations and competence were at odds with each other, I was challenged in roles of instructing and consulting.

A Private High School In Minnesota

Returning to Minnesota, I taught in a private middle school where a majority of the students were ELLs. With national statistics reporting an escalating dropout of students after middle school, our staff and families were committed to beating the odds. I conducted research to become more informed and realized that again I was returning to the absolute necessity of English language proficiency to master new and progressively demanding content.

Middle school students were studying advanced academic material with complex language, and cognitively demanding content in culturally loaded context. Students in elementary grades had been "learning to read". As they moved into the middle grades, they were "reading to learn". If for any reason, a learner missed out on the "learning to read" part of this duo, they would have limited ability "reading to learn" (Wilber, 2000, p.8). It appeared students had gaps in their mastery. During my teaching tenure, I

continually reflected and acted upon strategies to raise the comprehension and retention of academic learning for students.

In the spring of 2003, I was approached to join the faculty of a private high school, which was admitting a group of ELLs who did not fit the profile of their college-bound student body. The school was interested in welcoming and offering opportunities, but administrators knew that success and school completion required academic support. I accepted the faculty position as instructor of a newly designed content support class called Learning Enrichment Class.

Concern For Academic Content Mastery In A Second Language

Knowing that physical science and world history content vocabulary would require the most effort for students, I targeted these subjects for class support. In the first two trimesters, my lessons focused on review of the vocabulary for the two required subjects. Content-loaded games were played, puzzles were answered, hard-core rote memorization was encouraged. Concurrent with the academic support was direct instruction in study skills and student learning strategies. *Study Skills 1 and 2* (1999) were the texts for this portion of the curriculum. Midway through Trimester 1, I read the Physical Science text into an audiotape and had students read along silently. Progress was made, but the quantity of content-class work accumulated and the gap between LEC students and their grade-level peers became increasingly worrisome.

The necessity of finding ways for language learners to master their grade-level subjects brought me to my research topic. I felt a driving need to open more windows for these students who had enthusiasm, ability and commitment to their educational

successes in high school and beyond. The importance of teaching strategies, learner strategies, affect and metacognition of the learners seemed to loom big in my search for answers. Several resources caught my eye and led to refining my topic statement.

Questions continued to form: How could I better support the comprehension and retention of academic content for students in their grade-level classes? Since I was finding the ELL classroom activities only marginally useful for most LEC students, what instructional techniques would assist long-term and short-term retention of vocabulary and concepts? What learning activity could be designed to increase comprehension rather than foster a verbatim regurgitation of information and vocabulary? What could I do to motivate and engage students so they truly learned the material? Could I convince students that the extra effort involved in application of a learning strategy would increase their learning effectiveness as well as their test scores? Could an effective strategy be implemented in other content areas? Would an ELL strategy be of interest to the grade-level teachers?

My goal was to have high quality processing and product with increased comprehension and long-term retention. In the design of this project, the use of information transfer to master the Academic Language Functions (ALFs) necessary to excel in a grade-level classroom seemed to have potential. ALFs are the uses of language in academic work. Three common ALFs are description, classification, comparison and contrast. The goal would be to engage the student in the process of information transfer and through this to increase comprehension of the material to be learned. Often, I observed that a student completed the task assigned, but did not use the process to learn

and retain the information. Copying information from textbook to worksheet most often did not constitute quality learning.

In the literature search, I found inspiration in the writings of many practicing researchers. Although detailed more in the literature review, it is worth mentioning here that the classic works of Chamot & O'Malley (1994, 1999) offered a strong methodology for teaching in the content areas. Kidd (1996), an educator in Canada, expanded on the Chamot list of strategies and piqued my interest even further with papers on explicit teaching of ALFs (Kidd, 1996) in the sciences and math. Ecchevarria et al (2000) reinforced the importance of instructional strategies.

An action research approach offered opportunity for extensive literature review, experiment design, critiquing of teacher and students, reflection and evaluation. In action research, teaching leads to success and occasional failures, success and failure lead to further exploration, exploration leads to questions, questions lead to experimentation with dead ends and successes. The action-reflection process creates its own cyclical momentum with teacher and students reflecting and learning (Freeman, 1998). It was my intention to have a structured opportunity to design, implement, and evaluate effective teaching/learning strategies.

The students for the project were ninth grade ELLs who were 14 to 15 years of age and enrolled in an urban high school in Minneapolis. The school has a 45% non-white student population that offers diversity greater than the average Minnesota school. This high school targeted college-bound students, and its curriculum lacked remedial or second language support. All students completed an entrance exam and needed to

receive a qualifying score at the 50th percentile or above for admission. Those who scored lower than the 50th percentile may be considered for conditional admission with requirements for reasonable progress.

For a variety of reasons, a group of ninth grade ELL students scoring below the standard was admitted. Since a support person would be needed, I was asked to join the teaching staff, evaluate the learners, and mastermind a program that would offer part of the support needed to progress in grade-level content classes. The class was named Learning Enrichment Class (LEC) and included native and non-native speakers of English who needed academic support. All students entered on probationary status due to scores below the 30th percentile in reading, writing, and math on the placement examination.

As preparation for establishing the class, I visited three private high schools offering learning lab support. Two programs were very structured and one was loose offering help on a drop-in-as-needed basis. All of the program directors agreed that an essential part of remediation was the need to teach organization, learning strategies, and academic language. Vocabulary learning strategies were part of the programs since the secondary academic vocabulary demands were higher and cumulative in the content classes. None of the programs serviced ELLs.

The start date for first trimester arrived, and I began the school year instructing the LEC with the encouragement of school administration, ninth grade teachers, and counselors. LEC was held in the early afternoon in a 90-minute time block. This configuration allowed for a period of instruction and class activities followed by tutored

individual or group study. With the exception of math, students were taking the typical ninth grade course load. Remedial math was part of the LEC curriculum with Algebra being delayed until the tenth grade schedule.

My instinct told me that these students had no time for the typical language textbook ESL curriculum. They needed to engage the content material as quickly and as competently as possible. The eleven mainstream teachers with whom I interacted felt that my emphasis should be supplemental practice of the vocabulary of the English literature, physical science, religion, and world history. A bit naively, I nodded agreement and went to task.

As the trimester advanced, I gained knowledge of my students' competencies and needs, the academic course work and teacher expectations, and the problems of being a support person for curriculum in which I was not trained. After all, what had I ever learned about electromagnetic waves?

The ELLs began with high hopes of being able to compete at grade-level. Friendships were formed and students began participating in extracurricular activities. About four weeks into the trimester, motivation began to wane, and behavior became problematic as the students struggled within content classes. I held conferences with students, parents, teachers, and administrators as I brainstormed how students were to survive in this difficult schedule through the ninth grade curriculum.

At the end of first trimester, there was a mixed report on LEC students' progress. Students were having trouble reading the textbooks, completing projects, taking notes, and performing on quizzes and tests. Efforts to improve study skills through use of *Study*

Skills 1 and 2 (1999) and *Study Smart* (Abbamond & Bescher, 1990) had proven slightly effective, but had not brought the anticipated results. Video presentation and practice of memory training had been useful. Student reflection and metacognitive awareness through practice exercises had proven somewhat effective. Instructional strategies had been experimental and changeable which disturbed the students who needed constancy.

Initially, I diligently prepared worksheets for student practice, and students lazily completed the work. After realizing that I was doing more work than the students, a role reversal took place and students were given assignments to prepare vocabulary flashcards and other study aids. In more difficult materials, I would prepare part of the work, and they would complete it on cards or worksheets in jigsaw fashion. Concentration games were played. Game competition was attempted but discontinued when behavior became uncontrollable, and it became apparent that learning was not taking place.

Students were easily distracted and grabbed onto any social conversation or chance to laugh and giggle to relieve their frustration and anxiety. I understood this, but I knew that this behavior was not conducive to concentration and internalization of the lessons. Expectations for quality academic accomplishment were not being met – either by myself or by my students. This was becoming a huge puzzle to me, and there were key pieces missing.

Students were making the motions, but they were not learning the content as was demonstrated by poor grades in quizzes and tests. It seemed to me that short- and long-term memory were not functioning at the strength that was required to meet even minimal academic requirements. The immediate solution of getting the busywork finished and

satisfying the teacher was the student goal with a handful of students not even making an attempt.

These students defied all the teacher strategies I had studied and used throughout my short career. In my desperation, I had allowed LEC to become a teacher-centered classroom with all the problems associated with one person performing. Students were bored, had become disruptive, had become distracted, and were not engaged in their own academic success.

Questions Formed And A Capstone Topic Began Taking Shape

On a quiet Sunday afternoon, I sat and discussed my frustration with my husband. After receiving a capsule review of study skills and learning strategies and all the other buzz activities, his logical mind clicked in, and he put some comments and questions together for me. I listened carefully and came up with these hard to remedy problems:

When an ELL student is taught in a grade-level class, he or she reads the same textbook, hears the same lecture, does the same homework as classmates, and yet is unable to pass the test with other students who also have diverse learning styles.

Teaching and practicing vocabulary is not adequate. How could ELLs become proficient in using the academic functions of language – especially higher level thinking, and abstract concepts?

Do ELLs need different tools than the tools that work for most students? More practice? More time to study? More explicit instruction? More student-centered class time?

Is there a piece missing which if added could significantly improve performance of these students who are learning in a second language or is there something about the grade-level teaching methods that places insurmountable impediments to successful learning for the ESL students?

These and more questions were incorporated into the Researcher's Reflection Questions in Appendix 10.

As we talked, I was beginning to envision a plan for classroom research. I admitted my need for better understanding of the academic language abilities required for comprehension and retention of academic content. I needed to search for an academic information learning strategy that would be interesting, challenging and effective for retention. Combining these features with group work and a more student-centered classroom situation might begin to yield recognizable results. Perhaps in combination, I would be able to offer LEC students an improved strategy to master the increasingly demanding academic content, much of which was presented as abstract printed information. I had the beginnings of a plan to make a difference.

This reflection generated the question for my topic: Will the use of information transfer from a grade-level textbook to graphic organizer software be an appropriate strategy for teaching essential academic language functions to secondary school ELLs?

CHAPTER TWO: LITERATURE REVIEW

The literature review focuses on references to the topic which is an investigation of the efficacy of teaching academic language function to secondary school English Language Learners through the transfer of information from a grade-level physical science textbook to Inspiration®, a graphic organizer software program.

TESOL Standards

With more schools, districts, and states requiring mastery of basic standards, the success or lack of success of English Language Learners (ELLs) in mastering content as well as language has been a focus. In *ESL Standards for Pre-K-12 Students* (TESOL, 1997), the teaching profession joined the standards-setting movement by creating and publishing a baseline for practices of teachers and schools involved in educating ELLs. In the TESOL publication, Goal 2, Standards 1, 2, and 3 for Grades 9-12 delineated the English language components necessary to achieve academically in all content areas. Classroom interaction and curriculum must by necessity involve the use of all four language skills - reading, writing, listening, and speaking (TESOL, 1997).

The challenges of teaching English language while supporting the contents of math, science, literature, and social studies has entered into the professional literature and conferences of those who committed to successfully educating elementary, secondary,

and post-secondary language learners. In the project, I have chosen to study the current problems and “best practices” in the teaching of academic content to ELLs.

The Challenges To ELL Students In Grade-Level Classrooms

In schools today, students who have developed social communication skills while participating in beginning level English language classes and receiving daily exposure to the English-speaking environment are often placed into grade-level content classes. Many, if not most, of these students lack proficiency in the academic language needed for grade-level learning (Chamot & O’Malley, 1992). Because of the difficulty and infrequent use of academic language outside of the classroom, it takes longer to learn than the social language of daily life. By definition, academic language is language used in the classroom for the purpose of learning new material and skills. Academic language is used formally for academic subjects and often reflects a subject specific registry of vocabulary. Academic language increases in difficulty and quantity through the grades. New academic information is presented in terms which are progressively detailed, abstract, and cognitively demanding. The cognitive demands made by advanced material and language increase the difficulty of comprehension (Chamot & O’Malley, 1994; Echevarria, Vogt & Short, 2000). Academic Language Functions (ALFs) are the purposes of the language usage and are exemplified by description, classification, and comparison and contrast. Yet, the years of eligibility for language support services and sheltered classes are continually reduced to meet diminishing budgets and educational whims (Duff, 2001; Gersten, 2002).

The very nature of school systems and curriculum has added challenges to ELL students. ELL students are tested in reading, mathematics, and science as requirements for advancement and graduation (ESCORT, 2001). Grade-level classes are demanding and fast moving causing difficulty for a student learning the language as well as the content. A daily schedule, which includes five to seven content classes in the sciences, social science, math, literature, and world languages presents a heavy load of new material with new vocabulary. Often mainstream teachers are cast into classroom situations with multiple levels of ELLs mixed with grade-level students (ESCORT, 2001).

Even though research has demonstrated that students need interaction and feedback on language and content, the mode of instruction in many contemporary classrooms continues to be teacher-centered with minimal student interaction (Gersten, 2002). In student-centered classrooms, learners have more opportunities to use newly acquired language collaborative activities than in teacher-led instruction or activities (Corson, 1997).

In a grade-level classroom, there are expectations for student participation in classroom discussions, reading and writing activities. They are required to have a current knowledge of popular culture, mass media, and daily news. Student must be able to make critical comment on social issues. The frustrations in keeping pace with their mainstream counterparts add cause for dropping out of school as the workload increases. Students hardest hit are those whose home country education or first language literacy skills are limited, students who are socio-economically and socio-culturally deprived, and

refugees. These students lack all or part of the background knowledge and culture that can bridge them into the new academic material they are expected to master (Duff, 2001).

Grade-level teachers and student peers experience frustration in dealing with ELLs. This frustration does not help students or classrooms to work cooperatively and effectively. It slows learners' social, cultural and academic advancement (Duff, 2001; Report of the Center for Research on Education, Diversity & Excellence, 2001).

In addition to understanding background knowledge of complex subjects such as history and science, secondary students are asked to master usage of new words which are often presented only in print – print which contains even more unfamiliar vocabulary. Examples include science terms such as static, plastic coating, and conducting wire. Many words are passively read by students and not really learned in the sense that they are remembered and can be recalled for use. The important skill of knowing how to apply the rules of use for academic words is not accomplished by brief read-overs of words in print. The textual context for in-depth vocabulary learning needs supplementation with contextual usage in activities, student interaction, realia, demonstrations, and dialogue (Corson, 1997).

Krashen, in studies over 20 years, writes that students will be unable to learn if they cannot understand the language of instruction. “Comprehensible Input” becomes defined by context, non-linguistic clues, and oral modifications such as speed. The engaging of the student's knowledge of the topic is essential to facilitating learning and retention (Krashen, 1981).

Corson presented an interesting discussion on Graeco-Latin academic vocabulary acquisition as being essential to academic success. This piqued my interest because of the regularity of Graeco-Latin words used in science and literature. Outside of school, most students from diverse socio-cultural backgrounds have no introduction to this specialized, archaic vocabulary source. Use and learning opportunity of Graeco-Latin rooted vocabulary takes place within a school day since it would seldom be used in daily social conversation. ELLs with a Romance Language background would have advantages over those with Germanic, Asian, and indigenous languages. Corson labels mastery of Graeco-Latin vocabulary an “academic culture of literacy” (Corson, 1997, p.672). Native speakers begin to find them in upper elementary school literature and science with the volume and frequency increasing in secondary school. Students with strong academic backgrounds would have more opportunities for encountering the academic words while students who have little interest in academics do not become involved in the school’s “culture of literacy” – books, knowledge, taking meaning from print. Typically they are seeking culturally relevant skills that are more practical to their survival. Thus these children miss the foundation of the “culture of literacy” which will be needed to master the difficult vocabulary and concepts presented in advanced grades (Corson, 1997).

Characteristics of Graeco-Latin words that add to their difficulty for a learner include: usually abstract with low imagery, low frequency, and semantic uniqueness. The low frequency of use does not provide the necessary contextual familiarity for recall in infrequent use in a classroom situation (Corson, 1997).

The Support Strategies For Grade-Level Courses

Literature reviewed concerning support strategies in the classroom are discussed in the following subtopics: teacher behaviors, reader-friendly textbooks, and study skills introduction and reinforcement. These are followed by two sections summarizing the basics of the classic models of Cognitive Academic Language Learning Approach (CALLA) and Sheltered Instruction Observation Protocol (SIOP) as they apply to the project.

The Teacher's Role In Increasing Comprehension and Retention of the Subject Matter

Listed in Table 1 are research findings which seemed most relevant in the elements of information transfer, textbook comprehension, and graphic organizers.

Table 1. *Research Findings Related to Effective Teaching*

Research Findings Related to Effective Teaching
Use graphic organizers to help visualize and organize thematic content. Through the process of sorting and evaluating, students become involved in responding critically to their work. Graphic organizers force students to reformulate abstract information found in the text into a more concrete form. The activity of this transfer assists in comprehension as well as expressing difficult ideas (ESCORT, 2001).
Be explicit in defining the language and curriculum standards to assist students' identification of important target material (Jameson, 1998; Rojas as cited in Checkley, 2003).
Present listener-friendly lectures which include repetition, simplification of the basic material to be learned, outlining, demonstration, modeling, visual aids, writing key words on the board, and scaffolding (Sheppard, 2001; Gersten, 2002; Richard-Amato & Snow, 1992; Garcia, 2002).
Employ the best practices of direct instruction and communicatively based classroom interactions. (Gersten, 2002).

Access background knowledge to build upon the known through association and extension (Sheppard, 2001; Report by Northwest Regional Education Laboratory, 2003).

Include reading strategies such as read alouds, shared reading, guided reading, pre and post reading. Encourage effective writing strategies such as shared writing, interactive writing, drafting, revising, and editing (Rojas as cited in Checkley, 2003).

Provide opportunities for oral practice, cooperative learning and peer tutoring in structured form to encourage scaffolding (Sheppard, 2001; Gersten, 2002; Duff, 2001; Vidal, 2003).

Recap the most important information, through student participation during the lecture, discussion, and work session (Richard-Amato, 1992; Rojas as cited in Checkley, 2003).

Devise effective assessment and on-going feedback methods such as checklists, rubrics, and conferences (Rojas as cited in Checkley, 2003).

Understand students' strengths, weaknesses, interests and attitudes, skills in comprehension, phonemic awareness, word recognition and word meaning to best prepare, present, and review academic material (Towell, 1996).

Observe and evaluate grade-level classes and materials and collaborate with grade-level colleagues (Jameson, 1998).

Unlocking Grade-level Textbooks

Students are progressively required to master new material through reading of textbooks. Even though the readability of textbooks is improving, teachers are able to boost their user-friendliness in a variety of ways. Through teacher directed activities, students can be taught to analyze all text for clues to construction and formatting (Chamot, 1994). Students can be directed to highlighted vocabulary, need-to-

learn sections, formatting cues afforded by bold headings and subheadings, graphics, tables, pictures, sidebars, indexes, and glossaries (Chamot, 1994).

Many texts are now sold with video and audiotapes, but an economical alternative is for students or teacher to read the material into an audio or videotape while reading aloud to the class (Sheppard, 2001). An important support is supplemental help using comprehensible English dictionaries and bilingual dictionaries (ESCORT, 2001).

Taking Time to Teach Study Skills

Direct teaching of essential study skills reaps benefits forever because students learn how to learn. Teaching study skills involves alerting students to identification of material which must be learned, targeting this material out of the bulk of material which is irrelevant, and demonstrating grouping of like features for easier learning. Learning may require memorization of information which is not easily and naturally acquired (Cohen, 2000). Students must develop the ability to find relevant facts and note details (Richard-Amato, 1992).

The use of graphic aids and memory strategies to increase comprehension and improve retention is highly effective and available for ELLs (Sheppard, 2001). Exercises to increase students' metacognitive awareness of their personal styles can improve comprehension of academic reading materials (Mokhtari & Sheorey, 2002). Raising the question of relevancy by asking students how the information could be useful in their lives or why they need to learn may be at the heart of study skill strategies (ESCORT, 2001).

Using the Cognitive Academic Language Learning Model - CALLA

CALLA is characterized as content-based instruction that takes place in the English language. It is based on beliefs that mentally alert learners achieve more, that strategies can be taught, that academic learning is more effective using strategies, and that learning strategies will transfer to new tasks. A student-centered approach to both teaching and learning is key to success of the model. Chamot and O'Malley are the classic researchers in presenting this model of content and language instruction (Chamot & O'Malley, 1992, 1994; Chamot, 1999).

According to the CALLA approach, language is the functional tool for learning the academic subject matter so vocabulary and grammar are critical for learning concepts and skills. Content always drives the curriculum. There is explicit inclusion of the four language skills in daily lessons on content (which makes language learning in context more interesting than language exclusive drills). An integral part of the program is teaching the ALFs that are important for performing effectively in the specific content.

Explicit instruction in learning strategies is a central component to this approach. Instruction includes naming the strategy, telling students what the strategy does to assist learning, and providing instructional supports during practice and application. It has been found that students are more able to learn and apply strategies with new tasks if they are asked to verbalize and describe their efforts. CALLA researchers have found that students who are mentally active by analyzing and reflecting on their learning activities will learn, retain, and be able to use the new information at a higher level.

When teaching cognitively demanding material, comprehension improves with contextual support and scaffolding, and by explicit instruction on asking and answering high-level questions about the content.

Other characteristics I found important in the CALLA model include: beginning slowly so as not to overwhelm the students with content and language, linking the lesson topic to the students' prior knowledge, providing interactive and cooperative experiences, giving attention to varied learning styles, following a general overview of the lesson while adding new information in chunks, identifying major components for each content topic, asking content teachers to help select high priority topics and skills, and teaching in depth rather than breadth. It is important to provide supplemental books, articles, and resources on the content and teach students how to use them.

Using the Sheltered Instruction Observation Protocol Model - SIOP

A second model, which is considered "best practices" in content and English language instruction, is the SIOP model (Echevarria, Vogt & Short, 2000; Abadiano, 2002).

Sheltered instruction is a constructivist model. The theoretical basis for the model is that language acquisition is enhanced through meaningful use and interaction with the language. All four skills of reading, writing, listening, and speaking are integrated. The SIOP model brings together practical strategies to determine what to and how to teach it through modeling of selection, prioritizing and organizing techniques. It aims to help students set their own goals for learning and monitor their own progress toward achieving their goals. In this way, it is student-centered and culturally sensitive. SIOP strategies

teach content to ELLs in structured ways that make the academic subject matter comprehensible while in tandem promoting English language development. Since mastery of this model is a process for teacher and students, the beginning stages will have varying degrees of effectiveness (Echevarria, Vogt & Short, 2000).

Language and academic subject matter objectives are woven into the curriculum with special attention to language development. Heavily structured lesson plans and instructional strategies are designed to promote success for ELLs in the content area learning. Like the CALLA model, SIOP teachers explicitly target the level of English used and make the content more comprehensible through visual aids, modeling, demonstrations, graphic organizers, vocabulary previewing, predictions, outlining, adapted texts, reading aloud to students, cooperative learning, peer tutoring, multicultural content, and native language support.

Students are explicitly taught advanced ALF skills such as how to negotiate meaning, ask for clarification, confirm information, argue, persuade, and disagree. In the process of learning the ALFs, students are participating with increased opportunity to internalize the material. The model uses supplementary materials that support and enhance the key topics. Examples are related reading, graphs, illustrations, models, realia, and computer-based resources.

Learning the content vocabulary is a necessity. Teaching vocabulary involves teaching linking, analogy, and association, structured repetition for review, paraphrasing and restating students' responses, modeling correct usage, and supporting verbal scaffolding.

SIOP procedures make every effort to link the students' background experiences as well as connect previous academic learning to the material to be mastered.

Teaching Academic Language Functions – ALFs

Academic Language Functions (ALFs) put language to work in academic curriculum. Each academic content area has its own registry of ALFs. The ability to use ALFs in the content areas is essential to language and academic competence.

Two sources reported on ALFs and importance in academic and language proficiency. The first source, Chamot & O'Malley (1994), lists distinct functions of defining, describing, comparing, classifying, predicting, hypothesizing, seeking information, justifying, persuading, solving problems, synthesizing, and evaluating.

A second source, Richard Kidd (1996) agrees with the first six functions of Chamot and O'Malley but argues that seeking information, justifying, persuading, solving problems, synthesizing and evaluating are so general that a teacher would not know where to begin to teach the functions. Kidd further categorizes ALFs into two basic types: macrofunctions and microfunctions. Macrofunctions have more general language uses and would include O'Malley's ALFs of defining, describing, comparing, evaluating, and classifying. Microfunctions are narrow and specific and operate with limited language description.

Writers on the subject of ALFs agree that ELL students need to be explicitly taught the forms of language such as vocabulary, grammatical structures, and discourse features. More challenging is the explicit instruction on how to use the newly acquired language for accomplishing academic tasks. Teaching the ALFs is a combination of

teaching language and teaching academic concepts (Chamot & O'Malley, 1994; Chamot, 1999; Kidd, 1996).

Every content area has a unique registry and discourse that is characterized by its own vocabulary, textual patterns, and special communicative purposes. Each content area uses textbooks that reflect the discourse characteristics of that specialty area. The sciences are high in ALFs of defining, speculating and inquiring, imagining, concluding, expressing relationships, generalizing, expressing cause and effect, explaining, and instructing (Kidd, 1996). To master these functions and the academic content requires lower and higher order thinking skills suggesting a close relationship between the ALFs and thinking skill strategies. Lower order thinking may require only simple grammatical structures such as describing in simple sentences while higher order thinking skills may include more abstract and complex language, larger quantities of language, and complex ALFs such as analyzing and synthesizing. As complexity of processing increases, there is a need for higher-level vocabulary and the ability to use grammatical structures and discourse features to organize and explain the information (Chamot & O'Malley, 1994).

Often the grade-level teacher will assume that the student comes equipped with academic language and ALF capabilities and will not instruct or reinforce these aspects of the learning process. It must be remembered that academic language and its functions are not common on a daily basis outside of a classroom. These two realities mean that introduction, teaching, repetition and reinforcement must come primarily from the teacher and the curriculum (Chamot & O'Malley, 1994).

The instruction potential is layered to include activating a learner's prior knowledge and linking this with related materials, providing instruction on familiar, technical, and content vocabulary, encouraging consideration of the new and unfamiliar material in relation to the context in which it appears, and teaching commonly used grammatical structures. Familiarity with textbook layout and its built-in learner cues help to target important key material (Konold, 2003; Ediger, 1999; Frantzen, 2003)

Cummins (1981) points out the importance of student oral participation. The interaction involved in an oral study session provides useful non-linguistic cues and context for comprehending the material. Gaps in knowledge can be discovered and filled through learner questioning and conversation.

Understanding Physical Science Curriculum

The content of science courses offers a challenge to most students and is even more difficult for a language learner (Watson & Houtz, 2002). The National Research Council reports that the National Science Standards are now encouraging a broad approach to scientific inquiry for the learner. The requirements of scientific learning includes becoming knowledgeable of the material and understanding the various ways in which a scientist studies the material and proposes explanations based on findings. Current practices require students to observe, question, researching what is known, as well as plan and execute experiments. Formulating hypotheses, interpreting results, and writing up the activity are part of the process. Strong language abilities in scientific terminology become necessary for all scientific study (National Research Council, 1996).

ELLs who have not acquired the sufficient technical language skills will struggle to keep up with the daily rigors (ESCORT, 2001).

Chamot and Casey summarize the problems. Science curriculum contains extensive new and technical vocabulary which includes supposedly familiar words which are assigned a technical meaning; textual grammar is complex with regular use of the passive voice, multiple embeddings, and long noun phrases. There are subject specific ALFs that must be mastered. Study skills such as note-taking and understanding of information found in diagrams, charts and tables are often key to understanding the information. Graeco-Latin words are frequently used and often require knowledge of uncommon roots and affixes. Students often misunderstand scientific information because of simplistic understanding of the new information (Chamot, 1994; Casey, 2002).

What advantages can teachers give students to assist in scientific learning? Science curriculum is cumulative i.e. information presented at an elementary level will appear again with more detail in later use. The cumulative factor allows for repetition and association by students. Teachers should take advantage of this and tap prior knowledge as well as scaffold (ESCORT, 2001). Context embedded information can be further clarified through the use of realia, gestures, pictures, hands-on materials which will assist in learning content and language of the task. This important support represents (re-presents) the information visually (Silvana, 2002). For individual or group activities or assessment, giving students a choice of projects strengthens their comprehension of the material and offers opportunity for them to encounter the language of the lesson.

Reporting on projects benefits the presenter and the audience. Students with differing learning styles and language needs have potential for better access to the curriculum (Anstrom, 1998). Using comprehensible chunks of words and phrases, presenting a skeleton outline, presenting review sheets and supplemental lower language readings help to highlight the points of importance and reduce the less essential information which may be presented in text or classroom lecture (ESCORT, 2001).

Considering Action Research

In planning for the project, I considered the viability of several methods of research. Action research was chosen because it encouraged on-going reflection and adjustment of classroom practices (Glanz, 1998). The rigors of applied research performed by a teacher/researcher with a personal goal of improving teaching practices and offering greater opportunity for student success made this choice reasonable and desirable. As one who questions strategies and intuits student interest and engagement, I saw potential for development and change in myself and in my students (Grabe & Stoller, 2002).

The characteristic of action research as a circular process suggests the efficacy of adopting these strategies for lifetime use (Grabe & Stoller, 2002). The process can be repeated and adjusted with rethinking and evaluation an integral part of the process. Questions and possibilities can be experimented upon *ad infinitum*. Though action research appears informal, it gives structure by addressing the issues and problems of the immediate situation. There is opportunity for questioning as well as structured time and

attention for evaluating special needs, behaviors, and making discoveries. (Freeman, 1998; Glanz, 1998; Grabe & Stoller, 2002; Schoen & Schoen, 2003).

The variety of data collection options common to action research is flexible and can be personalized to the situation. Journals, teaching logs, student work samples collected and compiled into portfolios, field observations, teacher interviews and surveys can be used to assess effectiveness of the experimental strategies (Freeman, 1998).

Exploring Computer Software As An Instructional Tool

Two software programs were explored for student use in this project, Microsoft PowerPoint® and Inspiration®. At a MinneTESOL Conference presentation, Audrae Coury described classroom use of PowerPoint® to enhance fictional reading selections (Coury, 2003). Following her cues, I researched reports on PowerPoint® usage as graphic organizer and presentation software. Although PowerPoint® was not used in the project, citations have been included because of their importance in the justification of use of a graphic organizer tool. Many of the attributes of PowerPoint® are shared by Inspiration®, the software chosen for the project.

PowerPoint® is preferred software because of its potential as an “Interactive Lesson” (Tomei, 2000, p. 69). PowerPoint® is recommended because it is self-paced, student-controlled, individualized, and excellent for assessment. Being visually based, it has potential to grab the attention of learners who would benefit from taking an abstract concept and giving it concrete graphic form. It accommodates learners by offering instruction that is paced to their abilities or remedial learning needs. Being learner-centered, much of the mastery of tasks is placed in the hands of the student since

it is student initiated and controlled throughout (Tomei, 2000). By the creative addition of color, sound, and movement in the multi-media format, visual, auditory, kinesthetic/manipulative learning styles can be complemented (Harrison, 1999).

In the process of completing a slide show, students gain comprehension of the information as well as making connections between the content and its presentation. In the planning and implementation process, learners have opportunity to manipulate the information to increase comprehensibility and coherence. Editing and adaptation encourages risk taking and experimentation (Patten, 2001). The final product looks finished and professional in a graphic sense. In the manipulation and transformation of the abstract concept into a graphic form, there is strong possibility that the learner has gained comprehension of the abstraction and will have better potential for both short- and long-term retention. A cooperative learning activity involving the preparation of a software presentation offers scaffolding support (Kelly, 1999).

In a subsequent conversation Kathryn Heinze recommended exploration of a graphic organizer software program, Inspiration®. At first glance, Inspiration® offered many of the benefits of PowerPoint® with additional graphic capabilities. Conveniently, an Inspiration® diagram and outline document can be copy/pasted into a PowerPoint® slide for presentation.

Inspiration® is a visual learning tool aimed at increasing critical thinking, comprehension, planning and writing skills across the curriculum. In a report commissioned by Inspiration Software®, Inc., the Institute for the Advancement of Research in Education (IARE) summarized the findings of 29 scientifically based

research studies. Findings substantiated claims of the importance of graphic organizers in education. Under the heading Cognitive Learning Theories, Dual Coding Theory explains we learn in verbal and nonverbal ways. When accommodating both ways, information is retained and recalled more effectively. Schema theory suggests the importance of networking our information. Cognitive Load Theory suggests we have a maximum capacity for information and graphic organizers help reduce the load and allow for more capability for learning new material (2003).

Conclusions of the IARE study were that the benefits of graphic organizers across content areas and at multiple grade levels with varying student populations were proven to increase student performance, increase critical thinking, as well as help with retention and recall. A summary of supportive evidence for incorporation of graphic organizers into the curriculum is found in Table 2.

Table 2. *Graphic Organizers Support Learning*

Graphic organizers support learning by:
Assisting in brainstorming ideas
Assisting in developing, organizing, and communicating ideas
Assisting in seeing connections, patterns, and relationships
Assisting in accessing prior knowledge
Developing vocabulary
Promoting outlining for writing process activities
Highlighting important ideas

Classifying concepts, ideas, and information

Identifying and relating the events in a story or book

Improving social interaction between students and facilitate collaborative group work and collaboration

Guiding review and study

Improving reading comprehension skills and strategies

Facilitating recall and retention

From a report *Graphic Organizers: A Review of Scientifically Based Research* prepared for Inspiration Software® Inc. by The Institute for the Advancement of Research in Education at AEL, 2003.

Two case studies were reported in the Inspiration® Case Study website section report on use in schools. Tom Stahley, a Montana science teacher, collaborated with teachers from two other schools to research use of Inspiration® as a note-taking study tool for ninth and tenth graders. Stahley reported that 81 percent of the students organized information effectively and 36 percent showed test score improvement. Students were enthused about graphic organization for study use and began using it for their other subjects.

Hoppy Chandler reported on student use in a San Diego continuation school commenting on the effectiveness of explaining complex information with simplistic clarity. Ideas were generated and put into format as quickly as a student could type. Students were motivated to perform longer and more effectively.

Using Information From The Literature Review In The Capstone Project

Review of this information helped to establish a fuller understanding of the ELL students' needs and to find documented research results that met these needs. This information has been included under subheadings of "The Challenges to ELL Students in Grade-Level Classrooms" and "The Support Strategies For the Grade-Level Courses." "Teaching Academic Language Functions – ALFs". Literature reported on findings regarding fundamental academic uses of English language necessary to comprehend written and oral content material. Literature on the importance of ALFs offered my first insights to raising the comprehension level and adopting strategies to make meaning out of content specific words.

Teaching physical science is not my trained field, and as a result there are gaps in my understanding and strategies within this field. Science readings gave insight into the sciences, technical vocabulary, progressive addition of new material, and the requirement to become competent in abstract and conceptual information. Though there is limited literature on "Understanding Physical Science Curriculum", what was found was pertinent to my LEC situation and gave new information on the expectations and difficulties of mastering physical science curriculum.

Lastly, action research as a method of researching instructional alternatives empowered me to explore options on a day-by-day basis. All of the literature cited gave structure to assist in keeping perspective within a flexible framework. Action research as it was presented in the texts fit my introspective work style very well with the added

bonus of giving necessity to reflect, reconsider, create and recreate to meet the changing requirements placed upon a student.

CHAPTER THREE: METHODOLOGY

Topic Statement

The topic to be investigated through action research is the use of information transfer from a grade-level physical science textbook to graphic organizer software in order to determine whether information transfer is an appropriate strategy for teaching academic language function to secondary school ELLs.

Duration and Site

The data collection of the project took place over the course of seven weeks of third trimester, April to the end of May 2004. The time available for student participation varied from one to three 45 minute class periods per week, depending on the student's availability. Three students participated within the class periods of Learning Enrichment Class (LEC), while two participated during their scheduled study halls. The site was a ninth grade classroom in a six hundred student parochial high school in Minneapolis, MN. The school and LEC program are discussed in detail on page 3. The textbook used by ninth grade students was entitled Physical Science (McLaughlin, 2002).

Participants

All participants were ninth grade ELLs who were 14 to 15 years of age. For purposes of this project, they have been named Regina, Phao, Geraldo, Pedro, and Leona.

Four students were born in the United States and lived in families speaking Hmong or Spanish as language of choice. A fifth student was a recently adopted refugee from Africa who spoke several ethnic languages and lived in a native English speaking family. All students were orally fluent at ninth grade level or above (four with no accent).

Four students were admitted to the school on probationary status due to low performance in reading, writing, and math in the STS High School Placement Test. Student information and percentile scores are displayed in Table 3.

Table 3: Information on the Participants

Student	Language: First/Home	Admission status	STS High School Placement Test scores In National Percentile performance rankings	Language ability level
Leona	African/ English	Probationary	Reading skills 39-0 Language skills 1-0 Composite 22-0	High Beginner
Pedro	Spanish/ Spanish	Probationary	Reading skills 5-2 Language skills 5-2 Composite 4-1	High Beginner
Regina	Spanish/ Spanish	Standard	Reading skills 33-4 Language skills 77-7 Composite 58-5	Advanced
Phao	Hmong/ Hmong	Probationary	Reading skills 37-4 Language skills 8-2 Composite 21-3	Advanced
Geraldo	Spanish/ Spanish	Probationary	Reading skills 4-1 Language skills 3-1 Composite 4-1	Intermediate (TESOL, 1997)

Using criteria from TESOL standards, Leona and Pedro would be considered High Beginner ELLs, Geraldo would be an Intermediate ELL, while Regina and Phao would be Advanced in their English language learning (TESOL, 1997).

All students were mainstreamed in grade-level content courses. Leona, Pedro, and Geraldo were enrolled in my two-period Learning Enrichment Class as their elective class meeting requirements of their probationary acceptance. LEC was created to support five fast-paced, grade-level content classes, target long-term improvement in study skills, teach effective learning strategies, and deal with behavior issues. The high beginner and intermediate students, Pedro, Leona, and Geraldo, had reduced class loads while advanced students, Regina and Phao, were mainstreamed with full class loads of seven subjects.

Students attended four different physical science classes. They studied under three teachers. Each student was in a different section or chapter with no two students studying the same material at the same time. Leona, Regina and Phao were progressing well and earning acceptable trimester grades in all subjects. Pedro and Geraldo were challenged in several subjects and failing in others. All students generously dedicated their study hall time to physical science study within my research context.

Action Research And Inspiration® Software

I chose action research as my method of investigation. The cyclical nature of action research offered an effective format for investigation of the topic. The features of preparing a thesis, presentation, monitoring, exploring, discussing, documenting,

evaluating and analyzing, and then beginning anew by refining and revising presenting a workable framework (Shoen & Shoen, 2003). Action research fit my try-and-revise work style very well with the added bonus of giving impetus to create and recreate classroom strategies, to purposefully reflect on the day's activities, to consider schema for the next lesson based on my perception of the degree of previous success or failure.

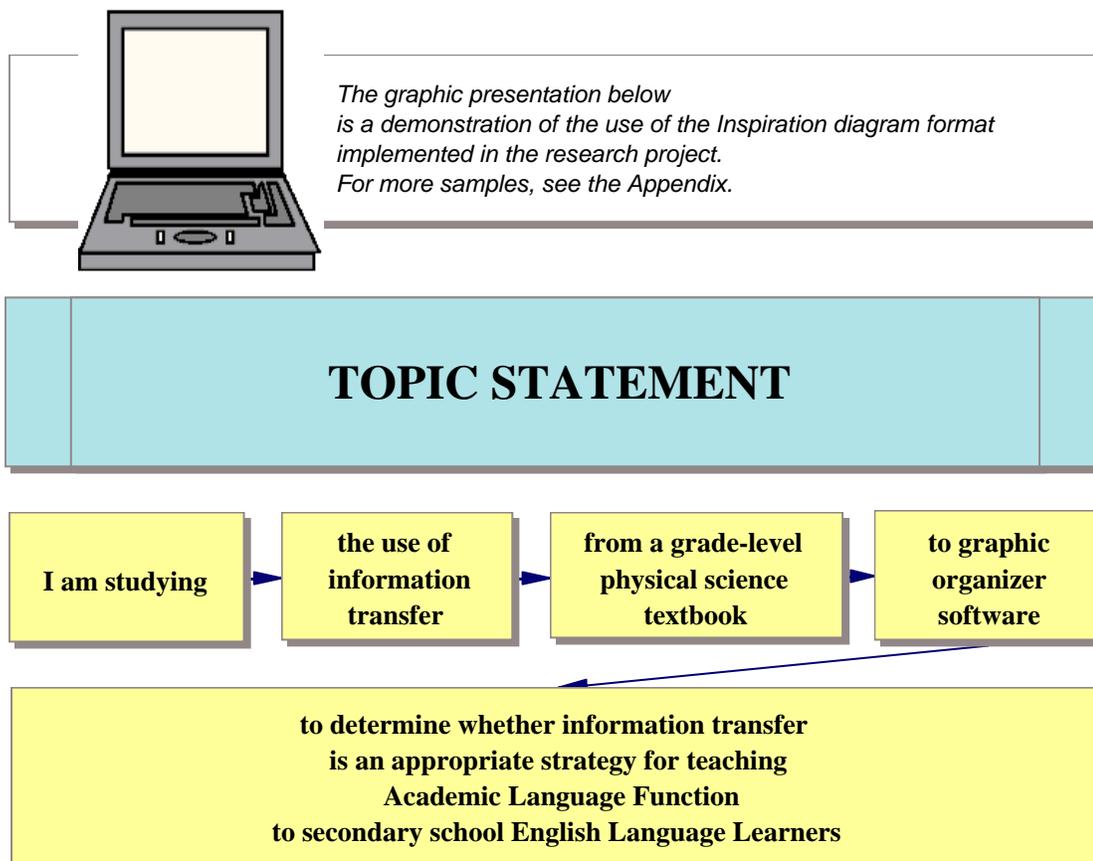
The ELL students enjoyed the relaxed atmosphere of the computer area and seemed motivated to complete work with the use of a computer. All of the students were familiar with the basic use of the keyboard and Microsoft Word® software.

Inspiration®, a product of Inspiration Software®, Inc., was chosen for the project because of the highly user-friendly diagram and outline formats. Through its use, students had practice in clarifying their thinking, processing the material, organizing and prioritizing, discovering patterns and finding interrelationships and interdependencies. Inspiration®, as a flexible graphic organizer tool, offered options for the student to create documents in either a traditional outline or graphic diagram format. There was time for instruction and experimentation during the orientation session.

The graphic in Table 4 demonstrates the diagram format of Inspiration® using the topic statement as the subject. By the click of an icon on the menu, either the diagram or outline format becomes available for student input and viewing. The outline is preset in standard outline format. In diagram format, there are options for sizes, shapes, colors, click art, and audio. This software is compatible with Microsoft Word® and Microsoft PowerPoint® either through menu or copy/paste options. Appendix 1 shows the topic statement in both outline and diagram format. Appendix 2 shows a detailed presentation

of the contents of the Methods Chapter using both the outline and diagram format of Inspiration®.

Table 4. *Graphic Presentation of the Topic Statement using Inspiration® Diagram Format*



Methodology in the Classroom

Expectations and Preparation of Students

An explanation of the scope of the project was given to students. A syllabus of the project was handed out to read and retain. Appendix 3, Inspiration® Information Sheet, was prepared to aid the student in a step-by-step introduction to the software program. Due to time limitations, software orientation took place using content material. For the initial phases of this project, students were encouraged to work in pairs with my active support. After completing the first chapter, students were able to work independently although they were encouraged to collaborate.

Students worked at two computers in a quiet area in a study hall classroom. All documents were saved in desktop files and on diskettes. After learning the capabilities and quirks of Inspiration®, students began work by using their physical science textbook to complete the documents.

Directives located in Table 5 explain to students the procedure for completing the work.

Table 5. *Directives for Student Preparation and Document Entries*

Directives for Preparation and Document Entries
Read the entire physical science chapter paying attention to new vocabulary, sidebar information, story boxes, illustrations, and highlighting
Browse the questions in the review and test at the end of the textbook chapter.
Practice describing, defining, comparing/contrasting a science concept or vocabulary.
The computer exercise portion of the work involves transferring physical science

information from your textbook onto the software document to help you memorize and learn the information.

Entries are to be a practice activity using the new vocabulary and concepts.

Entries are to go from the general to specific as in an outline.

Entries can be separate or connected to each other.

Entries are to be in your own words as much as possible - not copied directly from the textbook.

Entries are to be in short phrases and clauses - not in sentences.

Entries do not need punctuation.

At any time you can add or remove information in either the outline or diagram format.

The document created should be in a form, which would help you in review and study.

My intention was to begin the lesson with the Academic Language Function (ALF) of describing since it would be most familiar to them. We discussed some of the factors involved in giving a description of a scientific piece of information. The other ALFs used in later sessions were comparing/contrasting, and defining.

Beginning the Data Collection

In a demonstration of the Inspiration® document presented on the computer screen, key words from the physical science chapter were typed on the outline/diagram pages to give start-up cues. Students were able to work in the format in which they were most comfortable – in the graph or the outline. Appendix 4 demonstrates a jigsaw

document, which required working together to complete the missing entries on both documents. Students were familiar with this collaborative activity.

With a majority of the content material prepared for them, the first lesson was a read-and-keyboard activity. They were coached to say the words aloud to each other for oral pronunciation and listening practice. Collaboration between pairs of students rather than consultation with me was encouraged.

When the first document was completed, the students examined their work from both the diagram and outline perspective and enjoyed the magic of Inspiration®. Students observed that a long outline sentence would not fit in the diagram boxes – which was part of the goal – to shorten the entry to its smallest meaningful phrase. Students manipulated the document to shorten the outline and view it in the diagram – and the reverse. Students were able to spend time enhancing the diagram to make it visually artistic by adjusting the box size, colors, shapes, linking, connecting, adding clip art and more. Following completion of each document, students were given a color printout in diagram and outline form for use as a study tool.

Student Sessions Following Orientation

During the initial session, it became apparent that high beginner and intermediate students, Pedro, Leona, and Geraldo, would be requiring many more scaffolding cues on their starter documents. After heated discussions and threats of a boycott by students, a compromise was reached. For the remaining sessions, these students logged into a screen prepared with key words in diagram and outline format.

For the second and remaining lessons, the advanced students, Regina and Phao, opened to a screen prepared with outline headings or diagram boxes - but very limited text. With their first independent work, I had a diagram/outline roughed out for them to glance at but not use for their work. In the final session, both students were encouraged to complete the entire process alone. Phao was the only one who independently created the entire diagram. Samples of the work of Leona and Pedro, Regina and Phao are in Appendices 5,6,7,8 with all of the ALFs represented in the students' sample documents. Geraldo began a new project.

Geraldo worked as planned for only two lessons. After the second lesson, he refused to continue the original project since his physical science focus was to complete a final project assignment that weighed heavily on his trimester grade. Regretting possible loss of a participant and seeing this student's need and commitment, I decided to be flexible and work with Geraldo to use information transfer, ALFs, and some form of graphic organizer for this assignment. Geraldo was performing the same tasks as the other participants. He was using different topics but basically processing in the same way.

The project was multifaceted. He was to consider how the eight topics of shelter, food, waste, power, transportation, communication, light and heat were dealt with in four circumstances - in the city of Minneapolis, in a science fiction movie, in science fiction literature. Finally, he was to address the eight topics in his own fictional community.

Since he preferred to work in the diagram format when working in Inspiration®, he created a diagram for his development of the eight topics in the city of Minneapolis in 2104. See Appendix 9.

When reporting on results and discussion, I included Geraldo in the general comments because of the similarity of his processing of ALFs, information transfer, and graphic organizer usage to the processing of students completing the planned documents.

Data Collection, Storage, and Reflection

Document data was collected daily from students and placed into individual portfolios in hardcopy and diskettes. Students were given color printouts of the work accomplished during that session. At the end of the second chapter, a survey was given to elicit student opinions of this learning tool. A final survey was given at the end of the project in May.

To assist in maintaining focus on the topic and subtopics and as an essential part of action research, I maintained a log with comments on the sessions. I considered the effectiveness and shortcomings of sessions, teacher or student centeredness, student enthusiasm and motivation, as well as behavior. After reflection and evaluation, the appropriate reinforcement, adjustment, or change was prepared for the next session. I used the pre-designed form in Appendix 10 to cue myself during reflection.

CHAPTER FOUR: RESULTS AND DISCUSSION

There were anticipated and unanticipated results in the action research project investigating the use of information transfer from a grade-level physical science textbook to graphic organizer software by secondary school English Language Learners (ELLs).

I reported in the preface the obstacles to implementing this project as it was originally conceived. Surprisingly, the decision to recruit additional participants was informative offering an opportunity to observe ELLs at three language ability levels. Flexibility on my part remained key to success of daily work – especially for the high beginner students. As a teacher/researcher, I was as much a learner as my student participants.

Through my teaching experience, I had become aware of students' academic needs and challenges, and also sensitive to the powerful influences of the complicated social interactions of ELLs surviving as teenagers in grade-level classrooms. The personal issues of each student played an important role in his/her daily participation and commitment. Social behavior as well as academic progress was involved in the determination of success in this project.

Results

The use of information transfer using computer software was an effective strategy for teaching ALFs to ninth grade ELL physical science students. The amount of success

varied with each participant. The more advanced students, Regina and Phao, excelled at near grade-level ability. Intermediate student, Geraldo, was able to perform many of the requirements while high beginner students, Pedro and Leona, struggled at nearly every task. Many of the procedures of the information transfer were too difficult for the high beginner students.

Measurement of Success

Criteria were developed to determine students' success in mastering the transfer of information. In Table 6, the left column lists criteria considered for success. Some of the criteria were measurable through averaging scores, which I gave daily in each category. Other criteria were totally subjective with arbitrary values assigned by me using perceived grade-level performance as a baseline. For work sessions and for criteria scoring, participants were grouped in the three right hand columns by language level. The advanced students, Regina and Phao, were paired at work sessions, as were the high beginner students, Leona and Pedro. The intermediate student worked alone.

Criteria A dealt with motivation, attitude, and metacognitive awareness of personal style preferences. These scores were determined by conversation and observation. Criteria C, D, and E, dealt with the process of seeking, organizing, and presenting the information. Criteria F and G dealt with identification and transfer of the information into Inspiration® while in the process using the ALF. The session work samples provided material for judging Criteria C, D, E, F, and G. The scores 1-5 are averages of the scores give to participants in each language grouping.

Criteria H and I reflected classroom interaction and the potential for long-term use of information transfer strategies using a software tool. Scores were subjective and assigned by me pursuant to classroom observation and conversations with students.

Finally, Criteria J indicated my sense that these exercises influenced the student's productivity and assessment scores in the grade-level class. Student assessment information in physical science was made available to me through the school administration. This information included scores for class participation, classroom work and labs, quizzes, major tests, and final projects.

Table 6. Assessment Criteria and Group Success Ratings

Rated on a scale of 1-5 with 5 being grade-level performance and 1 being low performance.

CRITERIA	GROUPING OF STUDENTS		
	Advanced	Intermediate	High Beginner
A: MOTIVATION. Students had observable self-confidence, motivation, and positive attitude toward completing the academic tasks.	4	4	4
B: LEARNING STYLE. Students showed a personal preference for textual or visual processing and experimentation with alternative strategies.	5	5	5
C: USE OF SUPPORTS. Students demonstrated increased use of textbook supports of glossary, highlighting, sidebars, illustrations, and story boxes.	5	4	3
D: GENERAL TO SPECIFIC. Students demonstrated increased ability to present entries from general to specific and show relationships.	3	2	1

E: STUDENT LANGUAGE. Work samples demonstrated ability to state answers in their own words using short phrases and clauses.	3	2	1
F: INDEPENDENT IDENTIFICATION AND TRANSFER. Students demonstrated increased ability to independently identify and transfer physical science information from the text to graphic organizer software.	4	2	1
G: USE OF ALFs. Students demonstrated ability to effectively use the three-targeted ALFs of describing, defining, comparing and contrasting.	5	3	2
H: CONTINUED USAGE. Document and information transfer usage was considered by students for use in physical science and other content subjects.	3	4	3
I: INCREASED CLASSROOM INTERACTION. Students exemplified increased academic interaction with teacher by seeking assistance, by asking questions, or by supplying answers.	2	4	4
J: GRADE-LEVEL IMPROVEMENT. Students showed improvement in scored participation, class work, homework, quizzes and tests in grade-level classroom.	3	2	2

Discussion

The discussion of research results in the following paragraphs refers to criteria and student language level groupings in Table 6.

All students scored high on B: Learning Style. Students were appreciative of the choice to work in textual outline or graphic diagram format. They expressed definite preference for outline or diagram to complete the tasks. It was seldom that they had a graphic alternative with the added perk of computer input and presentation. The language groups were split within themselves with individual students preferring use of opposite formats. There was a split by gender with boys intrigued by the visual diagram format and girls preferring the more traditional text-based outline. When boys had time, they added color and changed the box shape and enthusiastically took the printout of the diagram. The girls had a different attitude. Leona was not at all interested in viewing the diagram or receiving the diagram printout. Regina did not work in the diagram but was fascinated viewing it after having made all her entries in the outline. She used her remaining class time to color the diagram.

Important to mention under B: Learning Style is the role that ALFs, information transfer, and outline/diagram format played in directing the ELLs to an organized pattern of knowing what to look for, where to look, and how to present what had been found in their own words and through their own efforts. They were pleased that their product looked professional and of high quality. My observation was that use of this system was a viable process for all students – no matter how hard it was to perform individual steps in the process. Students were given a regime to follow which was logical, able to be

corrected, easy to read and use. Students produced a neat, attractive, organized document that they could submit with pride.

I have found in that past that students were able to master the ALFs with assistance and practice but floundered when asked to present what they had learned. Inspiration® was perfect in that it regimented the process and required simple wording in a controlled pattern. Its formatting requirements assisted students to express what they knew. I observed students as they experimented, corrected their phrasing, saw links and associations, and saw flaws in their linking and associations. Any correction, addition, or removal was done with ease and efficiency. No doubt, practice and continued usage would have yielded improved organizational skills – a major personal and academic need for all of these students.

All students were excited about working on this project. The choice of computer and unfamiliar software may have been an influence in A: Motivation. The project took place at the end of the school year, and students needed all the support help they could get in physical science class. The intermediate and high beginner students were in trouble with low grades at the end of the third trimester. Their energy level was generally low. This fact made the high scores given for A: Motivation very important.

Generally, the students' mastery in the more academic aspects of the project was related to their language level. This was demonstrated in Criteria C, D, E, F, and G. The work of advanced students was completed faster with fewer corrections needed after our discussion of the answers. High beginner students were not able to meet the desired goals with any marked level of competence. It was encouraging to see them remain

committed to the lessons even though every lesson was strenuous and demanding for them. After several tantrums from Leona and Pedro, compromise was made, and they were supplied with key words rather than required to work without cues for the remaining lessons. For these students, mastery of any academic feature took additional time and practice. Rather than stress these students, I allowed more time for the completion of their work. I surmise that their performance would be significantly improved with extended time and additional practice.

Advanced students performed at grade-level when using Criteria G: ALFs. They needed introductory coaching but caught on immediately and were able to move ahead with confidence. There was low performance of Criteria G with Geraldo, Leona, and Pedro. With coaching they would eventually locate the information in the textbook, but were frustrated putting it into their own words. They asked for and were given help and encouragement to work together as partners to come up with “student language.” In the end, they resorted to copying from the book making only minor changes.

All students gained proficiency in Criteria C: Making use of Textbook Supports. Students were aware of the usefulness of these non-textual features (sidebars, highlighted vocabulary, illustrations, and glossary) but did not fully understand their usefulness for answers and supplemental insights into the main text. These supports became shortcuts for work in many sessions. The more proficient the student, the more frequent the use of textbook supports.

Generally, the evaluations in Criteria H and I were disappointing. Advanced students did not verbalize interest in continued use of information transfer or software.

This could be influenced by many factors: trimester end, year end, shortness of the project, and anticipation that the software would not be available beyond the project.

Perhaps I am too quick to judge because I can report on two positive observations. In the first, Geraldo was enthused at the convenience of the graphic layout. A major challenge to Geraldo was organization. This project offered him opportunity for organization with the convenience of computer-supported transfer through cut/paste functions. His keyboarding skills were good so the input and editing phases moved quickly. To Geraldo, the ability to see where he was and where he was going was a huge benefit. Visual presentation through Inspiration® gave him a boost and definitely was a motivating factor in completing his project. According to Geraldo, computer software made the project easier.

A second promising observation involved Leona who needed to create physical science-based questions and answers for a board game she was designing for her content physical science class. She came to me for assistance. Since one of her personal goals for the year was to become more computer literate, I suggested that she develop tables in Microsoft Word®. Each cell would contain a question and answer. Just as in the project, she searched the textbook for entries. After finding a good topic, she needed to create questions and answers from the information using her own words. She was basically using ingredients of the project for the 80+ entries she would need for game cards. She was delighted with this visual layout and her increased computer skills.

Influence of the project work on the students' grade-level physical science assessment scores, Criteria J, is difficult to determine. Generally I could not attribute

improvement or change in scores to the research although there were interesting observations. Advanced students scored lower in the third trimester while the other students scored higher. For the three trimesters of the 2003-2004 school year in grade-level physical science class, Phao earned a C, A-, and B- while Regina earned C, C, and C-. To his credit, Geraldo, the intermediate student, earned 155 of 200 possible points for his final project in the grade-level physical science class. His final grades in physical science for the three trimesters were F, D, and D. Completion of seven missing homework assignments would have raised his final grade. The high beginner students both improved their physical science grades during the third trimester. Leona's grades were D-, C-, and B- for the three trimesters of in her grade-level physical science class. Pedro had grades for the three trimesters of D-, F, and D- in physical science classes. The D- in the third trimester was questionable since he scored only 118 of 576 possible points, failed to submit 12 homework assignments, and missed a 50 point chapter test. Pedro's charm and agreeable attitude influenced the final grade in ways that his academic work did not.

Since this is a discussion within the framework of action research, I will include other reflections from my observation notes. Flexibility on my part was essential to helping students complete the rigors of this project. My daily sensitivity to their morale and needs played an indispensable role in achieving my goals and offering the students opportunity to explore alternatives, comprehend physical science material, and present what they had learned with the modern tool of computer software. No two lessons were alike. Each student was approached and coached as an individual. Individual

understanding of five students at three language levels gave me cause to feel confident about the importance of this project for academic success of my students.

The framework for discovering and tightening the oral gap was provided by action research. For two semesters, I had been unaware of the depth of this neglect. It took a holistic project with scheduled reflection time to realize the problem and consciously insert the fourth language skill into the work sessions.

A discovery during work sessions was that students had limited practice speaking aloud the scientific vocabulary words. They had been listeners but infrequent speakers of science vocabulary. They stumbled when pronouncing words and phrases when asking or answering questions, or even when reading from the textbook. Practice with teacher and peers in this active collaborative setting of the project gave them opportunity to voice the vocabulary. Correct pronunciation took place quickly because of their oral competencies. With the addition of pronunciation, students exercised all four language skills in a physical science context.

CHAPTER FIVE: CONCLUSIONS

The teaching of Academic Language Functions through information transfer to a graphic organizer using grade-level physical science material was an effective strategy for the learning of difficult academic material for secondary school ELLs.

A primary finding was that all students were able to use Academic Language Functions (ALFs) of description, comparison/contrast and definition in information transfer with varying degrees of difficulty and accomplishment. The fact that all high beginner, intermediate, and advanced ELLs were able to transfer the physical science material into the software makes this strategy a viable option in today's diverse classrooms.

Of major importance was the allowance of additional time for lower level learners to understand the information transfer process, search for answers within the textbook and transfer the information in their own words to software on the computer.

A secondary finding was that a computer-based graphic organizer was a useful tool to transfer the ALFs into student terminology. The Inspiration® software application allowed choices in outline or diagram format that simplified and organized the information into more usable study form. All students have a need for direct instruction and practice in organization of the material to be learned – organization appropriate for their particular learning style. This information transfer process as well as

the finished product in Inspiration® were effective organizational tools and assisted in creating meaning for individual students. It offered repetition and practice within the academic material of the physical science textbook, practice in sorting through material for pertinent information, and visual presentation of sequencing and association of information within a topic area. The diagram option was highly visual, but even the outline mode was significantly more visual than straight narrative text. Both formats encouraged condensing the material to short, meaningful phrases suggesting implementation of higher thinking skills. This conceptualization ability in a second language may be in development stage in an ELL Beginner.

Furthermore, students had yet another encounter with the science material. Repetition and manipulation of material increased their potential for comprehension and retention. With repeated manipulation, spelling was practiced and oral skills were employed for peer and teacher conversation. Students had an opportunity to pronounce new vocabulary. There was time to generate thoughtful questions and seek clarification when necessary.

Students had a condensed, organized, and highly readable display of key points using target vocabulary in either the outline or graphic mode. The process of text reduction assisted ELLs to organize and create meaning in a user-friendly format for study. There is no doubt that the transferred information was easier to review in preparation for an exam. As students became more comfortable with the information transfer and the Inspiration® document they created, the strategy became more effective and desirable as a notation tool. The rigor of multiple reviewing of the new material was

less tedious and more easily accomplished because of the simplicity of the notation. A spell check was possible with easy correction. New material could be added at any time in either format – especially useful following a discussion with peers and teacher.

Moreover, students seemed motivated and enthusiastic working on this project. The information transfer process was strenuous for all students and any strategy to process and make notation clear, condensed, and meaningful would streamline the procedure and possibly increase retention. This tool could be effective for teacher and students when frustration levels are high and a visual/non-textual would be desirable.

Visual learners were given an opportunity to perform in their preferred learning style using sophisticated tools. Most academic learning requires reading and working exclusively in text. In most situations, a visual learner must adapt to the norm – with the chance of never reaching full potential because of a differing learning style. Using either the outline or the diagram format of Inspiration®, the project's visual learners were given opportunity to process and create in a style most accommodating to their needs. A textual learner could with a click on the menu icon change the diagram to its corresponding outline – for use and comparison. Printing the document for study at a later date offered an easily readable document with simplified phrases and terms.

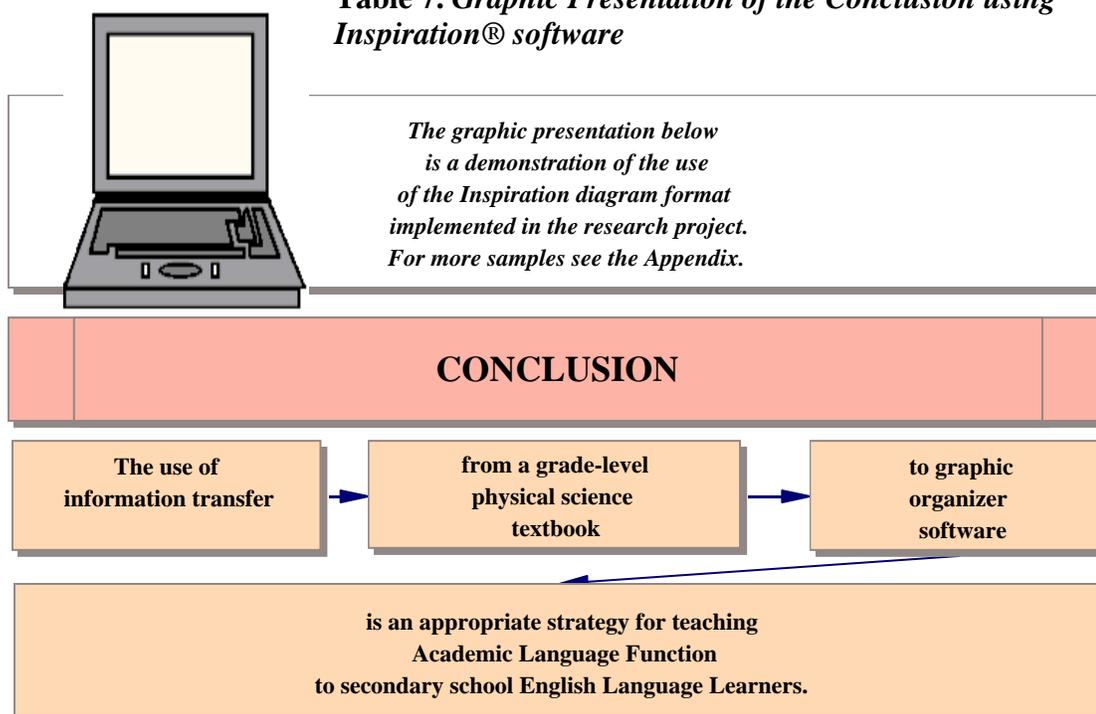
This project was successful partially because of the use of computers and user-friendly software. To my students, computer use was synonymous with power and prestige. Students had the potential to process more information faster. They could present a product which was easy to read, professional looking, and capable of easily accepting changes, additions, and corrections.

The action research model was an effective method of investigation of use of ALFs and information transfer. When faced with the difficulties described in the Preface, there was flexibility enough for me to restructure the project and reach my goals.

Little would I have suspected that with the restructuring, I would have a much more interesting and informative research project. I was able to work with and observe my original pair of students as planned. I also had the participation of three additional students with different academic and language ability levels, different stress levels, and different intrinsic and extrinsic motivation levels. The opportunity to contrast performance between groups added information. I was terribly frustrated at the time I needed to reconsider my plans, but in retrospect, I celebrate the changes.

My action research needs brought me closer to my students and their daily frustrations and learning hurdles through one-to-one interaction. In the final weeks of the trimester and school year, there were “teachable moments” as my challenged students struggled to survive in grade-level academic curriculum.

Table 7. Graphic Presentation of the Conclusion using Inspiration® software



Suggestions For Further Study

It is probable that a longer study in the same framework would further prove the effectiveness of teaching ALFs through information transfer using computer software.

Grade-level content teacher collaboration or co-teaching with the LEC teacher/researcher could lend better results than this satellite approach. It is necessary for the administration to join in this collaboration to add authority and credibility. A combined program which could offer some accommodations and accept alternative daily work assessment would be beneficial and worth considering. Perhaps products of the LEC work could be accepted by the content teachers for extra credit or replace other note-taking homework assignments.

Gender preferences in the choice of outline or graphic mode were obvious. A further study of these preferences could lend more definitive results.

The motivational qualities of computer use and software manipulation are important in the ELL classroom. With the aid of software, class presentation of the completed outline or diagram documents has potential as an important extension of the lesson for both presenter and audience. Presentation would demonstrate aspects of information and presentation organization to all concerned. It would involve pronunciation of the targeted scientific vocabulary and would offer practice in speaking before an audience. Either the Inspiration® or PowerPoint® software could be used.

Final Comment

The preceding chapters describing the research methods and results were a summary of this informative action research project. The project changed dramatically from its initial conception and through the process gave me unanticipated and lifelong insights into assisting students to conquer the challenges of surviving and succeeding in academic grade-level courses.

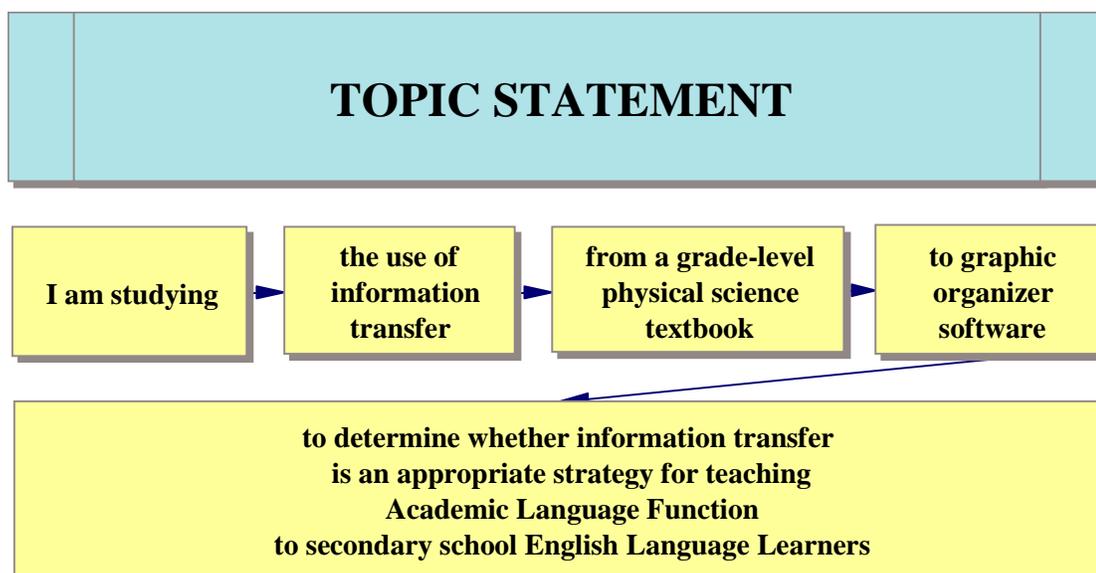
APPENDIX 1

Diagram and outline format of the topic statement
as prepared in Inspiration® software

In the two displays below, the topic statement is presented in diagram and outline format. It is a linear representation of the statement, and it flows from left to right and top to bottom. The outline format takes its descending subheading cues from the graphic in which the document was prepared.

The diagram was inserted into the Microsoft Word® document from Inspiration® in a copy/paste transfer. The outline was inserted through a “Transfer” menu selection. Following transfer, the diagram may not be altered, however the outline may be changed as in any Microsoft Word® document. Either outline or diagram may be changed in Inspiration® with the change automatically taking place in the other format.

Diagram format using Inspiration® software



Though the diagram format is readable and understandable, the outline format shows one statement leading to another from general to specific – which is not the case. The diagram format is appropriate for stand-alone use when one wishes to show components but not necessarily interrelationship. In this case, the outline would not represent correctly the intent of the statement.

Outline format using Inspiration® software

I am studying

- I. the use of
information transfer**
- A. from a grade-level physical science textbook**
- 1. to graphic organizer software**
- a. to determine whether information transfer
is an appropriate strategy for teaching
Academic Language Function
to secondary school English Language Learners**

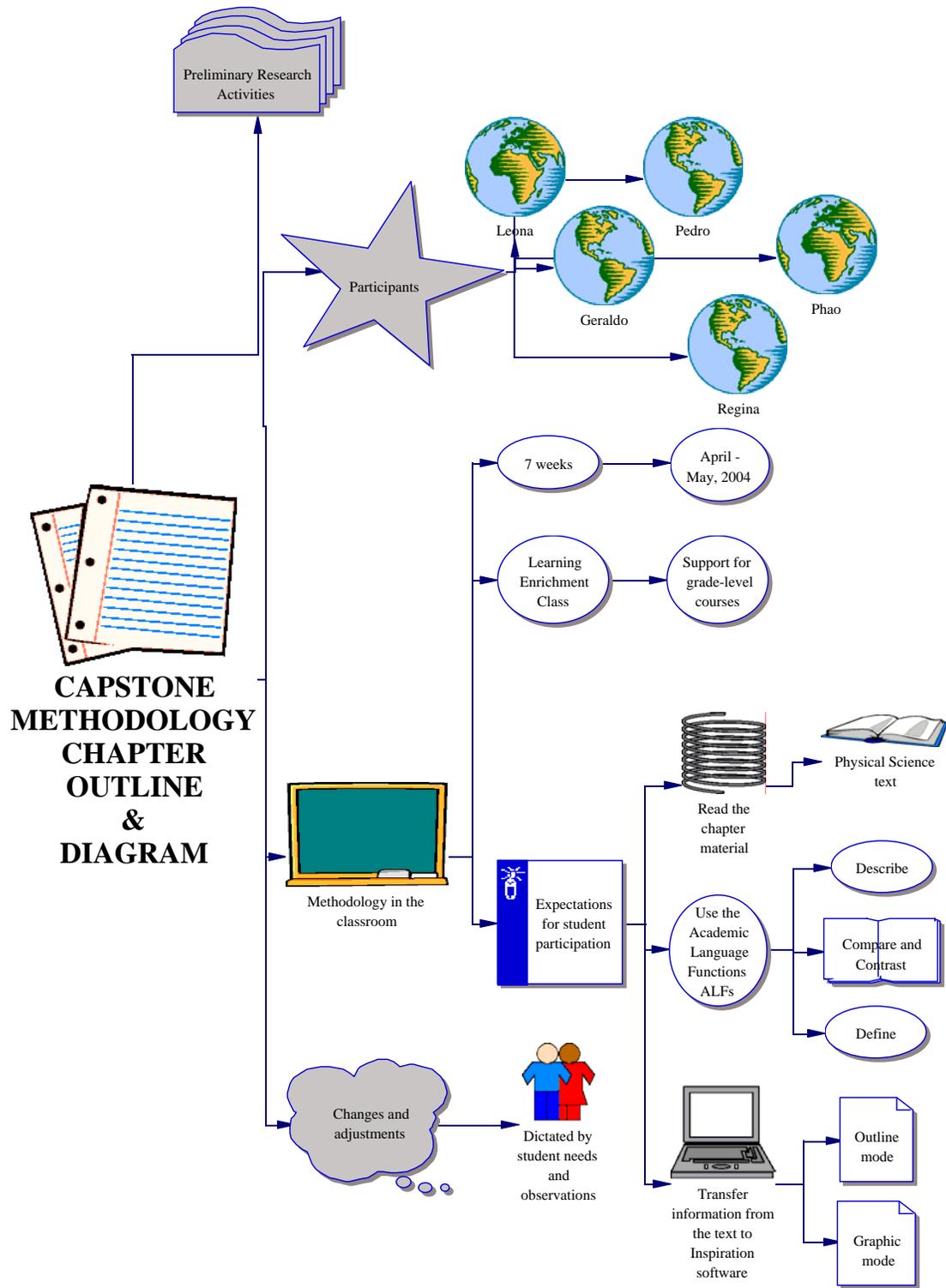
APPENDIX 2

Sample Methodology Chapter illustrated
using Diagram and Outline Format of Inspiration®
(following the same process used by students)

Methodology Chapter as viewed in Inspiration® Outline Format**METHODOLOGY CHAPTER OUTLINE and DIAGRAM**

- I. Preliminary Research Activities**
- II. Participants**
 - A. Leona**
 - B. Pedro**
 - C. Geraldo**
 - D. Regina**
 - E. Phao**
- III. Methodology in the classroom**
 - A. 7 weeks**
 - 1. April - May, 2004**
 - B. Learning Enrichment Class**
 - 1. Support for grade-level courses**
 - C. Expectations for student participation**
 - 1. Read the chapter material**
 - a. Physical Science**
text
 - 2. Use the Academic Language Functions**
 - a. Description**
 - b. Compare and Contrast**
 - c. Define**
 - 3. Transfer information from the text to Inspiration software**
 - a. Outline mode**
 - b. Graphic mode**
- IV. Changes and adjustments**
 - A. Dictated by student needs and observations**

Methodology Chapter as viewed in Inspiration® Diagram Format



APPENDIX 3
Inspiration® Information Sheet
for use during student orientation

Learning Enrichment Class
Physical Science
April through May, 2004

Thanks for agreeing to study your physical science lessons in Learning Enrichment Class while participating in Ms. Warpeha's Master of Arts Degree research project. The project is created to help you learn the science material, learn another software program AND have a good time working on the computer.

Open the Inspiration® document with your name on it. Let's look at the features.

On the *Outline* menu item at the top left, notice that you can type in words for an outline.

If you click on *Outline*, the name will change to *Diagram*. The diagram is another graphic organizer to help organize the information and help it mean something to you.

Lets go through the features together.

On the top menu:

- The text box can be changed in size, color, and shape
- Rapid-fire creation of box
- Linking
- Arranging
- Attaching a note to the text
- Hyperlinking it to a web page, email, file
- Spell checking
- Transfer to a Microsoft Word document

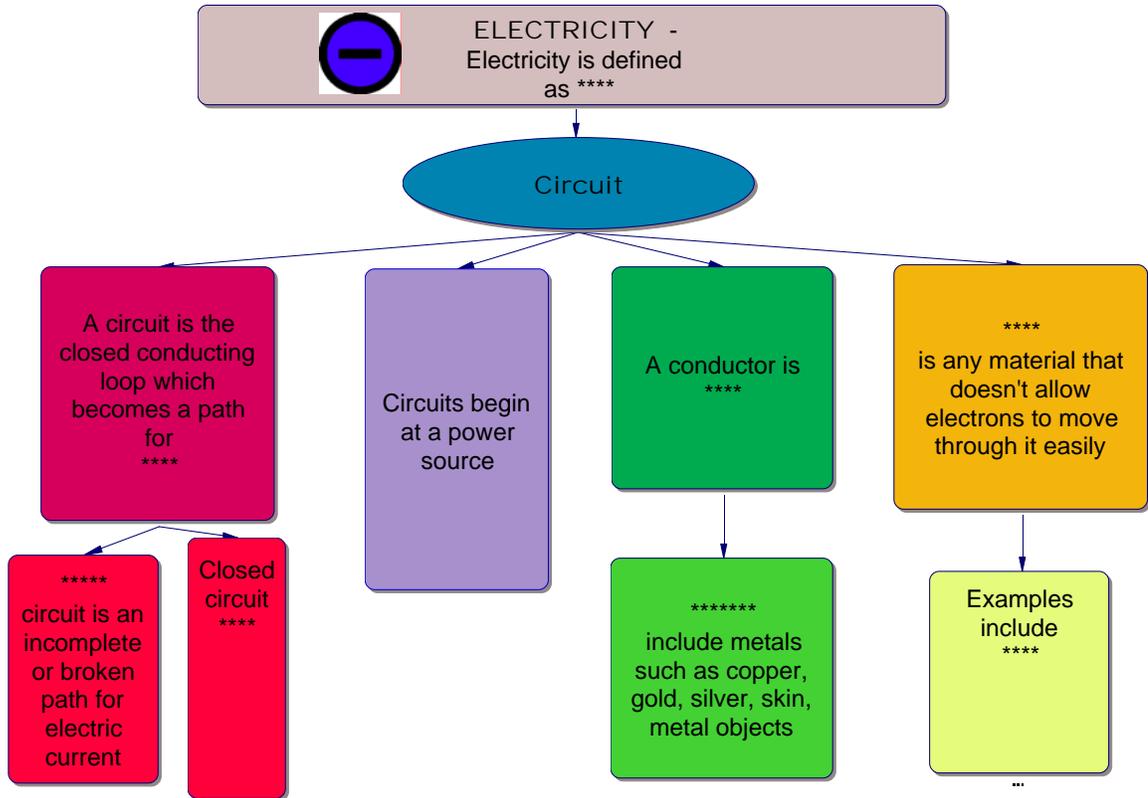
On the bottom menu:

- Change font, size, and color
- Use drawing tool and moving tool
- Export in 5 forms and print

We will take time now to learn and experiment with Inspiration®

APPENDIX 4

Jigsaw Activity for Partners –
 One partner preferring outline format and one preferring diagram format



ELECTRICITY -
 * * * * the flow of electrons

I. Circuit

A. electric current

1. Open ****
2. **** is a complete unbroken path for electric current

B. Circuits begin at a power source

C. ** something that lets heat, electricity, light or sound pass along or through it**

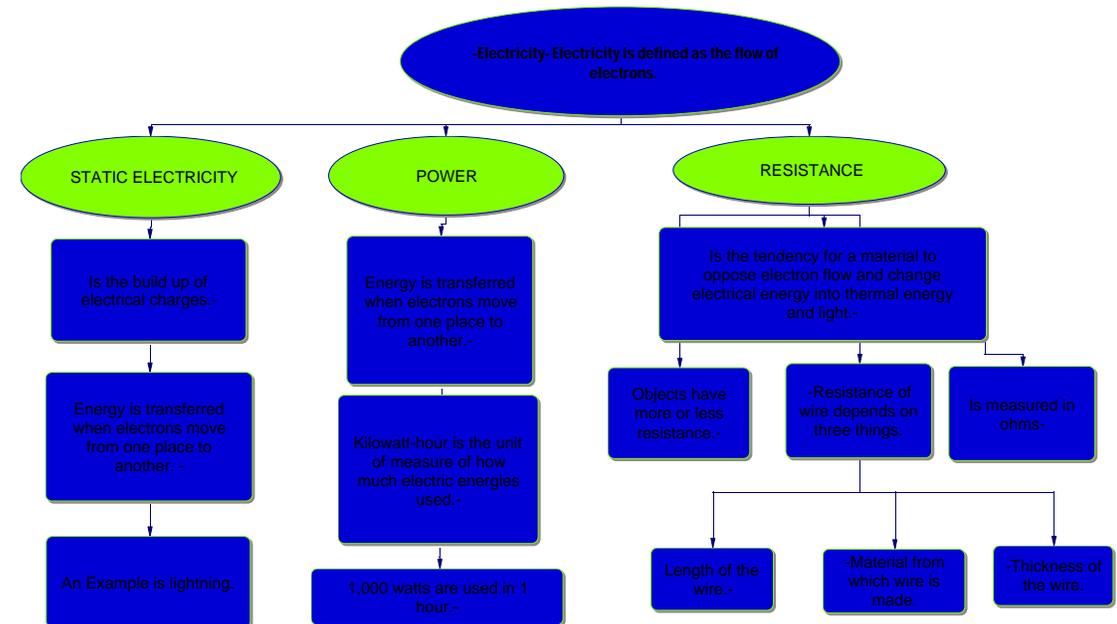
1. Examples include ****

D. A non-conductor ****

1. ****plastics, wood, rubber, glass

APPENDIX 5

Description of electricity by Pedro
This is an example of the ALF of description.



-Electricity- Electricity is defined as the flow of electrons.

I. STATIC ELECTRICITY

A. Is the build up of electrical charges.-

1. Energy is transferred when electrons move from one place to another. -

a. An Example is lightning.

II. POWER

A. Energy is transferred when electrons move from one place to another.-

1. Kilowatt-hour is the unit of measure of how much electric energies used.-

a. 1,000 watts are used in 1 hour.-

III. RESISTANCE

A. Is the tendency for a material to oppose electron flow and change electrical energy into thermal energy and light.-

1. Is measured in ohms-

B. Objects have more or less resistance.-

C. -Resistance of wire depends on three things.

1. Length of the wire.-

2. -Material from which wire is made.

3. -Thickness of the wire.

APPENDIX 6

Definition of Fossil Fuels by Leona

This is an example of the ALF of definition. Leona worked exclusively in outline format. Because Leona was not interested in diagram format, the graphic often was not spaced and positioned in a readable way. The original configuration of boxes for the diagram was prepared by the teacher with empty text windows.

Outline format

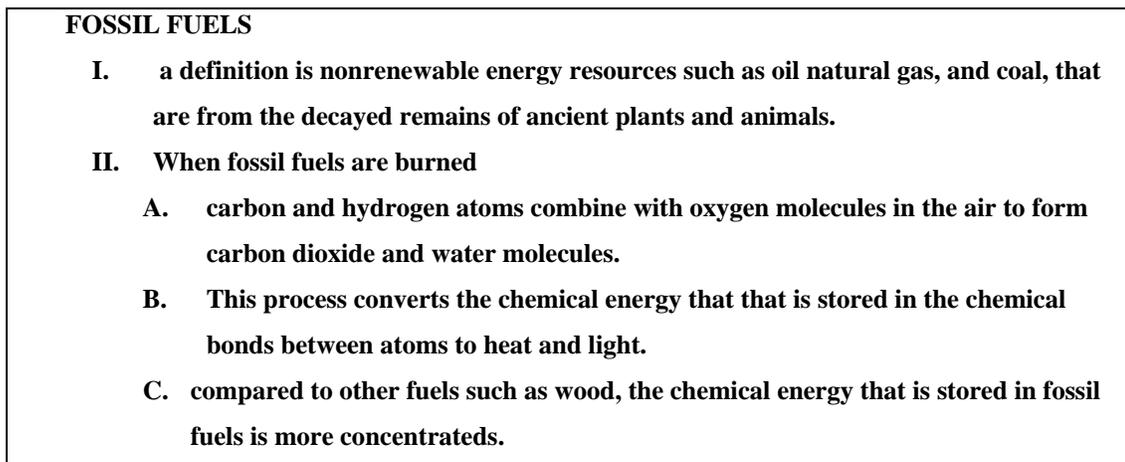
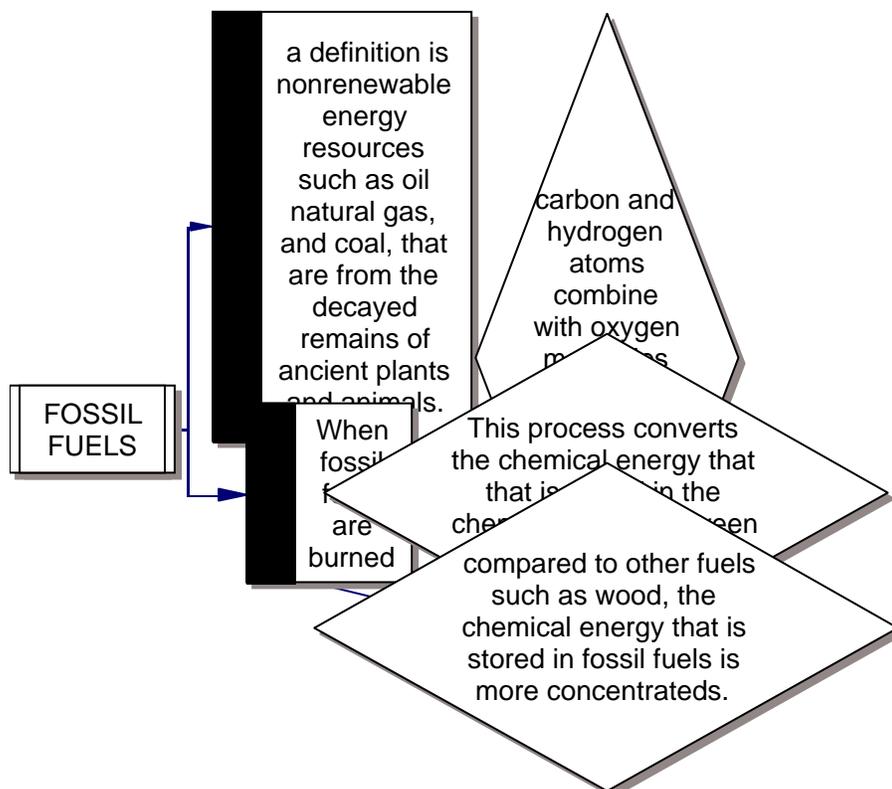


Diagram format

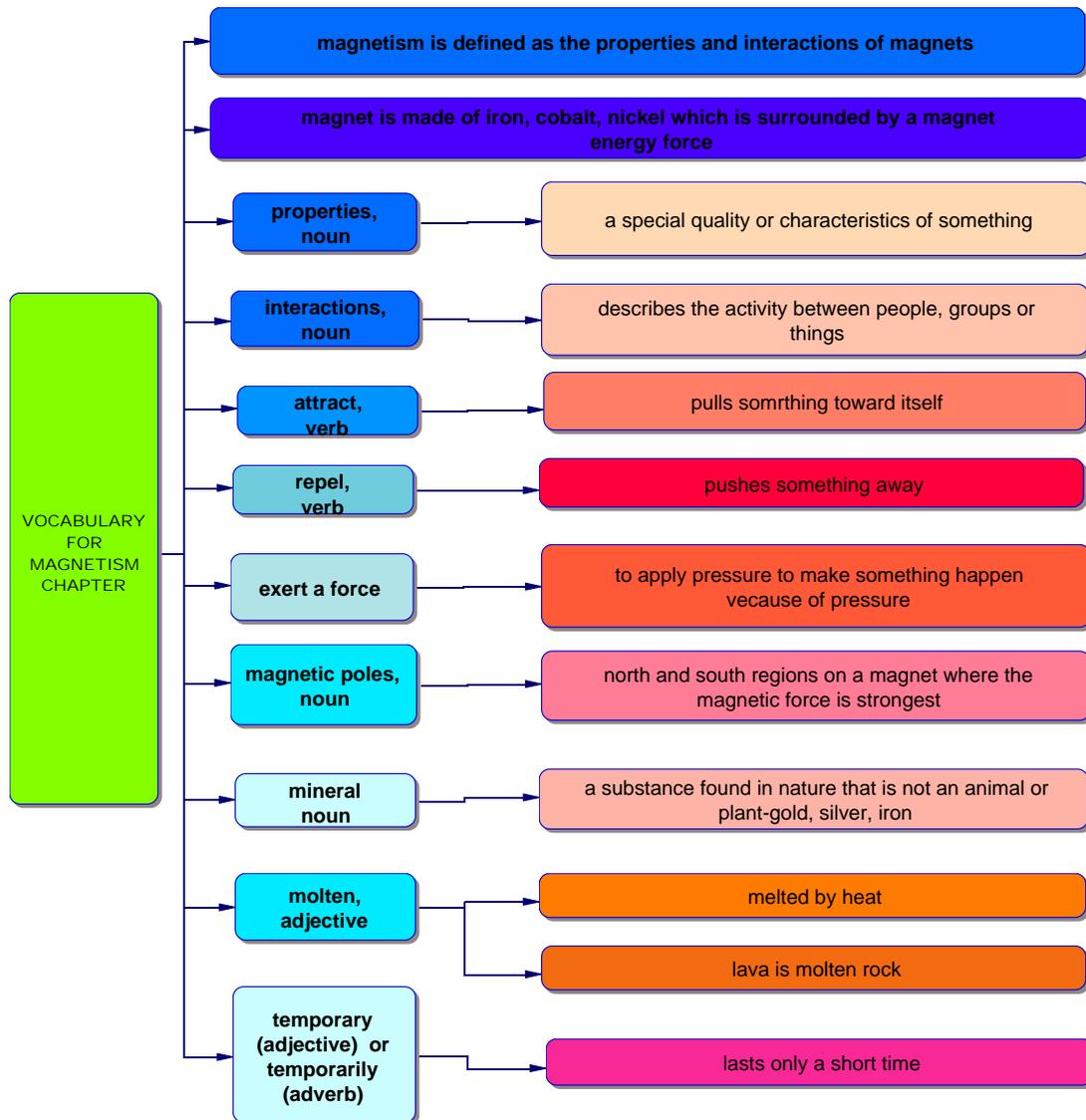


APPENDIX 7

Vocabulary for magnetism chapter by Regina

This is an example of the ALF of definition. The teacher prepared the framework and vocabulary list. Regina supplied the definitions and coloration.

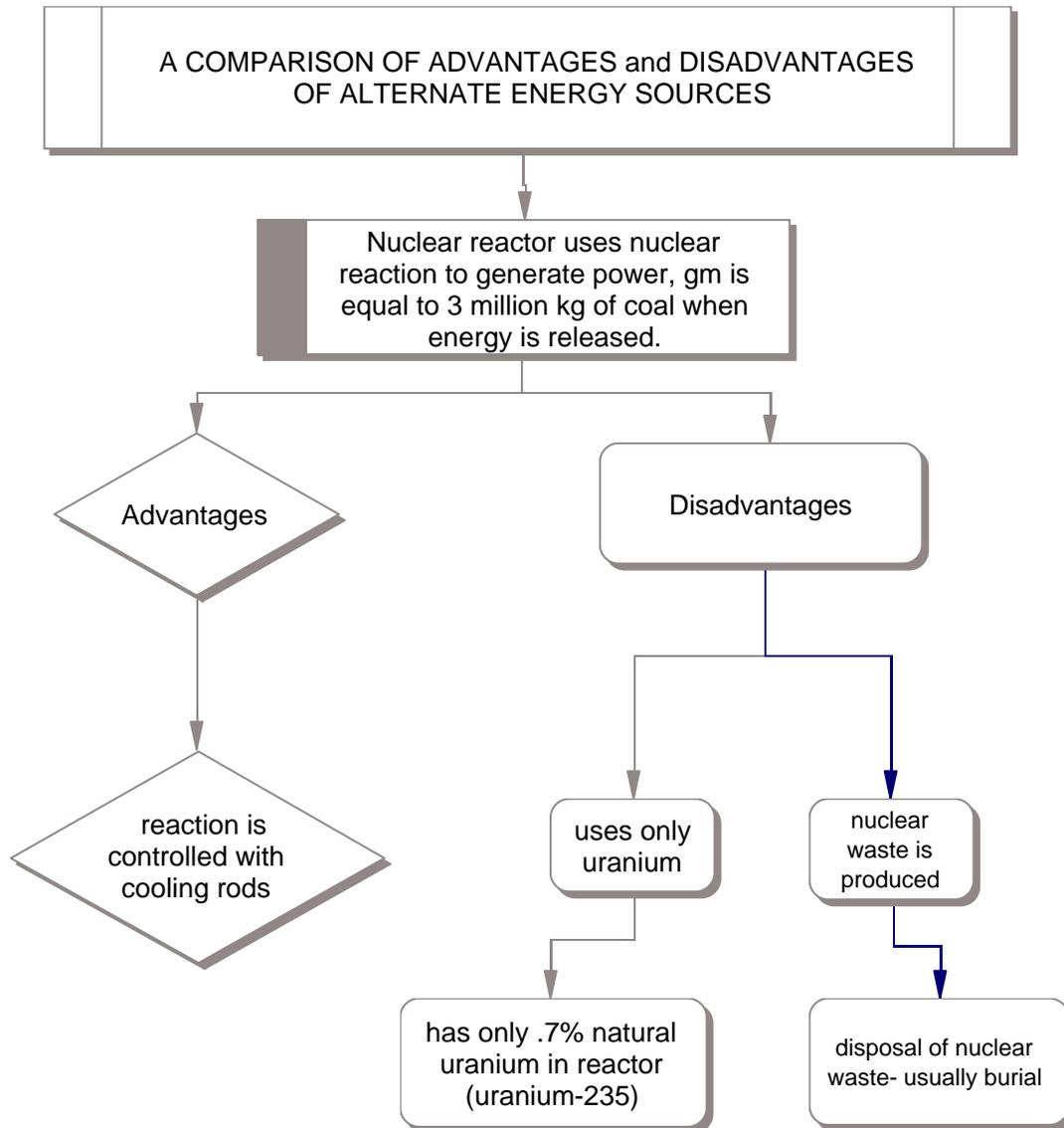
Diagram format



APPENDIX 8

Compare and Contrast Advantages and Disadvantages of Alternative Energy Sources –
Phao's work

This is a partial diagram of the compare/contrast ALF exercise. The sample is taken from the yellow highlighted material in the complete outline on the next page.



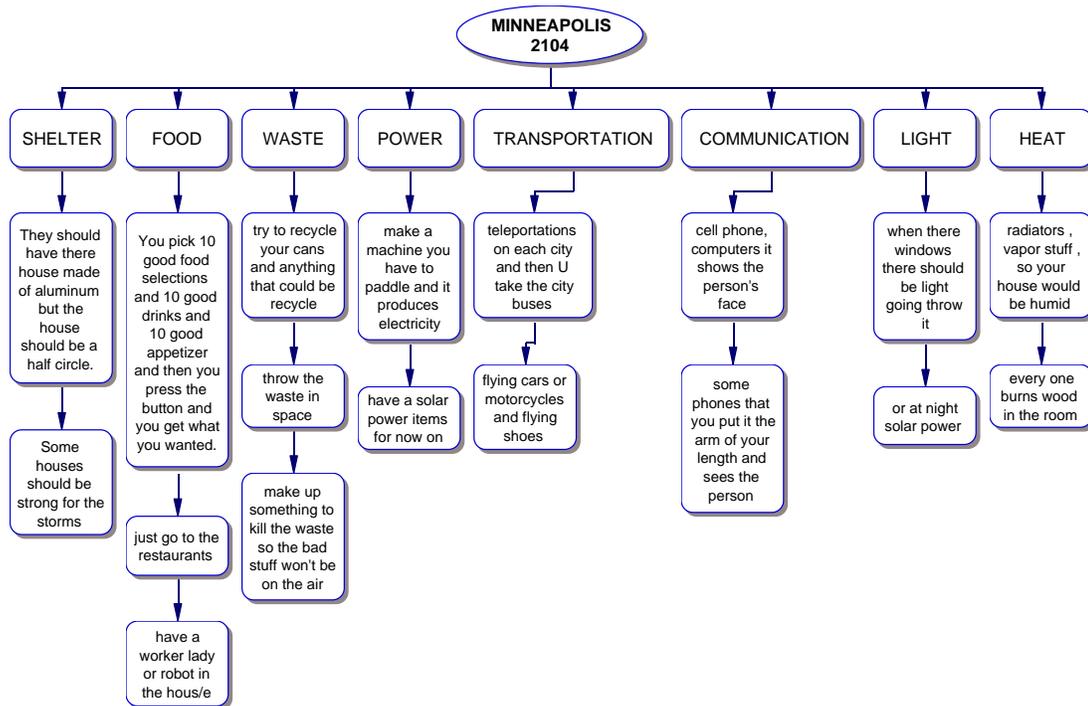
This is outline format for the entire comparison. The yellow highlighted section includes material which is displayed in the diagram format.

A COMPARISON OF ADVANTAGES and DISADVANTAGES OF ALTERNATE ENERGY SOURCES	
I.	Nuclear fusion splitting the nucleus to form an energy source.
A.	Advantages
1.	fuel for an fusion to happen is hydrogen.
2.	produces helium gas after fusion which is not radioactive
3.	very concentrated energy.
B.	Disadvantages
1.	creating the heat needed.
2.	Maintaining the heat for a fusion to happen.
3.	waste a lot of energy to start fusion
II.	Nuclear reactor uses nuclear reaction to generate power, gm is equal to 3 million kg of coal when energy is released.
A.	Advantages
1.	reaction is controlled with cooling rods
B.	Disadvantages
1.	uses only uranium
a.	has only .7% natural uranium in reactor (uranium-235)
2.	nuclear waste is produced
a.	disposal of nuclear waste- usually burial
III.	Nuclear fission is able to create enormous amounts of energy with small mass, used in over 100 power plants, it produces about 20% of America's electricity and 8% used.
A.	Advantages
1.	creates a lot of electricity from small mass
2.	doesn't use natural resources
3.	massive production of electricity
B.	Disadvantages
1.	leak in the power plant leads to disaster
2.	cause environmental damage from mining
3.	heat harms living organisms surrounding plant
4.	radiation sickness for workers
IV.	Solar energy
A.	Advantages
B.	Disadvantges
V.	Hydroelectric energy

APPENDIX 9

Minneapolis 2104

This is a sample of Geraldo's work on his final project begun in Inspiration®.
This is an example of the ALF of description.



MINNEAPOLIS 2104

I. SHELTER

A. They should have there house made of aluminum but the house should be a half circle.

1. Some houses should be strong for the storms

II. FOOD

A. You pick 10 good food selections and 10 good drinks and 10 good appetizer and then you press the button and you get what you wanted.

1. just go to the restaurants

a. have a worker lady or robot in the hous/e

III. WASTE

- A. try to recycle your cans and anything that could be recycle
 - 1. throw the waste in space
 - a. make up something to kill the waste so the bad stuff won't be on the air

IV. POWER

- A. make a machine you have to paddle and it produces electricity
 - 1. have a solar power items for now on

V. TRANSPORTATION

- A. teleportations on each city and then U take the city buses
 - 1. flying cars or motorcycles and flying shoes

VI. COMMUNICATION

- A. cell phone,computers it shows the person's face
 - 1. some phones that you put it the arm of your length and sees the person

VII. LIGHT

- A. when there windows there should be light going throw it
 - 1. or at night solar power

VIII. HEAT

- A. radiators , vapor stuff ,so your house would be humid
 - 1. every one burns wood in the room

APPENDIX 10

Researcher's Reflection Questions

Reflection Log Starters

I am studying the use of information transfer from a grade-level physical science textbook to a graphic organization and presentation software in order to determine whether an information transfer is an appropriate strategy for teaching academic language function to secondary school ELLs.

Questions for thought:

Using the ALFs, Finding textbook information, ALFs,
Information transfer with Inspiration®

- Was the textbook material comprehensible as it was presented?
- Were students able to modify the textbook language using ALFs? How much assistance was needed?
- What ALFs were used for the lesson? Did students prefer one ALF to others?
- Was one ALF more effective than another?
- Were these the best graphics for worksheets?
- How challenging was the use of Inspiration®? Worthwhile?
- Were four language skills used?
- What could have been done differently?
- Were problems diminished as this project progressed?
- How could activities have been tweaked?
- Could the lesson have been accomplished using only class time?
- Was the project worth the time needed?
- Did this project strategy do what was intended on a daily basis? Chapter basis? Trimester basis?
- How could the lesson skills be used in other classes?
- Did I have clearly defined language-learning goals on a daily basis? Content learning goals?

Individual students and the class as a whole

- Were students motivated to complete the worksheets?
- Were students capable of making this transfer onto worksheets and software?
- Were students continuing to copy without comprehension? Were students beginning to learn as they transferred information?
- Did students engage in the use of Inspiration®?
- Did partnering help develop the worksheet? Get in the way?
- Was student behavior reflective of interest in learning? Was this activity nurturing a positive climate in the classroom?
- Did students feel more competent?
- Did students interact to help each other?
- Did students become bored with the project? Will they if it is used regularly?
- Were students motivated to learn rather than just complete the assignment?

Teaching and Teacher

- Were all students' attempts at mastering ALFs, transferring the information into software, language usage, and participation rewarded?
- What kind of support did I need to give today? On a daily or regular basis?
- Did I elicit student questions? Did I encourage them to support their answers?
- Did I allow ample time for each student to complete steps of the process?
- Did this process allow flow of uninterrupted student thought?

(Parts adapted from Walter, 1996)

REFERENCES

- Abadiano, H. & Turner, J. (2002). Sheltered Instruction: An empowerment framework for English Language Learners. *The New England Reading Association Journal*, 38, 50-5.
- Abbamond, G. W. & Brescher, A. (1990). *Study Smart!* San Francisco, CA: Jossey-Bass.
- Anstrom, K. (1998). *Preparing secondary education teachers to work with English Language Learners: SCIENCE*. National Clearinghouse for English Language Acquisition. [Electronic version]. From <http://www.ncela.gwu/ncbepubs/resources/ells/science.html>
- Casey, R.E. (2002). *The intersection of language, education, and content: Science instruction for ESL students*. [Electronic version]. *The Clearing House*, 76, 71-4.
- Center for Research on Education, Diversity & Excellence. (2001). *A National Study of School Effectiveness for Language Minority Students' Long-Term Academic Achievement Final Report: Project*. [Electronic version]. From http://www.crede.ucsc.edu/research/llaa/1.1_final.html.
- Chamot, A.U. & O'Malley, J. M. (1992.) The Cognitive Academic Language Learning Approach: A Bridge to the Mainstream. In Richard-Amato, P.A. & Snow, M.A. *The Multicultural Classroom: Readings for Content-Area Teachers* (pp 39-57). Reading, MA: Addison-Wesley Publishing Co.
- Chamot, A. U. & O'Malley, J. M. (1994). *The CALLA Handbook*. USA: Addison Wesley Publishing Company, Inc.
- Chamot, A.U., Barnhardt, S., Beard El-Dinary, P., & Robbins, J. (1999). *The Learning Strategies Handbook*. White Plains, NY: Addison Wesley Longman, Inc.
- Checkley, K. (2003). Teaching English Language Learners in the general classroom. [Electronic version]. *ASCD*, 4, 1-5.
- Cohen, A.D. (2000). Strategies-based instruction for learners of a second language. *NASSP*, 84, 10-18, January 2000.

- Corson, D. (1997). The learning and use of academic English words. [Electronic version]. *Language Learning*, 47, 671-718.
- Coury, A. (2003). Telling a Story with PowerPoint®. Paper presented at the MinneTESOL Conference, Minneapolis, MN.
- Cummins, J. (1981). The role of primary language development in promoting educational success for language minority students. In California State Department of Education. *Schooling and Language Minority Students: A Theoretical Framework*. Los Angeles: Evaluation, Dissemination and Assessment Center.
- Cummins, J. (1992). Bilingualism and second language learning. *Annual Review of Applied Linguistics*, 13, 51-70.
- Duff, P. (2001). Language, literacy, content, and pop culture: Challenges for ESL students in mainstream courses. [Electronic version]. *Canadian Modern Language Review*, 58, 103-32.
- Echevarria, J., Vogt, M., & Short, D.J. (2000). *Making Content Comprehensible for English Language Learners*. Needham Heights, MA: Allyn and Bacon.
- Ediger, M. (1999). Reading and vocabulary development. [Electronic version]. *Journal of Instructional Psychology*, 26, 7-15.
- ESCORT.(2001). *The Help! Kit A Resource Guide for Secondary Teachers of Migrant English Language Learners*. Oneonta, NY: U.S. Office of Migrant Education.
- Frantzen, D. (2003). Factors affecting how second language Spanish students derive meaning from context. [Electronic version]. *The Modern Language Journal*. 87, 168-99.
- Freeman, D. (1998). *Doing Teacher Research*. Canada: Heinle & Heinle.
- Garcia, P.A. (2002). Making content comprehensible for English Language Learners. [Electronic version]. *The Modern Language Journal* 86, 277-8.
- Gersten, R. & Baker, S. (2002). What we know about effective instructional practices for English Language Learners. *Exceptional Children*, 66, 454-70.
- Glanz, J. (1998). *Action Research*. Norwood, MA: Christopher-Gordon Publishers, Inc.
- Grabe, W. & Stoller, F.L. (2002). *Teaching and Researching Reading*. Harlow, UK: Longman.

- Harrison, A. (1999). Power Up! Stimulating your students with PowerPoint®. [Electronic version]. *Learning and Leading with Technology*, 26, 6-9.
- Inspiration® Software, Inc. Portland, OR. <http://www.inspiration.com>.
- Institute for the Advancement of Research in Education at AEL. (2003). Graphic Organizers: A review of scientifically based research. [Electronic version]. From www.inspiration.com.
- Jameson, J. H. (1998). *Enriching Content Classes for Secondary ESOL Students Study Guide*. Delta Systems Co., Inc.: Center for Applied Linguistics.
- Kelly, R. (1999). Getting everybody involved: Cooperative PowerPoint® creations benefit inclusion students. [Electronic version]. *Learning and Leading with Technology*, 27, 10-14.
- Kidd, R. (1996). Teaching academic language functions at the secondary level [Electronic version]. *Canadian Modern Language Review*, 52, 285-307.
- Konold, T. R., Juel, C., McKinnon, M., & Deffes, R. (2003). A multivariate model of early reading acquisition. *Applied Psycholinguistics*, 24, 89-112.
- Krashen, S.D. (1981). *Bilingual education and second language acquisition theory*. In *Schooling and language minority students: A theoretical framework*. Los Angeles: Evaluation, Dissemination, and Assessment Center, California State University.
- McLaughlin, C.W., National Geographic Society, Thompson, M., and Zike, D. (2002). *Physical Science*. New York: Glencoe McGraw-Hill.
- National Research Council. 1996. *National Science Education Standards*. [Electronic version]. Washington, D.C.: National Academy Press.
- Mokhtari, K. & Sheorey, R. (2002). Measuring ESL students' awareness of reading strategies. [Electronic version]. *Journal of Developmental Education* 25, 2-10.
- Reed, B. & Railsback, J. (2003). *Strategies and resources for mainstream teachers of English Language Learners*. [Electronic version]. Northwest Regional Education Laboratory. [Brochure].
- Patten, K. (2001). PowerPoint® – Why I assign it and why you should too! [Electronic version]. *Book Report*, 19, 47.

- Payne, R. (2001). *Learning Structures*. Highlands, TX: aha! Process, Inc.
- Richard-Amato, P.A. & Snow, M.A. (Eds.). (1992). Strategies for content-area teachers. In *The Multicultural Classroom: Readings for Content-Area Teachers*. Reading, MA: Addison-Wesley Publishing Co.
- Schoen, S.F. & Schoen, A.A. (2003). Action research in the classroom: Assisting a linguistically different learner with special needs. [Electronic Version]. *Teaching Exceptional Children*, 35,16-21.
- Sheppard, S. (2001). Improving academic success for diverse language learners. [Electronic version]. *Preventing School Failure*, 45, 132-5.
- Silvana, M.R. & Houtz, L.E. (2002). Teaching science: Meeting the academic needs of culturally and linguistically diverse students. *Intervention in School and Clinic*, 37, 267-78.
- Study Skills 1*. (1999). Irvine, CA: Saddleback Publishing, Inc.
- Study Skills 2*. (1999). Irvine, CA: Saddleback Publishing, Inc.
- ESL Standards for preK-12 students*. (1996). TESOL (Teachers of English to Speakers of Other Languages). Alexandria, VA:TESOL.
- Tomei, L. & Balmert, M. (2000). Creating an interactive PowerPoint® lesson for the classroom. [Electronic version]. *T.H.E. Journal*, 28, 69-71.
- Towell, J.H. (1996). Case study analysis in Reading/Language Arts: Getting to the “Nitty-Gritty”. [Electronic version]. *Reading Horizons*, 37, 116-29.
- Vidal, K., (2003). Academic listening: A source of vocabulary acquisition? [Electronic version]. *Applied Linguistics*, 24, 56-89.
- Walter, T. (1996). *Amazing English! How-To Handbook*. USA: Addison-Wesley Publishing Company, Inc.
- Watson, S.M.R. & Houtz, L.E. (2002). Teaching Science: Meeting the academic needs of culturally and linguistically diverse students. [Electronic version]. *Intervention in School and Clinic* 37, 267-78.
- Wilber, P.M. (2000). *Reading Rescue 1-2-3*. Roseville, CA: Prima Publishing.