THE EFFECTS OF COGNITIVE ORGANIZERS AND PRECISION TEACHING STRATEGIES TO FACILITATE VOCABULARY INSTRUCTION AMONG HIGH SCHOOL STUDENTS WITH MILD DISABILITIES

by

LISA HAWTHORNE ULMER

(Under the Direction of Cecil Fore, III)

ABSTRACT

This study examined the relative effects of cognitive organizers on rates of responding with new vocabulary words in a high school inclusion classroom. The study was an extension of the current literature base that both cognitive organizers and precision teaching methods enhance and improve content-area learning for students with mild disabilities (Boon, Fore, Ayres, & Spencer, 2005; Bos & Anders, 1990; Lovitt, Fister, Freston, Kemp, Moore, Schroder, & Bauernschmidt, 1990; White & Haring, 1980). Four students who were being served in special education at a large rural high school under the mild disability category participated in the study. A multiple probe design (Carr, 2005) was used to evaluate the efficacy of the intervention. Cognitive organizers were used as an intervention to help teach new vocabulary words in a history class. Within the intervention condition, students completed a cognitive organizer along with the instructor for approximately 15 minutes. Students were then assessed using a one-minute precision teaching probe over the 10 new vocabulary words, covered on the graphic organizer, to measure their rate of response (frequency). If a student exhibited two or more days of flat data, a

second cognitive organizer was introduced to help move the student closer to the predetermined level of mastery (8 words per minute). Results of this study indicate cognitive organizers are an effective strategy for increasing rate of response of vocabulary words to a predetermined level of mastery that makes future learning more likely.
INDEX WORDS: cognitive organizers, graphic organizers, precision teaching, curriculum-based measurement

THE EFFECTS OF COGNITIVE ORGANIZERS AND PRECISION TEACHING STRATEGIES TO FACILITATE VOCABULARY INSTRUCTION AMONG HIGH SCHOOL STUDENTS WITH MILD DISABILITIES

by

LISA HAWTHORNE ULMER

B.S., The Florida State University, 2001

M.Ed., The Florida State University, 2003

A Dissertation Submitted to the Graduate Faculty of the University of Georgia in Partial Fullfillment of the Requirements for the Degree

DOCTOR OF PHILOSOPHY

ATHENS, GA

2008

THE EFFECTS OF COGNITIVE ORGANIZERS AND PRECISION TEACHING STRATEGIES TO FACILITATE VOCABULARY INSTRUCTION AMONG HIGH SCHOOL STUDENTS WITH MILD DISABILITIES

by

LISA HAWTHORNE ULMER

Major Professor: Cecil Fore, III

Committee: Richard Boon
Yolanda Keller-Bell
John Dayton

Electronic Version Approved:

Maureen Grasso
Dean of the Graduate School
The University of Georgia
May 2008

DEDICATION

This dissertation is dedicated, in its entirety, to my mother Dr. Linda White Hawthorne. My mother graduated with her PhD in special education in 1973 from the University of Texas at Austin. I would consider her a member of the first wave of special educators and researchers whose goal in life was to find ways to enhance the lives of individuals with special needs. As a child, both of my parents taught a Sunday school class for the intellectually disabled. It was then that I realized persons with disabilities were created equally in the eyes of God and as human beings it is our job to pursue equality for all in society.

My mother has been my role-model for hard work, persistence, and personal sacrifices. She instilled in me the inspiration needed to set high goals and the confidence to achieve them. When I was a little girl I used to dress up in my mother's clothes and jewelry because I wanted to be just like her. Who knew that over 20 years later I would be following in her footsteps as a special educator.

It would not be fair for me to take sole credit on the completion of this dissertation, for it has been my mother who has spent countless hours editing, revising, typing, emailing, and reading. Mom, I will never forget the numerous weekends we spent bonding over cognitive organizers. I will forever cherish the time we have spent in pursuit of this goal of mine. My hope is that one day I can dedicate my time and talents to my children the way you have dedicated your time and talents to me.

ACKNOWLEDGEMENTS

I wish to thank my committee members who were more than generous with their expertise and precious time. A special thanks to Dr. Cecil Fore, III, my committee chairman. Not only was he readily available for me, as he so generously is for all of his students, but he always read and responded to drafts of my work more quickly than I could have hoped. Thank you Dr. Richard Boon, Dr. Keller-Bell, and Dr. John Dayton for agreeing to serve on my committee.

I am also grateful to my husband, Matt, who has been proud and supportive of me and who has shared the many uncertainties and challenges for completing this dissertation. I know I have been less available than I should have over the last three years of our marriage. You never once complained or made me feel guilty for the time I dedicated to my school work. I give my deepest expression of love for the encouragement that you gave and the sacrifices you made during this graduate program. Thank you for the support and company during late nights of typing.

My sister, Mary Ann, has been a source of support through not only this graduate program, but my entire life.

I feel I must acknowledge my grandparents, Richard Carlton and Betty Hawthorne, who emphasized the importance of education to all of their children and grandchildren. Their emotional and financial support has made it possible for me to pursue all three of my degrees.

Finally, I must acknowledge my biggest fan, my Daddy. He has taught me many things during my life; lessons that I have held close to my heart. With those lessons, I have gone places,

met people, and done many things. However, of all the things I have done, and of all the things I am, the one that I am most proud of, is that I am my father's daughter.

TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

With the 2004 reauthorization of the Individuals with Disabilities Education Act (IDEA) and No Child Left Behind (NCLB) have come increased expectations for all students, including special education students, and an increased emphasis on accountability. The result is that children in public education are being tested more than ever, and many of the tests they are being given are considered to be "high-stakes tests." Such tests are commonly called exit exams, competency tests, or certification tests. Those tests are referred to as "high stakes" because of the consequences they carry for students and schools (O'Neill, Farr & Gallagher, 2000). Consequences can include grade retention or the withholding of high school diplomas.

Further, with the current push for more inclusion in our general education classrooms, teachers are more and more being held accountable for the learning of both regular education students and those served in special education. Thus, with both increased testing and increased inclusion implemented, teachers in general education must find appropriate instructional strategies to assist students with various disabilities in their various subject areas, particularly in the reading curricula.

Particularly because reading has been specifically identified as a major thrust in recent federal legislation, it has become increasingly important that teachers be able to use a number of reading instructional strategies to help learners of all ability levels to comprehend and retain what they read and thus perform adequately on various standardized tests in reading. Enhancing all students' ability to read and comprehend is important, but it is especially important for the

students with learning disabilities (Kim, Vaughn, Wanzek, & Wei, 2004). Students with learning disabilities typically struggle in content area classes, especially when reading expository text (DiCecco & Gleason, 2002).

Rationale

One instructional tactic that has been cited in the literature as an effective approach to addressing student academic learning problems is Precision Teaching (PT) (Bender, 2002; pp 122-127; Binder, 1996; Lindsley, 1991; McDade &Goggins, 1993; Schoen & Jones, 1993; Witt & Beck, 1999). Ogden Linsdley is known as the original pioneer of PT. Lindsley was an original student of B.F. Skinner and sought to apply Skinner's experimental protocol to the needs of exceptional children and their teachers in the classroom (Lindsley, 1971). Precision teaching refers to the use of timed and charted measures (such as daily celebration charts), of students' performance on instructional activities to support a curriculum-based decision making process (Binder, Haughton, & Van Eyk, 1990; Keel, Dangel, & Owens, 1999). Further, the word *precision* refers to changes that are made to instructional strategies based on frequent, continuous monitoring and analysis of student performance (Binder, 1996; White, 1984). Probes or task sheets are used to monitor target skills daily. Unlike standardized tests, which only test a small sample of skills, PT provides a direct measure of performance by using frequency of response to measure the number or correct and incorrect responses in a specific time period (typically within a one-minute timed period). The unit of measure in PT is frequency per minute. Frequency, also known as fluency or accuracy, is the number of behaviors occurring during a specified time period. Charting data can be seen as a built-in advantage of PT; a basic chart can take as little as 2-3 minutes to complete. The line on the chart can be quickly referenced to determine whether the frequency of performance is increasing, decreasing, or remaining the same. Therefore, PT

can be viewed as a method of evaluating the effects of instructional efforts instead of a method of instruction (Lindsley, 1991; West,1995).

The implementation of PT principles has been a growing phenomenon in special education, though the term "precision teaching" has not been widely utilized recently. Instead, many of the principles of PT are currently embodied in curriculum based measurement procedures, which, over the last 30 years, have been widely studied (Deno, 2003; Lembke & Foegen, 2006). Research has documented the technical adequacy of this type of progress monitoring, as well as the efficiency of curriculum-based measurements for classroom settings (Deno, 2003; Lembke & Foegen, 2006). Further, curriculum based measurement has been employed as both a screening tool--to identify students who may require special assistance—and a pre-referral intervention procedure. This review includes research-based studies at the primary and secondary level that used PT in the classroom as a decision-making tool, in order to enhance learning in the general education classroom.

Another learning strategy has received increasing support for enhancing reading among students with disabilities- the use of various types of cognitive organizers. Cognitive organizers have been employed by educators to help readers perceive information as a meaningful unit, i.e., understand that the material being taught is not merely unrelated words or concepts (Horton, Lovitt, & Bergerund, 1990). Research has demonstrated the efficacy of organizers in teaching a variety of content area vocabulary (Boon, Fore, Ayres, & Spencer, 2005; Horton, Lovitt, & Bergerud, 1990; Bos & Anders, 1992; Griffin, Simmons, and Kane'enui, 1989; Sturm and Rankin-Erickson, 2002; Boyle, 1996). Cognitive organizers, originally referred to as advanced organizers or structured overviews, were developed to help link a learner's prior knowledge to new meaning in a content area (Ausubel, 1968). Cognitive organizer is a broad term that refers to

the use of semantic feature analysis, semantic mapping, cognitive maps, story maps, advanced organizers, visual and spatial displays, and Venn diagrams (Vaughn & Edmonds, 2006). This review will synthesize information from 25 intervention studies which examined the effects of cognitive organizers as an academic reading intervention that were used to increase the performance of elementary, middle and high school students with mild intellectual disabilities (MID), learning disabilities (LD), and emotional behavior disorders (EBD).

Precision Teaching is very compatible with Response to Intervention (RTI), a more global means of assessing and documenting students' achievement or more specifically, the way students respond to different types and levels of instruction. RTI is gaining in popularity and with the passage of IDEA 2004, it became an option for documenting a learning disability. Precision Teaching and RTI are inherently very compatible in that PT provides a means of informally monitoring student progress, and much of RTI is progress monitoring. If studies such as the present one continue to support the efficacy of PT, there are many positive implications for Precision Teachings use as a component of RTI.

The review of the literature reveals that two methods, the use of PT and the use of cognitive organizers are effective means of increasing student achievement in the classroom. However, there is limited research to show that the use of cognitive organizers at the secondary level will increase rates of response with new vocabulary words or help students maintain a continued higher level of fluency in that subject area. Further, not many studies have employed a PT methodology using various cognitive organizers as the intervention. If cognitive organizers are used each week with new material, will students have a better understanding of vocabulary and in turn increase their automatic recall of such words (automaticity)? If a student demonstrates two or more days of flat data on a PT probe, will changing the instructional

strategy (e.g. switching cognitive organizers) allow the student to continue to move closer to the mastery of new vocabulary?

Purpose

The purpose of this study was to evaluate the efficacy of cognitive organizers as a strategy for increasing rate of response of vocabulary words to a level that makes future learning more likely. Increasing the rate of responding to levels of fluency aid in generalizing and maintaining learned skills. While the literature base is continuing to develop, there is a lack of single subject research that evaluates how cognitive organizers effect rates of response during a timed assessment. Further, previous studies lack a PT design that uses daily progress monitoring to evaluate the instructional technique being used. By combining the use of cognitive organizers and daily progress monitoring the results can confirm that the chosen intervention is working as expected.

Research Questions

This study sought to answer three separate research questions. The first question was the primary focus of the research. The dependent measure of number correct per minute on a daily PT probe of 10 questions covering world history content area vocabulary was used to address each of the questions.

1.) If cognitive organizers are used each week with 10 new world history vocabulary words per week, will students have a better understanding of vocabulary and in turn increase their fluency or automatic recall of the words?

2.) If a student demonstrates three or more days of flat data on a PT probe, will changing the instructional strategy (e.g. switching cognitive organizers) allow that student to continue to move closer to the mastery of new vocabulary?

3.) Will the use of cognitive organizers allow participants to better retain new words after a period of no practice?

CHAPTER 2

REVIEW OF THE LITERATURE

Search Methods

In order to glean the extant research on the several relevant topics, a series of computer search strategies were used. Initially these strategies were structured to locate research articles that employed Precision Teaching as a method of evaluating instructional efforts and/or monitoring student academic behavior. A computerized search was conducted through the Galileo search system of the University of Georgia using key words such as precision teaching, precision learning, academic assessment, standard celebration, setting aims, and measurement of behavior. Further, a hand search was conduced of numerous relevant academic journals from 1970 to 1995, including the *Journal of Learning Disabilities, Learning Disabilities Quarterly, Journal of Special Education Technology, International Journal of Disability, Development, and Education, Learning Disabilities Research & Practice, Exceptional Children, The Journal of Special Education, Learning Disability Quarterly, Journal of Learning Disabilities, Focus on Exceptional Children, Remedial and Special Education, Insights on Learning Disabilities,* and *Teaching Exceptional Children*. This search yielded 33 different articles on PT, but of those, only 4 were empirical articles that investigated the efficacy of Precision Teaching. Those are reviewed below.

A second search was conducted to locate research articles that employed graphic organizers as an intervention for students with learning disabilities, emotional and behavioral disturbances, and mild intellectual disabilities. A computerized search for the years 1980 to

2007 was conducted through the Galileo system using key words including causal chains, force fields, flow charts, visual organizer, computer assisted instruction, cognitive organizers, graphic organizer, advanced organizer, Venn diagram, flow chart, Inspiration, semantic organizers, semantic feature analysis, syntactic feature analysis, visual education, teaching aids and devices, assistive devices (for disabled), webbing, concept chains, concept mapping, and visual strategies. Further, dissertations dating 2000-2007 were searched for bibliographies that might contain relevant references. This search yielded over 50 different articles on graphic organizers, but of those, only 28 were empirical articles that investigated the efficacy of graphic organizers. Those are reviewed below.

Efficacy of Precision Teaching

Precision teaching has been shown to effectively help children in elementary general education classes overcome deficits in a variety of subject areas, including basic skill areas such as mathematics and reading (Binder, Haughton, Van Eyk, 1990; Cohen & Martin, 1971; Williams, Haring, White, Rudsit, & Cohen, 1990). For example, in one early study, Cohen and Martin (1971) used PT in a single-subject design to assess a student's basic addition skills. The eight-year-old participant was labeled as being severely emotionally disturbed and having a learning deficit. The participant was enrolled in a primary school for students with special needs. Baseline data were collected over a period of four days on the student's skill in addition math facts. The participant was given 36 worksheets presenting various single-digit addition problems with no regrouping and sums from zero to nine and was provided one minute to complete each worksheet. The researchers reported that the student completed "around 14 problems" per minute on worksheets, but "almost all" of his responses were incorrect. The intervention consisted of the teacher's implementation of precision teaching to monitor the impact of a

reinforcement system. This involved introducing a motivational procedure that allowed the participant to earn one point for every four problems completed correctly. In using precision teaching as a monitoring system, the researcher and/or teacher may implement virtually any instructional intervention desired, as long as the selected intervention results in student improvement. In this case, each point, in turn, earned him one minute of free time. During each of the work sessions that followed the intervention, the teacher recorded the participant's number of correct and incorrect responses from his math worksheets. Results indicated that after the implementation of the motivational point system in the PT paradigm, the participant consistently completed 10-25 problems per minute with no errors. Thus, a PT intervention involving a simple reinforcement plan resulted in increased mastery of these basic addition facts for this student.

Typically when using PT, teachers use one minute measures of performance. It might be good to measure more or less then one minute when dealing with a problem of attention span. One often wonders, how long can students maintain "reasonable" levels of performance on a given task. Previous PT data suggests that until students attain certain minimal levels of speed and accuracy, they typically lack the ability to maintain steady performance for an extended period of time. Nonfluent (hesitant) but accurate performance for extended time periods is often accompanied by increased error rates and negative emotional behaviors. Requiring students to work for relatively long durations before they have attained minimal level of speed and accuracy may depress learning rates. Binder, Haughton, Van Eyk (1990) used PT to improve attention span. Teachers changed performance durations without altering any other condition. Seventy-five general education students in kindergarten through eighth grade practiced writing their digits zero through nine as fast as they could. On different days, they wrote digits for 15 seconds, 30

seconds, 1 minute, 2 minutes, 4 minutes, 8 minutes, or 16 minutes. Results indicate that students who initially wrote digits 0-9 at fluent rates (70 digits per minute when timed for 15 seconds) were less distracted and maintained their performance levels when the interval of time was extended to a 16-minute probe. Students who were initially nonfluent (wrote less than 70 digits per minute when timed for 15 seconds) showed higher rates of off-task behavior during the shorter probes and quit writing altogether during the extended probe. The researchers concluded that students who have not attained minimal levels of performance cannot be expected to attend, that is to continue working on a task for extended periods of time without slowing down or stopping. This study supports the use of precision teaching as a means of studying the relationship between behavioral fluency and attention (endurance). Students who have not yet attained minimal levels of performance cannot be expected to continue working for longer than a brief interval without slowing down considerably or even stopping.

Researchers also have applied precision teaching principles to teaching students with disabilities at the secondary level and the research demonstrated the efficacy of PT for these students (Lovitt, Fister, Freston, Kemp, Moore, Schroder, & Bauernschmidt, 1990; White & Haring, 1980). For example, Lovitt *et al*. (1990) evaluated the effects of precision teaching (PT) techniques used in conjunction with three researched-based instructional strategies: keywords, graphic organizers, and study guides. In this study, "keywords" refers to important words in text that provide indexes to the content, and these words are usually bolded, underlined, or italicized. Graphic organizers were defined as spatial displays that contain information and connect them in a meaningful pictoral way. Finally, study guides included written outlines, questions, or abstracts that emphasize important information in a text or lecture. The participants were 1431 students with mild disabilities. Seventy-five teachers from eight Utah school districts were taught a six-

step procedure for instructing students in the use of the three strategies. Precision teaching procedures were used as the progress monitoring tool as each strategy was implemented, and the three strategies served as the independent variables. The dependent variables were measures of the number of vocabulary terms, which were presented as keywords correctly identified. The effects of the keyword strategy were evaluated using a three-phase study: baseline, intervention, and retention. During both baseline and the intervention, data were collected once daily for five days. During the retention phase, data were collected once a week for four weeks. Standard celeration charts (standardized graphs developed by PT theorists which use the same scale to record various academic or social behaviors (White, 1986), were used to record data during all three phases. For another group, graphic organizers were used as an aid to visually present information students heard in lectures. Researchers used a two-phase study (five-day baseline and five-day intervention) to evaluate whether or not students improved their timings when teachers presented material using graphic organizers. Students were evaluated at the end of each session using 50-item, three-minute PT timings that were recorded on celebration charts. In the third intervention, students were given study guides that emphasized important information in textbooks and lectures (independent variable). Again, researchers used a five-day baseline period and a five-day intervention period. Each session was followed up with a 50-item, three-minute timing (dependent variable), and all data were plotted on the standard celeration chart. When the teachers implemented the three strategies in their classrooms using PT techniques, student achievement increased. Data indicate that the mean correct rates increased from baseline to intervention phases for all three strategies. Further, the mean incorrect rates decreased from baseline to intervention phases for both study guides and graphic organizers, and from baseline to retention phases for keywords.

In conclusion, PT has been shown to be an efficient set of procedures for evaluating and improving classroom instruction for students with disabilities. Research has shown that PT can be used effectively to identify pupils at-risk for learning problems, monitor progress rates for classroom learning, evaluate students' difficulties with academic skills, and compare interventions in terms of rate of learning and accuracy (Bender, 2002; Keel, Dangel, & Owens, 1999; White, 1986). While it might appear that the research on PT is somewhat dated, it should be noted that PT principles such as daily timings and teacher/student input have been widely used in the classroom for over thirty years under other names such as " daily data based measurement", "curriculum based measurement", and "progress monitoring". Most of the studies done to date have been with elementary and middle school students. However, the limited work done with secondary students has demonstrated the efficacy of PT for secondary students, though more research should be undertaken with older students, particularly secondary students with disabilities.

Table 1. Precision Teaching

Citation	Sample Description	Intervention	Dependent Measures	Results
Lovitt, T.C., Fister, S., Freston, J.L., Kemp, K., Moore, R.C., Schroeder, B., & Bauernschmidt, M (1990)	1431 students with mild disabilities	Three research-based teaching and learning strategies (keywords, study guides, and graphic organizers) were presented to teachers of students with disabilities. Teachers implemented strategies in classrooms using precision teaching techniques to increase student achievement.	Number of vocabulary terms, which were presented as keywords correctly identified.	The effects of the keyword strategy were evaluated using a three-phase study: baseline, intervention, and retention. Results showed student timings improved when PT methods were implemented.
Cohen, M.A. & Martin, G.L. (1971)	1, 8-year-old participant with a severe emotional disturbance and a learning disability	Researchers used PT methods to assess a student's difficulties in math and, after implementing a change in teaching procedures, to evaluate the student's performance to determine the effects of the change in teaching procedures.	36 worksheets presenting various single-digit addition problems with no regrouping and sums from zero to nine and was provided one minute to complete each worksheet	A PT intervention involving a simple reinforcement plan resulted in increased mastery of these basic addition facts for this student.

Table 1. Precision Teaching

Binder, C. Haughton,E., & Van Eyk, D. (1990)	75 general education students in kindergarten through eighth grade	Precision teaching methods were implemented to increase attention span by increasing students' behavioral fluency and decreasing error rates. PT methods were used to chart students' attention span.	Number of digits (zero through nine) per minute. Timed sessions were 15 seconds, 30 seconds, 1 minute, 2 minutes, 4 minutes, 8 minutes, or 16 minutes.	Students who were initally nonfluent were less distracted and maintained their performance levels when PT techniques were used to extend the interval of time.

Cognitive Organizers in Elementary Classes

Research on cognitive organizers has included a number of studies that applied these organizers to various learning problems in the elementary grades, and this body of work has demonstrated the efficacy of instruction based on cognitive organizers (Boulineau, Fore, Hagan-Burke, & Burke, 2004; Bos and Anders,1992; Darch and Carnine,1986; Sinatra, Stahl-Gemake, and Berg,1984. For example, story maps were used in a study by Boulineau, Fore, Hagan-Burke, & Burke (2004) to improve the reading comprehension of 6 third through fifth grade students with learning disabilities. The participants exhibited reading deficits and were served in a special education resource room. The researchers used a descriptive ABC , three-phase, descriptive, single-subject research design to measure the effectiveness of the intervention. Phase A (baseline) consisted of the teacher probing the students on story-grammar without instructional intervention. Phase B (intervention) involved the teacher delivering explicit instruction on story-grammar elements, and during Phase C, all story-grammar instruction was discontinued by the teacher. Story maps were used as a visual aid and an organizer for guided practice during the intervention phase; these story maps emphasized the structuring aspects of the story, which is sometimes referred to as story grammar and includes elements such as story problem, characterization, story climax, etc. The story map intervention was continued until all students completed a story map with 90% accuracy for three consecutive sessions or six days. The dependent measure was mean percentage of correct story-grammar elements for all participants. Results indicated that participants' identification of story-grammar elements increased from baseline throughout the intervention phase. Further, improvement over baseline was maintained for a minimum of three one-day sessions after the intervention was terminated.

Bos and Anders (1992) studied the effects of three interactive teaching strategies designed to help students cognitively organize their understanding: these included semantic feature analysis (uses a relationship chart or matrix), semantic mapping uses a relationship map or web), and, semantic/syntactic feature analysis (a combination of the two strategies mentioned previously). The researchers sought to determine the effects of these strategies on the comprehension and content learning of bilingual (Spanish/English) elementary students and junior high students with learning disabilities. All students were identified as LD and had a minimum IQ of 85. The researchers implemented six studies done in three phases with two studies per phase. The elementary-level participants were taught social studies content material, and the junior high students were taught science material. All students had a minimum IQ of 85. The research was quit extensive, and was conducted in three phases over a three-year period. In the first phase, researchers investigated the effectiveness of the interactive teaching strategies with researchers serving as the teachers. In the second phase, researchers investigated the effectiveness of the interactive teaching strategies when special education teachers provided the instructional intervention, each of whom had participated in a five-week staff-development plan. The third phase focused on the use of interactive teaching strategies and the modification of those teaching strategies into interactive learning strategies used by students in cooperative learning groups.

In Phase 1, Bos and Anders conducted two studies in which researchers trained in the three different instructional interventions taught those interventions directly to the students. The first study was implemented with 42 bilingual elementary students with learning disabilities, and the second study was conducted with 61 junior high students with learning disabilities. The same interventions and dependent measures were used in both studies. The students participated

in one of three interactive teaching strategies-semantic mapping, semantic feature analysis, or semantic/syntactic feature analysis, or in a traditional definition instruction group. Initially, intervention took place during three 50-minute practice sessions, and two weeks later, in three 50-minute experimental sessions. During intervention, the students were given a test of prior knowledge. The dependent measures were 20 to 30 item multiple-choice tests used as posttest measures of content knowledge. Students were administered the same tests a month after intervention to obtain a measure of long-term learning.

Phase 2 consisted of two studies using the same three intervention strategies and dependent measures as those of Phase 1. Participants in study three were 47 bilingual elementary social studies students with learning disabilities, and participants in study four were 53 junior high science students with learning disabilities. Phase 2 studies differed from Phase 1 studies in that the intervention was implemented by special education teachers in Phase 2 rather than by the researchers.

In the four studies in Phases 1 and 2, the effectiveness of the interactive teaching strategies was measured using simple effect sizes generated on the comprehension and vocabulary scores that were adjusted for scores on the pretests. No tests of significance were reported, but the researchers said that in the Phase 1 and 2 studies when the effect sizes for the interactive teaching strategies were compared to the effect sizes for the definition instruction at the initial posttest and a follow-up posttest administered one month later, the differences were "substantial" (p. 231). In addition, effect sizes for studies in Phase 1 (researchers) and studies in Phase 2 (teachers) were described by the researchers as being "similar."

In the two studies in Phase 3 the participants were 26 upper elementary, bilingual students with learning disabilities (study 3) and 22 junior high school students with learning

disabilities (study 4). Instruction was conducted by special education teachers. Intervention took place during a five-week period during which, the instructional groups were changed from whole group to small cooperative learning groups, and the teachers' roles were changed from being informant to facilitator to reflector/coach. Two intervention techniques were used in each study, semantic mapping and semantic feature analysis. Students were pretested, posttested and tested again a month after instruction using a multiple-choice researcher-developed instrument. Results from the posttest and the later test were compared to pretests and to the results of a group of average achieving students who studied the same final week materials. Results reported were pretest, posttest and follow-up multiple-choice test score means and standard deviations for the two experimental and one normative group of elementary students and junior high students. No tests of significance were reported, but the researchers said that the elementary students "gained a substantial amount of knowledge" (p.234) between the pretests and posttest and maintained that learning a month after the intervention. Further, they concluded that the results from the junior high students followed the same trend.

Darch and Carnine (1986) studied the effectiveness of advanced organizers in the form of visual spatial displays with 24 randomly assigned fourth, fifth, and sixth grade students with learning disabilities. Students were randomly assigned to one of two treatment groups, with 12 participants in each. The first group was presented social studies and science material with visual spatial displays, while the second group was presented material of the same content via text. Daily, 50-minute sessions were conducted for nine consecutive school days. The dependent measures were five experimenter-made tests consisting of probe tests, a pretest, a posttest, a transfer test, and a student attitude measure. The visual display group averaged 86% correct (near mastery) on the posttest as compared to the text group who got 56% correct on the

posttest. Statistically significant results of the posttest indicate that the use of visual displays, when used in conjunction with group instruction, can increase comprehension for students' with learning disabilities. Results indicate there was no significant difference on the transfer measure.

Sinatra, Stahl-Gemake, and Berg (1984) studied the effects of a mapping readiness technique on the reading comprehension of twenty-seven 2nd through 8th grade students with learning disabilities who were being taught in a university reading clinic. All participants were taught to use three types of semantic maps. The maps consisted of circles, squares, or rectangles containing key words that are linked together by arrows showing the flow of events in a story. Instruction took place over a four-month period and the researchers did not specify the length of each instructional session or how much instruction each participant received. Reading scores of the students using the mapping approach were compared to their scores when they used a more verbal traditional direct-instruction reading approach. The dependent measure was a researcher-developed multiple-choice comprehension test that included comprehension items, inferential items and detail items. Results indicate that 19 of the 27 participants scored higher on the dependent measure when using the semantic mapping procedure. Two participants scored the same regardless of which approach they used, and six children scored higher when using the traditional verbal approach. The results of the comprehension questions on the posttest were significant at the .05 level, however, there were no significant differences noted on inferential and detail questions.

This literature supports the efficacy of graphic organizers with elementary students and one group that also included junior high along with elementary students. The results of these studies done primarily with elementary students and one small subgroup of junior high students, indicate students will perform better when using graphic organizers to accompany text.

Cognitive Organizers in Middle School and High School

In addition to the research demonstrating the efficacy of various cognitive organizers for younger school age students, several studies have suggested the efficacy of cognitive organizers with older students (Gleason and DiCecco, 2002; Horton, Lovitt, and Bergerud,1990; Griffin, Simmons, and Kane'enui,1989; Rankin-Erickson ,2002). For example, Gleason and DiCecco (2002) studied the effects of graphic organizers on the attainment of factual and relational knowledge of 24 middle-school social studies students with learning disabilities. The experimental group received instruction in graphic organizers for 20 school days during three 40-minute periods a day while the control group received traditional classroom instruction for the same period of time. The students were then expected to utilize their understanding of graphic organizers during lectures and while reading. Three dependent measures were used to determine the effects of intervention: multiple choice pre and posttests, eight factual quizzes, and two domain knowledge essays. Researchers used a pretest-posttest control group design to determine the effectiveness of using GOs. Results indicate that students in the GO group did not score better on tests of factual knowledge but did score better on measures of relational knowledge. These findings suggest that the graphic organizers may be more effective for developing higher order understandings of reading material.

Horton, Lovitt, and Bergerud (1990) conducted three experiments comparing the effects of teacher-directed graphic organizers (GOs), student-directed organizers with text references, and student-directed organizers with clues. Participants included students with learning disabilities, remedial students and students in regular education, all of whom were in regular education content area classes. Students were in grades 7 and 10. Each experiment included two conditions, a self-study condition and a GO condition. The dependent measures were ratings of

student-completed GOs scored for content information. Experiment 1 examined the effectiveness of a teacher-directed GO condition compared to a self-study condition. Participants included three middle school social studies classes, three middle school science classes and three high school social studies classes. Within those classes, eight students were labeled as having learning disabilities, and 172 students were not identified as having disabilities. Treatments were implemented during two 45-minutes class sessions, in which the students were reading passages from within a subject area and completing the corresponding graphic organizers. During each of the 45-minutes sessions, students in the self study condition were asked to read and reread the passage for 15 minutes, take notes in a format of their choice for 20 minutes and then take up to 10 minutes to complete the 15-item student version of the graphic organizer. Students in the teacher-directed cognitive organizer condition were also asked to read and reread the passage for 15 minutes, complete the graphic organizer with the teacher on the overhead for 15-20 minutes, and take the test for up to 10 minutes. Results indicate that the scores of students with learning disabilities were significantly higher when they used teacher-directed graphic organizers (73% correct) rather than self-study (30% correct). Scores of students without disabilities also were significantly higher when they used teacher–directed graphic organizers. These findings suggest that the use of graphic organizers benefits both students with and without disabilities, and therefore should be more widely applied in the general education class.

In Experiment 2, the textbooks, participants, settings, duration, and manner of selecting reading passages were the same as in Experiment 1(Horton, Lovitt, and Bergerud, 1990). The purpose of experiment 2 was to examine the effectiveness of student-directed graphic organizers with referential cues to text compared to a self-study condition. Experiment 2 required participants to complete their graphic organizers as an independent activity while the teacher

circulated through the classroom and provided assistance. Results indicate that the scores of students with learning disabilities were significantly higher when they used the student-directed GO (71% correct) rather than merely self-study (19% correct). Again, the scores of students without disabilities also were significantly higher when they used student–directed graphic organizers. These data suggest that a student's ability to use graphic organizers in not dependent on the teacher's direct involvement- thus, this may suggest some savings in terms of teacher's time.

Experiment 3 examined the effectiveness of a variation of student-directed graphic organizers when students were given a list of clues to help complete diagrams. Participants included students of three middle school social studies classes, three middle school science classes and three high school health classes. Within those classes, four students were labeled as having learning disabilities, and 226 students were not identified as having disabilities. Researchers used the same experimental design from the two previous investigations. Results indicate that students with learning disabilities correctly answered 67% of the items on the post-test when using the student-directed graphic organizers with clues, as compared to 10% when using self-study. Results in performance were significant indicating that in all three studies students with learning disabilities performed better when using GOs rather than self-study.

A study conducted by Griffin, Simmons, and Kane'enui (1989), studied the effects of graphic organizers, used along with science text, on the recall and comprehension of expository text on 28 fifth and sixth grade students with learning disabilities. Participants were randomly assigned to a control group or an experimental group. The study took place over one week during four 45-minute sessions. The control group was given a list of facts to accompany their text, while the experimental group was provided with a graphic organizer, which they were

expected to complete during their reading. Dependent measures included an oral-free retell, a researcher-developed production tasks and choice-response tasks. Participants were given assessments the day after the completion of treatment and two weeks after the completion of treatment. Results indicate no significant differences between the experimental group (GO) and the control group (no GO). Researchers recommend future research using textbooks that closely math the reading level of the students instead of the text they are currently using in class.

Using a repeated measures within-subject design, Sturm and Rankin-Erickson (2002), examined the effects of two types of concept mapping to, hand-drawn mapping and computer-drawn mapping, on the written essays of 12 eighth-grade students with learning disabilities. The students were in a non-special education English and reading classroom and had been identified as needing reading support. The first week, students were instructed in the hand-drawn method of concept mapping for five days in one 50-minute session each day. The second week, students received training in the Inspiration software and additional practice with computer-generated concept mapping. Dependent measures included two baseline essays, six student-generated descriptive essays (2 essays under each of the three conditions no-map support, hand-map support, computer-map support) scored for: number of words, syntactic maturity, number of t-units, writing quality, and attitude toward writing. Results indicate that when students used either type of mapping as a prewriting strategy, many aspects of their writing improved; students wrote more as measured in t-units, and their quality of writing improved as indicated by holistic writing scores. Results for number of words, number of t-units and holistic writing scores were significant. However, since students in all three groups (i.e., two types of mapping and no mapping) wrote longer and better essays than they did prior to instruction in mapping, the study did not support an advantage of using mapping vs. not using mapping.

Boon, Fore, Ayres, & Spencer (2004) conducted a pilot study using a one-group, non-randomized pre-posttest design to look at the effects of integrating Inspiration 6 software into high school social studies instruction. Ten tenth-grade students with mild disabilities (8 with LD, 1 with a mild intellectual disability, 1 with ED) were participants. They were taught content taken from a social studies textbook using traditional instructional methods integrated with a technology-based strategy utilizing cognitive organizers. Dependent measures were one 15-item production test used as a pretest, immediate posttest and delayed posttest and an informal student satisfaction survey. Results indicated that the scores on the immediate and delayed posttests were both significantly higher than scores on the pretest. Further, informal survey data indicated that most of the students liked using Inspiration 6 software, and it helped them remember the most important information in the textbook.

Boyle (1996) studied the effects of a cognitive mapping strategy on the literal and inferential reading comprehension of thirty middle school students with mild disabilities (learning disabilities and educable mental retardation). An experimental group-control group matched-subjects design was used by researchers to compare results from the experimental group (15 participants who were taught to use cognitive organizers) and the control group (15 participants who did not receive training on the mapping strategy). Dependent measures were pre and post tests, Stanford Diagnostic Reading Test (SDRT), curriculum-based reading questions, a metacognitive awareness measure, the Rhody Reading Attitude Assessment, and comparisons of cognitive maps. The independent variable was a cognitive mapping strategy that incorporated the use of the mnemonic device "TRAVEL" (topic, read, ask, verify, examine, link) to aid students in developing their organizers from reading passages. Results from the study indicate that participants in the intervention group showed gains in both literal and inferential

comprehension of on-grade level and below-grade level reading passages. However, results from t-tests found no significant differences on the SDRT, the Rhody Assessment, or the metacognitive questionnaire.

Boyle (2000) used an experimental group-control group design to determine if the Venn diagram strategy would improve the literal, inferential, and relational reading comprehension of students with mild disabilities on two-topic and three-topic reading passages. Twenty-four students in the 9th and 10th grades with mild disabilities (18 students with LD and 6 students with EMH) were randomly assigned to either an experimental or control group. Dependent measures included a pretest, the Nelson-Denny Reading test (NDRT), a post-test of curriculum-based reading questions, and accuracy of Venn diagrams. The experimental group was taught to construct a Venn diagram using the strategy "RELATE". Results indicated statistically significant increases in both literal and relational comprehension on two-topic and three-topic reading passages for students who had used the Venn diagram strategy. Measures of the third variable, inferential comprehension, proved not to be statistically significant. These finding support previous findings (Boyle, 1995, 1996; Boyle & Weishaar, 1997) that certain types of organizers better aid certain types of types of reading passages and perhaps, Venn diagrams may be most effective when used with reading passages with two or more topics.

Using an experimental group-control group design, Boyle and Weishaar (1997) studied the effects of student-generated and expert-generated cognitive organizers on the literal and inferential reading comprehension of 39 students in 10th, 11th, and 12th grade with learning disabilities. Participants were randomly assigned by grade to one of two experimental groups (student-generated or expert-generated) or a control group. The study took place over 10 sessions at a frequency of three to five sessions per week. Both intervention groups were

instructed to use graphic organizers with reading passages of approximately 400 words. The student-generated group used the TRAVEL strategy (topic, read, ask, verify, examine, link) to help create graphic organizers. Dependent measures included the SDRT (used as pretest and posttest), a curriculum-based reading measure (CB), and a comparison of organizers. Results indicate that participants in the student-generated and expert-generated groups performed higher on measures of literal comprehension when compared to the control group. Although students who used student-generated organizers scored higher on measures of inferential comprehension when compared to the control group, the same was not true for the expert-generated group. Further, it can be concluded that regardless of who generates the graphic organizers, they are effective for improving reading comprehension for students with learning disabilities.

Fore, Scheiwe, and Boon (2006) studied the effects of the direct instruction of story mapping on four 11th grade students with specific learning disabilities. Participants were being served in a resource room for literature at a public high school. A multiple probe across participants design was used to measure the effectiveness of the intervention on the percentage of correct reading comprehension questions. The results indicated that all four students with specific learning disabilities answered more comprehension questions correctly after the direct instruction of story mapping.

Bos and Anders (1990) studied the effects of three types of reading strategies: semantic mapping (SM), semantic feature analysis (SFA), and syntactic/semantic feature analysis (SSFA) on the reading comprehension of 61 junior-high students with learning disabilities in content-area classes. Definition instruction was a fourth condition that served as the control. Students were randomly assigned to one of the four conditions and participated in three 50-minute practice sessions and three 50-minute experimental sessions over a two-week period.

Researchers developed a multiple-choice test that consisted of 30 items to measure the learning of the participants. The researchers found that the students who participated in one of the three interactive vocabulary instruction strategies scored higher on the posttest than did the participants who were in the direct-instruction condition. The researchers found a significant effect for all participants in an interactive condition; however, they found no significant differences between the three interactive strategies.

Anders, Bos, and Filip (1984) investigated the effects of semantic feature analysis (SFA) on the reading comprehension and vocabulary knowledge of 62 high school students with learning disabilities as compared to a traditional vocabulary method. Participants were randomly assigned to either the experimental group (SFA) or the control group (traditional vocabulary instruction) and received instruction over a two-week period. The experimental group received treatment over two fifty-minute class periods. During intervention the students and teacher completed a relationship chart. That helped the students to link the new vocabulary with major concepts from their reading. Students in the control group, or the traditional vocabulary look-up condition, were given a list of words and were asked to look them up in the dictionary and write a definition and a sentence for each word. Researchers developed a 20-item multiple-choice comprehension test for the dependent measure. The comprehension test consisted of ten vocabulary items and ten conceptual items. A data analysis was done using a three separate analysis of covariance (ANCOVA). Prior knowledge was the covariate and did account for significant adjustments on the group means for the total score on the comprehension test and on the conceptual score. Results of the posttest indicate that students who participated in SFA scored significantly higher than those who participated in the traditional vocabulary instruction group.

Bos, Anders, Filip, and Jaffe (1989) evaluated the effectiveness of semantic feature analysis on the reading comprehension of social studies text. The participants included 50 high school students with LD and all students were reading three to five years below grade level. Students' prior knowledge was assessed before the study began using a 20-item multiple choice test. Intervention took place over two fifty-minute class sessions. Students were placed in either the semantic feature analysis (SFA) condition or in the dictionary method condition. Students in the SFA condition completed a relationship chart for each passage along with their teacher. This chart linked the important ideas of the social studies passage to the key vocabulary from the reading selection. Students in the dictionary method condition were given a list of vocabulary words to define and were told to look them up using the dictionary. A multiple-choice test with vocabulary questions and conceptual questions was used to measure comprehension immediately following the intervention and 6 months later. The dependent variables included the number of correct vocabulary items and the number of correct conceptual items on the reading comprehension test. A data analysis was completed using a 2x2 multivariate analysis of covariate (MANCOVA) design. Results indicated significant differences on comprehension between the dictionary method condition and the semantic feature analysis condition. Further, results from the test given 6 months later, indicate that the effects of the intervention are long term.

Darch and Eaves (1986) randomly assigned 22 9^{th}, 10^{th}, and 11^{th} grade students with learning disabilities to one of two treatment groups to study the effects of advanced organizers, in the form of visual spatial displays, on the comprehension of secondary science material. Dependent measures included six experimenter-made tests that measured student performance on science material and the students' ability to generalize their knowledge of visuals displays to

other (unfamiliar) passages. The study was conducted in a resource room for students with learning disabilities over four consecutive days during 50 to 55-minute sessions. Results from the post-test were statistically significant indicating that the lessons taught using visual displays were more effective than the text-approach lessons. Further, the group taught with visual displays had better recall of key concepts when compared to the text-based group. Both groups did poorly on the transfer test and maintenance test. The study indicated that even with the use of advanced organizers, students with learning disabilities have difficulty maintaining new information.

In 1986, Darch and Gersten compared two direction-setting activities used to teach reading comprehension to 24 high school students with learning disabilities. Participants were randomly assigned to one of two instructional groups. The first group received instruction in comprehension using a motivational discussion approach based on basal teacher guides, while the second group received instruction using advanced organizers in the form of a text outline. The advanced organizers allowed students to construct a framework for organizing text. Both groups received instruction during one 50-minute session daily for nine school days. Researchers developed three dependent measures: a six item pretest given one day before intervention, three 6-item unit tests used to measure comprehension, and a multiple-choice posttest. A data analysis was conducted using analysis of variance (ANOVA). The analysis showed a statistically significant main effect favoring the advance organizer group. The advanced organizer group scored higher on the posttest (75% correct) when compared to the basal group (53% correct).

Onachukwu, Boon, Fore, & Bender (2007) studied the effects of a story-mapping procedure on the reading comprehension of three 8th grade male students with learning

disabilities, two of the students were Caucasian, and one was Hispanic American. The students were taught language arts in a public middle school inclusion classroom. The participants IQs ranged from 96 to 99. Participants were taught to use story maps to identify specific story-grammar elements in stories taken from an eighth-grade literature textbook. Instruction took place over 23 schools days. The dependent measures used to determine the effects of intervention were percentage correct on reading comprehension questions and percentage correct for identification of the story-grammar elements. The independent variable was the students' use of the story map to correctly identify the specific story grammar elements. Researchers used a multiple baseline across participants design to assess the efficacy of the intervention. During baseline students were given an introduction to the vocabulary in the story then the teacher instructed them to read the selection from their workbook independently and then answer the corresponding reading comprehension questions. The students were allotted 60 minutes to complete the assignment. During intervention, students were given a story map and asked to read the chosen selection and answer the comprehension questions. Students continued in the intervention phase until 80% of the questions had been answered correctly. All three students scored higher on reading comprehension questions when using the story mapping procedure demonstrating the effectiveness of the intervention.

Boon, Burke, Fore & Spencer (2006) examined the efficacy of computer-generated cognitive organizers using Inspiration 6 software versus traditional textbook instruction on students' comprehension of social studies content material using a pretest/posttest treatment control group design. The participants were 29 tenth-grade students in regular education and 20 students with learning disabilities. The study took place in a high school located in a large suburban area in the Southeast. The study used two inclusion classrooms that both contained

regular education students and special education students. The experimental group was comprised of students in the graphic organizer condition, while the control group consisted of students in the traditional textbook condition. During the graphic organizer condition, students were asked to complete a paper and pencil graphic organizer during the teacher's presentation. After the chapter was completed students then used the content from their hand drawn organizer to complete a graphic organizer electronically on the computer using Inspiration 6 software. Students in the traditional textbook condition did not use technology, rather, were given guided reading worksheets to complete after oral reading and lecture. Both conditions were conducted over a three-week period. The dependent measures were a 35-item open-ended pretest/posttest test of social studies content. Results were analyzed using a one-way analysis of variance (ANOVA) on the 35-item pretest and posttest. Participants in the cognitive organizer condition scored significantly higher than those in the traditional textbook condition. The results between the pretest and posttest were statistically significant; illustrating how cognitive organizers can have a considerable impact on the acquisition of social studies knowledge.

Boon, Burke, Fore & Hagan-Burke (2006) replicated the study by Boon et al. (2006) using a quasi-experimental pretest-posttest group design to study the effects of computer-generated cognitive organizers using Inspiration 6 software versus traditional textbook instruction on students' ability to comprehend social studies content material. The same inclusion classrooms were used for this study containing regular education and special education students. The participants were 44 tenth-grade students, of which 26 were general education students, and 18 were classified as either learning disabled or emotionally disturbed. Students in the cognitive organizer condition served as the experimental group, while students in the traditional textbook condition served as the control group. The control group from the previous

study was put in the cognitive organizer intervention group for the current replication. In order to prevent a carryover effect from the previous study, researchers gave students a pretest on the new content and evaluated the statistical differences. Both instructional conditions were conducted over a three-week period and were comprised of four 90-minute blocks of instruction. The dependent measures were a 45-item open-ended pre/posttest of social studies content. The data analysis included a mixed-effect, repeated measures analysis of variance (ANOVA) to study the effects of the graphic organizers completed using the Inspiration 6 software on the dependent measures. The results of the study showed a statistically significant main effect for the pretest/posttest on content knowledge. Participants in the cognitive organizer group scored significantly better than students in the traditional textbook condition. These findings are similar to the previous findings from Boon et al. (2006) indicating that technology-based instruction increases achievement in social studies content when compared to traditional textbook instruction.

Research to date supports the efficacy of cognitive organizers as an instructional technique for students at both the elementary and secondary levels. Educators use cognitive organizers in hopes of increasing the readers' knowledge and understanding through visual representations of the material and the relationship between the key terms (Simmons, Griffin, & Kame'enui, 1998). However, the preponderance of research has been at the elementary level using group design studies and including large numbers of students without disabilites. There is a need for more single-subject studies at the secondary level using students with varying types of mild disabilities. Further, research has neglected the use of GO's to develop content-area vocabulary in areas such as social studies, science, and literature at the secondary level.

The current review of the literature provides significant support for the use of graphic organizers at both the elementary and secondary levels. However, since the support is based largely on group design studies and studies done at the elementary level, there is an obvious need to further investigate the use of graphic organizers at the secondary level using single-subject design studies. Further, research demonstrates that students with and without disabilities greatly benefit from the use of graphic organizers to visually represent and organize prior knowledge and make connections between ideas (Vaughn & Edmonds, 2006).

There are very limited studies done using graphic organizers to enhance vocabulary acquisition, and no studies done to determine the effects of graphic organizers on rate of response. The present study will focus on areas in which research is very limited: single-subject design, secondary level participants, and vocabulary acquisition and rate of response.

Reading Comprehension of Students with Mild Disabilities

Research has demonstrated that students with mild disabilities i.e., mild intellectual disabilities and learning disabilities, usually lack adequate reading comprehension skills (Boyle, 2000; Mastropieri, Scruggs, & Graetz, 2003; DiCecco & Gleason, 2002; Kotsonis & Patterson, 1980; Wong & Jons, 1982). In the case of learning disabilities, the most common reason the students are referred for special education is their difficulty with reading (Bender, 1998). It is estimated that 80% of students receiving LD services struggle in the area or reading (Jennings, Caldwell, & Lerner, 2006). It has been found that students with mild disabilities tend to be more passive learners who have deficits in the areas of processing and organizing written information (DiCecco & Gleason, 2002). In addition, numerous researchers have suggested that the poor reading comprehension of these students may be due largely to their lack of

metacognitive and strategy use (Scruggs & Laufenberg, 1986; Swanson, 1989; Wong, 1978, Wong & Jones, 1982).

The reading deficits of secondary students with mild disabilities become very obvious when the students are required to understand new vocabulary, make inferences, locate main ideas, skim reading selections and demonstrate an understanding of relationships within a passage. Especially relevant to the current study is the finding that there is a positive relationship between students' vocabulary knowledge and their overall reading comprehension. Stahl and Fairbanks (1986) did a meta-analysis of studies of the effects of vocabulary instruction on comprehension. They found a significant effect size for comprehension of passages containing the vocabulary which students had been taught and for global comprehension measures.

Given their difficulties with reading comprehension, it is especially critical that students with mild disabilities in the mainstreamed classroom be given explicit instruction in reading comprehension. Mastropieri, Scruggs, and Graetz (2003) have said that students with learning disabilities require repetitive, intensive opportunities to practice reading comprehension strategies before they are able to become proficient and succeed in school. However, given the fast pace of today's classrooms, teachers are not allotted any extra time for the instruction of reading comprehension strategies. At the secondary level, students are usually given reading assignments followed by questions to complete independently with little or no instruction on how to unravel the text. As Berkeley (2007) succinctly put it, as students move into the upper grades, expectations for them shift from "learning to read to reading to learn." (p. 7).

DiCecco and Gleason (2002), consider reasons why students with mild disabilities often have difficulty acquiring knowledge in content area classes. Their problems acquiring content

information are due, not only to the learning problems (such as reading disabilities) of the students, but also to the fact that text books are poorly organized, not user-friendly, and often do not make important connections and relationships explicit. Further, Boyle (2000) notes that most curricula at the secondary level is textbook driven and requires mainstreamed students with mild disabilities to independently comprehend and analyze textbook information that is written several levels above their own reading level.

As students with mild disabilities progress into the secondary level of education, reading in content-area classes poses even more challenges than at the lower grade levels, where the main focus is on skill acquisition. At the secondary level, students are exposed to various types of texts that include longer passages and fewer pictures, more complex vocabulary, and new ideas that are specific to a content-area in which they may not have any background knowledge to which they can link new learning. Secondary Science and Social Studies are two subjects that traditionally introduce students to a large volume of content with little introduction or in-depth coverage (Mastropieri, Scruggs, & Graetz; 2003).

Students with mild disabilities who are already struggling with reading are also affected by legislation that places unrealistic demands on their secondary teachers. While there are no specific guidelines or expectations for children in special education, NCLB has raised expectations for all students (all children are expected to be on grade level by 2013-2014), which in turn holds schools more accountable for groups of students who at one point may have been excluded from assessment or accountability programs. According to Kahl (2003), by 2005-06 school year, states must be testing all students in reading and mathematics in grades 3 through 8, plus one higher grade. The assessments must directly reflect state standards for content. Results from assessments must be reported by percentages of students in at least three academic areas,

and the results must be reported by subgroups based on gender, race/ethnicity, poverty level, English-language proficiency, and disability. The NCLB has left schools feeling pressure to include their special education students in high-stakes testing in order to help schools meet Adequate Yearly Progress (AYP). In order for schools to meet AYP, they must show that all required subgroups are making adequate yearly progress towards the 100% on grade level goal. NCLB puts all students into one of the following subgroups: ethnic groups (American Indian, Asian, Hispanic, Black, and White), Limited English Proficient, Special Education, Migrant Status and Free and Reduced Priced Lunch. Only the scores of subgroups with 20 students or more are used to compute AYP with exception of Special Education and Limited English Proficiency; they must have at least 40 students. If a school does not meet their adequate yearly progress (AYP) goal for two consecutive years, then it is put on the "in need of improvement" list. As a result of this pressure on teachers to improve the achievement of their students, some teachers are increasing the pace at which they cover content material. Covering once chapter per class session is very common, but recently many teachers have begun to cover even more content in a single class session. (Mastropierei, Scruggs, & Graetz, 2003).

It is no wonder that students with mild disabilities are struggling in their secondary classes. Given that they come to high school with poor reading skills and the fact that they no longer receive instruction in reading, coupled with the increased complexity of the reading material and the increased demands for proficiency placed upon them by pressured teachers, it is hardly surprising that so many of them struggle.

Citation	Sample Description	Intervention	Dependent Measures	Results
DiCecco, V.M., Gleason, M.M (2002)	24 middle school students with LD in pullout resource program	E:GO used for postreading activity GOs:geometric shapes with lines and arrows C: same inst. as E, but no GOs Duration/Intensity:4 weeks (20 school days), three 40-minute periods/day	1. content knowledge 20 item multiple-choice (pretest, posttest) 2. 8 fact quizzes, 5 ques.each 3. 2 domain knowledge essays	Experimental group scored better on measures of relational knowledge but did not score better on test of factual knowledge
Sturm, J.M., Rankin-Erickson, J.L.(2002)	12 eighth grade student with LD in a non-special ed english/reading classroom	E1: (concept map) hand-drawn used as pre-writing strategy E2: (concept map) computer-generated used as pre-writing strategy C: no-map Duration/Intensity: 50-minute session for 5 consecutive days for each experimental group	1. (pre-test) 2 baseline essays 2. (post-test) 6 student-generated descriptive essays (2 essays using each planning strategy) scored for: number of words, syntactic maturity, number of t-units, writing quality, writing attitude 3.general writing attitude survey (given pre-intervention, after writing essays using hand-mapping, after writing essays using computer-mapping, following all writing	All three conditions (no-map, hand-map, computer-map) showed increases in number of words, number of t-units, and holistic writing scores on descriptive essays

			conditions)	
Boon, R., Burke, M., Fore, C., & Hagan-Burke, S. (2006).	44 tenth grade students (26 in regular education, 18 with LD and EBD)	E: computer-generated cognitive organizers using Inspiration 6 software C: traditional textbook instruction	The dependent measures were a 45-item open-ended pre/posttest of social studies content	Participants in the cognitive organizer group scored significantly better than students in the traditional textbook condition
Boon, R., Burke, M., Fore, C., & Spenser, V. (2006)	29 tenth grade students (9 regular ed., 20 LD)	E: computer-generated cognitive organizers using Inspiration 6 software C: traditional textbook instruction Both conditions were conducted over a three-week period.	The dependent measures were a 35-item open-ended pretest/posttest test of social studies content.	Participants in the cognitive organizer condition scored significantly higher than those in the traditional textbook condition.
Boon, R.T., Fore, C., Ayres, K., & Spenser, V.G. (2005)	10 tenth grade students (8 with LD, 1 with mild intellectual disability, 1 with ED) in social studies	E: cognitive organizers made using Inspiration 6 software Duration/Intensity: four school days	1. 15 item production test (pre test) 2. immediate post test and delayed post-test 3. student satisfaction survey	Posttest scores were significantly higher after the use of cognitive organizers

Boulineau, T., Fore, C., Hagan-Burke, S., & Burke, M. (2004)	6 third/fourth grade students in special education resource room ,with LD, who exhibited reading deficits	Design: ABC Duration/Intensity: daily intervention until all students completed a story map with 90% accuracy for 3 consecutive sessions	% of correct student-generated story grammar elements	Identification of story-grammar elements increased during intervention
Anders, P.L., Bos, C.S., & Filip, D.(1984)	62 high school students with learning disabilities	E: semantic feature analysis C: traditional vocabulary look-up Duration/intensity:2 wks., 2 50-min. practice sessions and 2 50-min. experimental sessions	researcher-made 20 item multiple-choice comprehension test	Experimental group scored significantly higher than traditional look-up vocabulary group on posttest
Bos, C.S.,& Anders, P.L. (1990)	61 junior-high students with learning disabilities served in either resource or self-contained	E1: semantic mapping E2: semantic feature analysis E3: semantic/syntactic feature analysis C: definition instruction duration/intensity: over 2 weeks, three 50-min. practice sessions three 50-min. experimental sessions	researcher-made 30-item multiple-choice test	Semantic feature analysis group and semantic/syntactic feature analysis group showed greater recall than the direct instruction group

Bos, C.S.,& Anders, P.L. (1992)	Study 1: 42 bilingual elementary students with learning disabilities	Phase I (implemented by researchers) E1: semantic mapping E2: semantic feature analysis E3: semantic/syntactic feature analysis C: definition instruction duration/intensity: over 2 weeks, three 50-minute practice sessions, three 50-minute experimental sessions	20 to 30-item researcher-made multiple-choice content knowledge test	Effect sizes were substantial when compared to the definition instruction condition
	Study 2: 61 junior high students with learning disabilties	Phase I (implemented by reserachers) E1: semantic mapping E2: semantic feature analysis E3: semantic/syntactic feature analysis C: definition instruction duration/intensity: over 2 weeks, three 50-minute practice sessions, three 50-minute experimental sessions	20 to 30-item researcher-made multiple-choice content knowledge test	Effect sizes were substantial when compared to the definition instruction condition

	Study 3: 47 bilingual elementary students with learning disabilities	Phase II (implemented by spec. ed. teachers) E1: semantic mapping E2: semantic feature analysis E3: semantic/syntactic feature analysis C: definition instruction duration/intensity: over 2 weeks, three 50-minute practice sessions, three 50-minute experimental sessions	20 to 30-item researcher-made multiple-choice content knowledge test	Effect sizes were substantial when compared to the definition instruction condition
	Study 4: 53 junior students with learning disabilities	Phase II (implemented by spec. ed. teachers) E1: semantic mapping E2: semantic feature analysis E3: semantic/syntactic feature analysis C: definition instruction duration/intensity: over 2 weeks, three 50-minute practice sessions, three 50-minute experimental sessions	20 to 30-item researcher-made multiple-choice content knowledge test	Effect sizes were substantial when compared to the definition instruction condition

	Study 5: 26 bilingual elementary students with learning disabilities	Phase III (implemented by spec. ed. teachers) E1: semantic mapping E2: semantic feature analysis C: normative group duration/intensity: over 2 weeks, three 50-minute practice sessions and three 50-minute experimental sessions	20 to 30-item researcher-made multiple-choice content knowledge test	Both groups had scores similar to normative group, all groups gained knowledge from pretest to posttest
	Study 6: 22 junior high students with learning disabilities	Phase III (implemented by spec. ed. teachers) E1: semantic mapping E2: semantic feature analysis C: normative group duration/intensity: over 2 weeks, three 50-minute practice sessions and three 50-minute experimental sessions	20 to 30-item researcher-made multiple-choice content knowledge test	Both groups had scores similar to normative group, all groups gained knowledge from pretest to posttest
Bos, C.S., Anders, P.L., Filip, D., & Jaffe, L.E.(1989)	50 high school students with learning disabilities	E: semantic feature analysis C: dictionary instruction duration/intensity: over 2 weeks four 50-minute experimental sessions	researcher-made multiple-choice comprehension test	Semantic feature analysis group had significantly higher scores than control group

Boyle, J.. (1996)	30 sixth, seventh, eighth graders with learning disabilities(20 students) or EMR	E: cognitive mapping strategy TRAVEL C: traditional reading techniques duration/intensity: over two weeks, six 50-minute sessions	1. Stanford Diagnostic Reading Test 2. curriculum-based reading questions 3. metacognitive awareness measure 4. Rhody Reading Attitude Assessment 5. comparisons of cognitive maps	Experimental group showed gains in both literal and inferential comprehension, no significant differences on the Stanford Diagnostic Reading Test, Rhody Assessment, or metacognitive questionnaire
Boyle, J.R. (2000)	24 ninth and tenth graders with learning disabilities (18) or EMH	E: cognitive mapping strategy RELATE C: traditional reading techniques duration/intensity: over 1 week, two 50-minute sessions	1. Nelson Denny Reading Test 2. Curriculum-based reading questions 3. Accuracy of Venn diagrams	Significant increases in literal and relational comprehension for Venn diagram group
Boyle, J.R., & Weishaar, M. (1997)	39 tenth, eleventh, twelfth grade students with learning disabilities	E1: cognitive organizer made by student using TRAVEL E2: cognitive organizer made by expert using TRAVEL C: Traditional reading technique duration/intensity: over two weeks, eight 50-minute sessions	1. SDRT 2. curriculum-based reading measure (CB) 3. comparison of organizers	Experimental groups scored significantly higher on measures of literal and inferential comprehension when compared to control group

Darch, C., & Carnine, D. (1986)	24 fourth, fifth, and sixth graders with learning disabilities	E: visual display C: instruction via text duration/intensity: over two weeks, nine 50-minute sessions	researcher-made multiple-choice comprehension test	Posttests were significantly higher for group taught with visual displays
Darch, C., & Eaves, R. (1986)	22 high school students with learning disabilities	E: visual display C: instruction via text duration/intensity: over three weeks, twelve 50-minute sessions	researcher-made multiple-choice comprehension test	T tests show students who generated their own organizers had significant higher scores than control group
Darch, C., & Gersten, R. (1986)	24 high school students with learning disabilities	E: advanced organizer C: basal reading duration/intensity: over 2 weeks, nine 50-minute sessions	researcher-made multiple-choice comprehension test	Advanced organizer condition scored higher on posttest when compared to the basal group

Griffin, C.C., Simmons, D.C., & Kame'enui, E.J. (1991)	28 fifth and sixth graders with learning disabilities	E1: graphic organizer C: list of facts duration/intensity: over 1 week, four 45-minute sessions	1. oral free retell developed by researcher 2. production comprehension test developed by researcher 3. multiple-choice comprehension test developed by researchers	No significant differences between experimental and control conditions
Horton, S.V., Lovitt, T.C., & Bergerud, D. (1990)	study 1: 8 students with learning disabilities(5 middle school, 3 high school), 163 without disabilities	E: teacher-directed graphic organizer C: self-study duration/intensity: over 1 week, two 45-minute sessions	analysis of student-made graphic organizers	Participants who used either type of GO, had significantly higher performance scores than self-study condition
	study 2: 8 students with learning disabilities(5 middle school, 3 high school), 163 without disabilities	E: student-directed graphic organizer w/ referential cues C: self-study duration/intensity: over 1 week, two 45-minute sessions	analysis of student-made graphic organizers	Participants who used either type of GO, had significantly higher performance scores than self-study condition
	study 3: 4 students with learning disabilities(3 middle school, 1 high school), 226 students without disabilities	E: student-directed graphic organizer w/ clues C: self-study duration/intensity: over 1 week, two 45-minute sessions	analysis of student-made graphic organizers	Participants who used either type of GO, had significantly higher performance scores than self-study condition

Lovitt, T., Rudsit, J., Jenkins, J., Pious, C., & Benedetti, D. (1986)	30 seventh graders with learning disabilities and 172 seventh graders without learning disabilities	E: adapted text(framed outlines) C: regular text duration/intensity: over 12 weeks	Laidlaw comprehension test	Scores were improved when advanced organizers were used.
Onachukwu, I., Boon, R., Fore, C., & Bender, W. (2007)	3 eighth grade students with LD	E: story mapping procedure over 23 sessions	Reading comprehension questions	Percent correct on reading comprehension tests increased for all three students
Sinatra, R.C., Stahl-Gemake, J., & Berg, D.N. (1984)	27 students with learning disabilities from second-eighth grades	E: mapping readiness approach including episodic webs, thematic maps, and classification maps C: verbal readiness approach duration/intensity: over 16 weeks	researcher-made multiple-choice comprehension test	Participants scored significantly higher on comprehension when using the semantic map approach as compared to the verbal approach
Fore III, C., Scheiwe, K., & Boon, R. (2006)	four 11th grade students with specific learning disabilities served for literature in a resource room	E: direct instruction of story mapping duration/intensity: 28 sessions	% correct of reading comprehension questions	The mean percentage of story grammar elements for all students increased

CHAPTER 3

METHODS OF THE STUDY

Methods

Experimental Design

The study took place over an eleven-week period, with four sessions being conducted each week. A multiple probe design (Kennedy, 2005) was used to demonstrate the effects of cognitive organizers (independent variable) and students' frequency of response and retention of the definitions of content-area vocabulary words as measured by one-minute daily probes. The multiple probe design allows for data to be collected through "probe trials" that are introduced throughout instructional sessions (Tawney & Gast, 1984). The daily measure of the students' ability to correctly relate the vocabulary terms to their definitions was the dependent measure in this study. The design was used across participants to predict the path of baseline data (Kennedy, 2005). Further, the design demonstrated that targeted behaviors change as a result of the interventions while those same behaviors do not change when the interventions are not in effect, across word sets for each participant.

Subjects in the Study

A total of three students participated in this study. Demographic data was collected on each student including: (a) disability, (b) gender, (c) age at the time of study, (d) race, (e) IQ. Participants were freshman in a suburban high school in central Georgia. These students were taking a required World History class for the first time. Each student also participated in one period of a study skills elective that allowed time for basic skills to be remediated each day, in addition to their regular schedule.

In order for each student to participate they had to be previously identified as having a mild disability and they were required to have parental permission. Initially a number of students in the class were offered the opportunity to participate, including all students with good attendance records. Those who were unable to get permission or those who were likely to change classes during drop/add were excluded. The first three students who returned parental permissions for participation were selected as participants.

The IQ assessments had been administered to the participants within the last five years by the school psychologist. Scores from WISC-R were used for all three participants. A summary of the participants' characteristics is provided in Table 3.

Table 3. Student Participant Characteristics

Student	Disability	Age	Sex	Race	IQ[a]	PPVT-III[b]
Imelda	SLD	16.3	F	Hispanic	87	N/A
Brad	SLD	16.7	M	Caucasian	90	N/A
Martin	MI	16.6	M	Hispanic	57	75

[a]Full scale IQ score on the Wechsler Intelligence Scale-Revised
[b]Standard Score for the Peabody Picture Vocabulary Test-Third Edition

Participants included two males and one female. One participant was Caucasian and two were Hispanic. The diversity of the group was not representative of the school's population. All three students were taking freshman World History for the first time. The mean chronological age at the time of the study was 16.5 years. The mean IQ score was 78. Both of the students

who qualified for Special Education under the label SLD (specific learning disability) had severe deficits in the area of reading.

Setting

The study took place at a large suburban high school with approximately 1200 students. The school is located in an affluent area with the majority of students being Caucasian and from middle class or upper class homes. Data collection, including both probes and instruction, took place in a high school special education study skills classroom. This class is assigned to students who need to remediate basic skills or need additional help studying for academic classes. The Study Skills is an elective and not a required class for high school graduation. However, a number of students take this class in conjunction with the World History class, so obtaining participants did not pose a problem. The county does not mandate that a specific curriculum be used for Study Skills; instead the teachers teaching this class create materials and lessons based on the students' areas of weaknesses.

The classroom for the study skills class was located at the end of an academic hall and was approximately half the size of the other regular education classrooms; in order to provide a smaller structured environment for the special education students. The room had ten desks, two computers, and two study carols. The size of the room allowed for students to work independently or as a group as needed. The students were already accustomed to this setting, and therefore, thus avoiding a novelty effect. Further, the participants were registered in World History and they would have ordinarily been given help during Study Skills for this subject.

Materials and Equipment

The researcher provided the materials required for implementation of the study. Materials included (a) sets of 10 vocabulary words selected from later chapters of the required history text that have not yet been covered in class, (b) daily probe questions relating the

vocabulary word to each definition for each set of 10 words (c) two graphic organizers to accompany each set of 10 words, and (d) data collection sheets.

Vocabulary Word Sets: The World History vocabulary words were chosen from the required text that was already being used in the content area class. The words were selected from chapters towards the end of the text to ensure that the students had not already had exposure to the vocabulary during regular instructional time. Each set of vocabulary words consisted of exactly ten words that shared some type of relationship and could be easily linked to each other, thus facilitating generation of the graphic organizers. Each vocabulary set was completely independent of each other, with no overlap of vocabulary terms. The word sets are presented in Appendix A.

Probe Sheets: Each one-minute probe that accompanied each set of words consisted of 10 fill- in-the-blank researcher generated questions about the meaning of the chosen vocabulary words (see Appendix B). Questions did not require interpretation and had only one possible correct response. Students were required to recall vocabulary words from memory. However, if a subject did not progress in recall of words within four days of each intervention phase, the task was modified to include a list of 10 vocabulary words from which a student could choose the correct word for each definition on each daily probe (see sample presented in Appendix B). The researcher recorded attendance and the number of correct responses on a data collection sheet.

Cognitive Organizers: Two cognitive organizers were prepared for each set of vocabulary words. The organizers visually displayed the subject area's content in groups, allowing the participants to synthesize, organize, compare and contrast information among the different vocabulary words (see Appendix C,D). Student samples are presented in Appendix R.

Data collection sheets: Date collections sheets were used to note the phase, set of vocabulary words being taught, the graphic organizer being used, students' attendance, condition, and the scores for each daily probe (see Appendix N).

General Procedures

The study took eleven weeks and four instructional/intervention sessions were completed per week, with one session completed each day for each participant. The time of day and location remained the same for all sessions. A criteria for mastery of the vocabulary terms was set at 8/10 words per minute. The experimental design had three word sets. Data was collected four times a week to help establish trends within word sets.

Initial Probe Procedures

The initial probe condition was used to assess each student's knowledge of the vocabulary sets prior to intervention and to verify that each participant could benefit from additional help in this area. Data was initially collected across all sets of words in each probe condition and required participants to take a one-minute probe for each set of words (a total of three). The initial probe phase lasted for two days, and no instructional intervention was provided during that two-day probe period. Students completed only one probe at a time, this was done in three one-minute periods as opposed to one three-minute period. During study skills students were required daily to work independently for periods longer than three minutes, making it possible for them to stay on task for such a brief period of three minutes. All probes were fill-in-the-blank and students were not allowed to ask for help or use any reference materials during the timed probes. If they did not know the answer they were asked to leave the blanks empty rather than attempt to answer the questions incorrectly. An intervention was then introduced to directly teach the participants the vocabulary words.

Intervention and Measurement Procedures

In order to assess student acquisition of vocabulary words, daily data were obtained using 10-question, one-minute intervention probes only on the word set on which the student is receiving intervention. The same data collection procedures will be used across all phases and participants. During intervention, each student was required to complete a daily one-minute probe after fifteen minutes of individual vocabulary instruction using a graphic organizer for the specific word set. Students were given exactly one minute to complete each probe. When time was called, students were asked to put down their pencils. Each probe, along with an answer key, was developed prior to the beginning of the study. The probes were graded for accuracy by dividing the number of correct responses by the given time period for a unit of response per minute.

Reliability

Inter-rater reliability data was gathered throughout the experiment. The classroom paraprofessional served as an independent observer and was asked to rescore probes. This was done for 75% of the assessments. The teacher and the paraprofessional both used the same answer key to score each probe. Given that the dependent variable was a permanent product, it was not difficult to achieve 100% agreement. Reliability was computed by calculating agreements over agreements plus disagreements.

The dependent measure was the daily measure of the students' ability to correctly relate the vocabulary terms to their definitions in a one-minute period. The outcome of treatment was measured by graphing the number of correct responses per minute for each participant daily in each word set. Each participant had the possibility of earning 10 points on each probe if all fill-in-the-blank questions are correctly answered. For each definition that was completed incorrectly, 10 points was deducted from 100.

Internal Validity

The multiple probe design allows for experimental control to be demonstrated between the behavior (ability to relate vocabulary terms to their definitions) and the independent variable (graphic organizer). Probes were taken for all participants and targeted behaviors throughout the study to control for maturation. Thus, a functional relationship was demonstrated between the independent variable and the dependent variable since scores during preintervention probe trials were low and the targeted behavior only improved after the independent variable was introduced. This controlled for the possibility that participants' gains in achievement were due to exposure of the material or the environment.

External Validity

External validity was demonstrated in this single subject experiment through direct and systematic replication. There was direct replication of the treatment effect across and within each word set. The treatment effect was replicated until each participant in the study met criteria for mastery to help establish the generality of findings to other experiments that were similar in nature.

Social Validity

To ensure that the interventions and the outcomes met the needs of the students, an informal survey of the students was conducted. The student survey questions (presented in Appendix M) focused on whether or not they enjoy using graphic organizers and one-minute probes. Given that the researcher also served as the teacher throughout the study, no social validity data was collected from the teacher.

Data Analysis

Data analysis consisted of visual inspection of the data and comparison of intervention data to probe data for the individual word sets. Also any overlap of intervention data and probe data on particular word sets were noted.

CHAPTER 4

RESULTS

The Context of the Study

The purpose of this study of high school students with mild disabilities was to evaluate the efficacy of cognitive organizers as a strategy for increasing rate of response in learning new vocabulary words to a level that would make future learning of content-area vocabulary more likely. The study used precision teaching to evaluate the effectiveness of cognitive organizers. The study sought to answer the following questions: 1) If cognitive organizers are used each week with 10 new world history vocabulary, will students have a better understanding of vocabulary and in turn, increase their fluency or automatic recall of the words? 2) If a student demonstrates three or more days of flat data on a PT probe, will changing the instructional strategy e.g. switching cognitive organizers, allow that student to continue to move closer to the mastery of new vocabulary? and 3) Will the use of cognitive organizers allow participants to better retain new words after a period of no practice?

The study took place over 43 sessions. The first two sessions were used to conduct initial probes for three sets of words for each of three students. Following the initial probes, each student was simultaneously introduced to the first word set. Once students began this intervention phase, they were given daily probes over each word set until they reached the minimum criterion of 8 out of 10 correct responses per minute for 2 consecutive days. When they met criterion for one word set, they began the next word set and took a maintenance probe for the previous set completed. Each student took a daily probe for each given word set. All

students began the study at the same time; however, some completed the study ahead of schedule. Each student completed all required phases and remained in the study for its entirety.

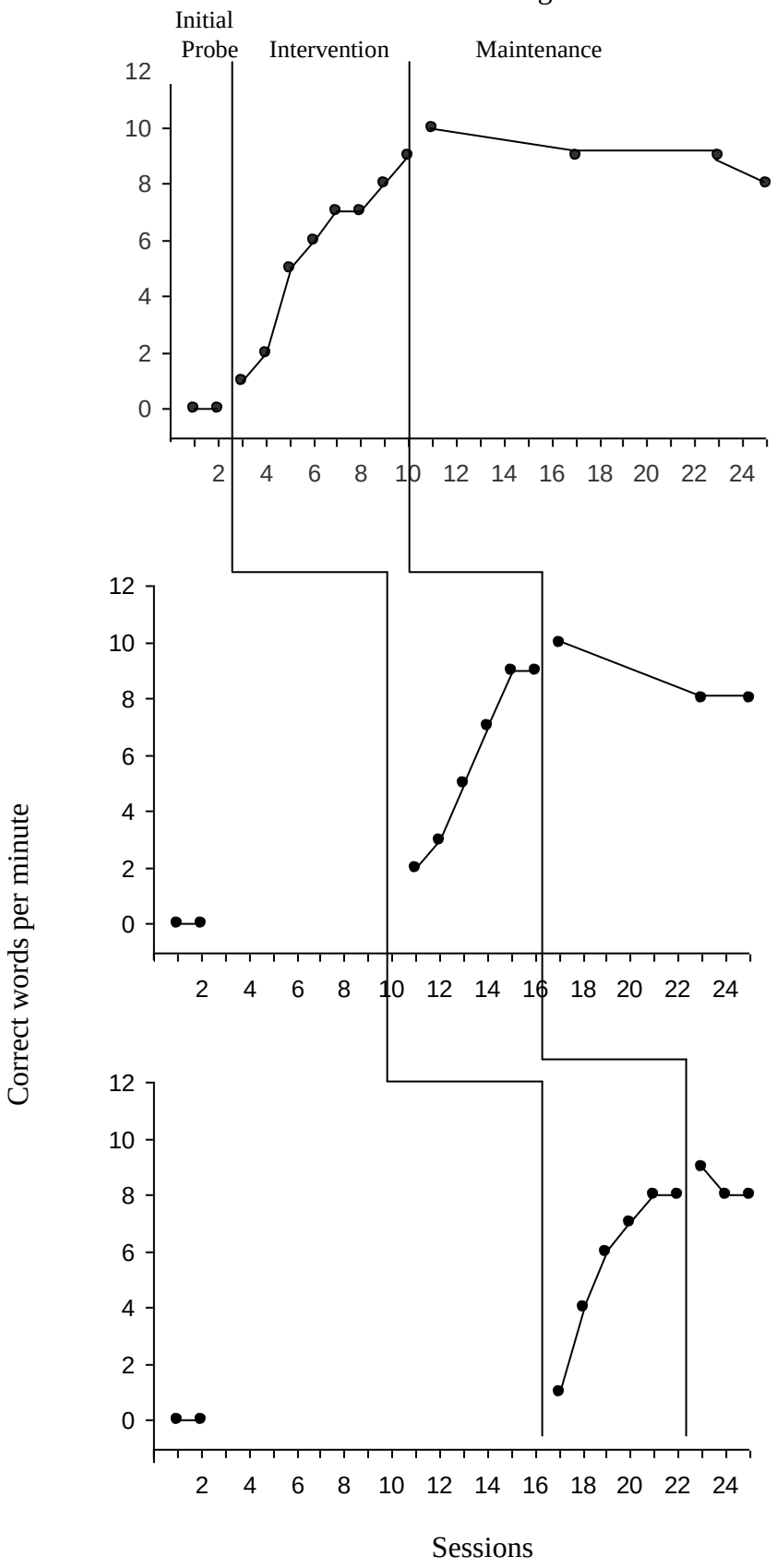
Fluency Measure

Over an eleven-week period, students were administered daily probes during preintervention conditions and intervention conditions, and the data are presented in Figure 1 (Appendix O). The three students were unable to correctly answer any questions about the vocabulary words during the initial probe condition. The data indicated that the cognitive organizers were effective for enhancing vocabulary acquisition for each student.

Imelda. The first student to complete all three word sets was Imelda. Imelda completed the study in 25 sessions. Imelda's scores demonstrated efficacy of the intervention (Figure 2). During the initial probe condition, Imelda was administered a probe for each word set over two days. During the initial probe condition, Imelda scored 0% on all of the probes administered to her. She remained in the intervention condition for 20 days. As noted in Figure 1, Imelda showed an immediate increase in correct words per minute after the cognitive organizer was introduced. A visual analysis of Figure 2 indicates that Imelda's data points did not overlap when comparing her initial probes to the graphic organizer conditions. When Imelda was in the intervention condition, she consistently outperformed her original probe scores, even on the first day of intervention for each of the three word sets. Imelda scored an average of 60% accuracy for the 20 one-minute probes she was given during intervention; this was a 60% increase from her baseline score of zero. A within-condition analysis indicated an accelerating trend for each cognitive organizer condition.

Imelda's mean rate of response in the initial probe condition was zero words per minute. Her mean rate of response in the first, second, and third intervention conditions were

Figure 2. Imelda

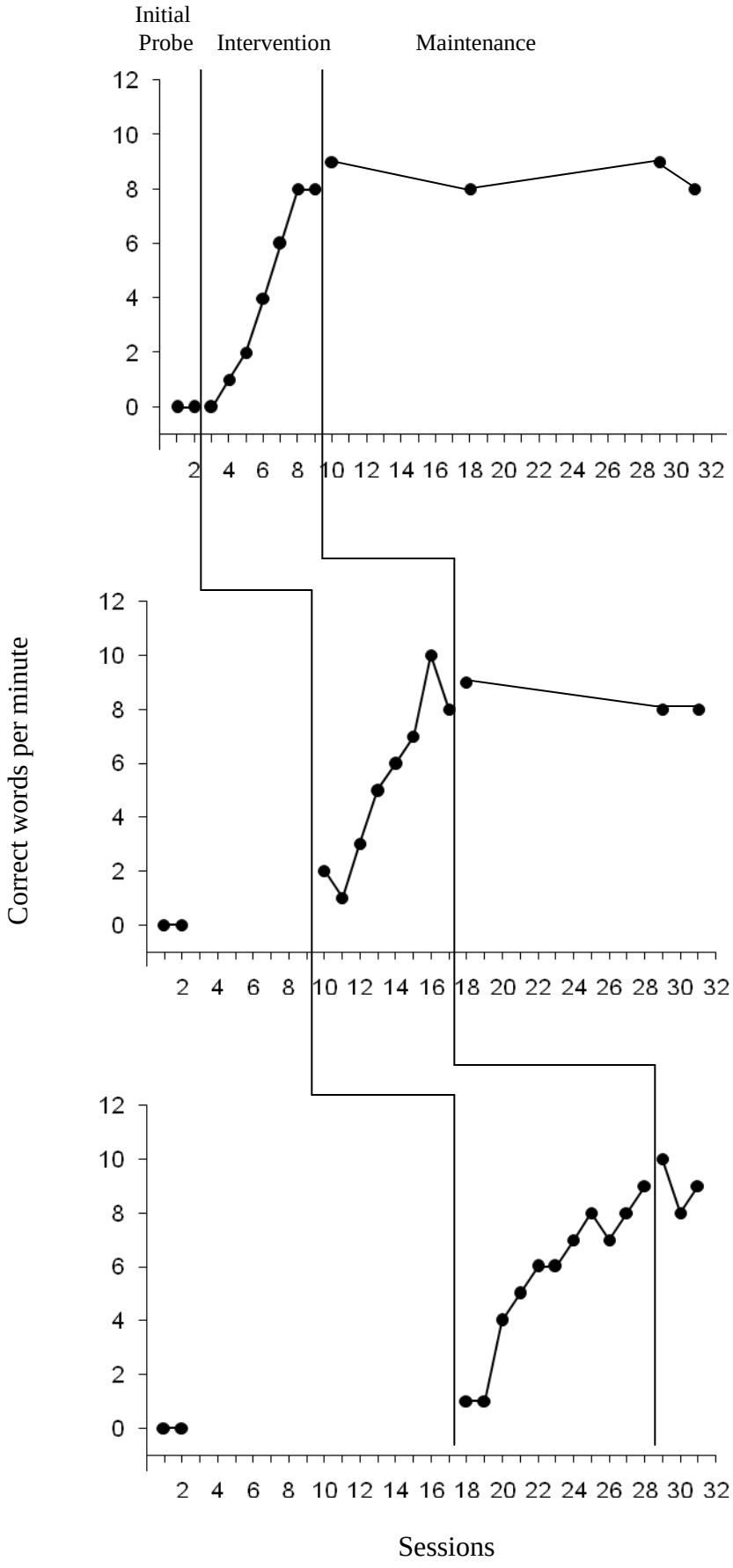


5.63, 5.83, and 5.67 correct words per minute respectively. The mean of all of her maintenance probes was 8.7 correct words per minute. Surprisingly, Imelda met the criterion for mastery for each word set (8 out of 10) and additionally, remained at mastery level for all maintenance probes across all three word sets even after periods of no practice. These data demonstrated that Imelda's rate of response, or fluency, progressively increased over time and, she effectively maintained the vocabulary words she learned for, at least, four weeks after the intervention.

Brad. Brad was the second student to complete all three word sets; he finished six days after Imelda. Brad's results, as illustrated in figure 2, also demonstrated the efficacy of the intervention. Brad was in the initial probe condition for two consecutive days, and he was administered a probe for each word set during both days. Brad scored 0% on all probes administered over the two days during the initial probe condition. After Brad entered into the intervention phase, he remained there for 26 days. As shown in figure 2, once the intervention began, Brad showed immediate gains in number of correct words per minute. A visual analysis of figure 2 shows that when comparing his initial probes to those given during the intervention, Brad consistently scored better during intervention. Brad was given 26 probes during intervention, of which he scored an average of 53%; this shows an increase of exactly 53% from his initial probe condition score of zero across all word sets. An accelerated trend was demonstrated during the intervention.

Brad scored zero words per minute during the initial probe condition. However, during the first, second, and third intervention conditions, his mean rates of response were 4.14, 5.25, and 5.64 respectively. His mean for all maintenance probes was 8.6 correct words per minute. Brad was able to meet criteria for mastery for all three words sets and remained at mastery for

Figure 3. Brad

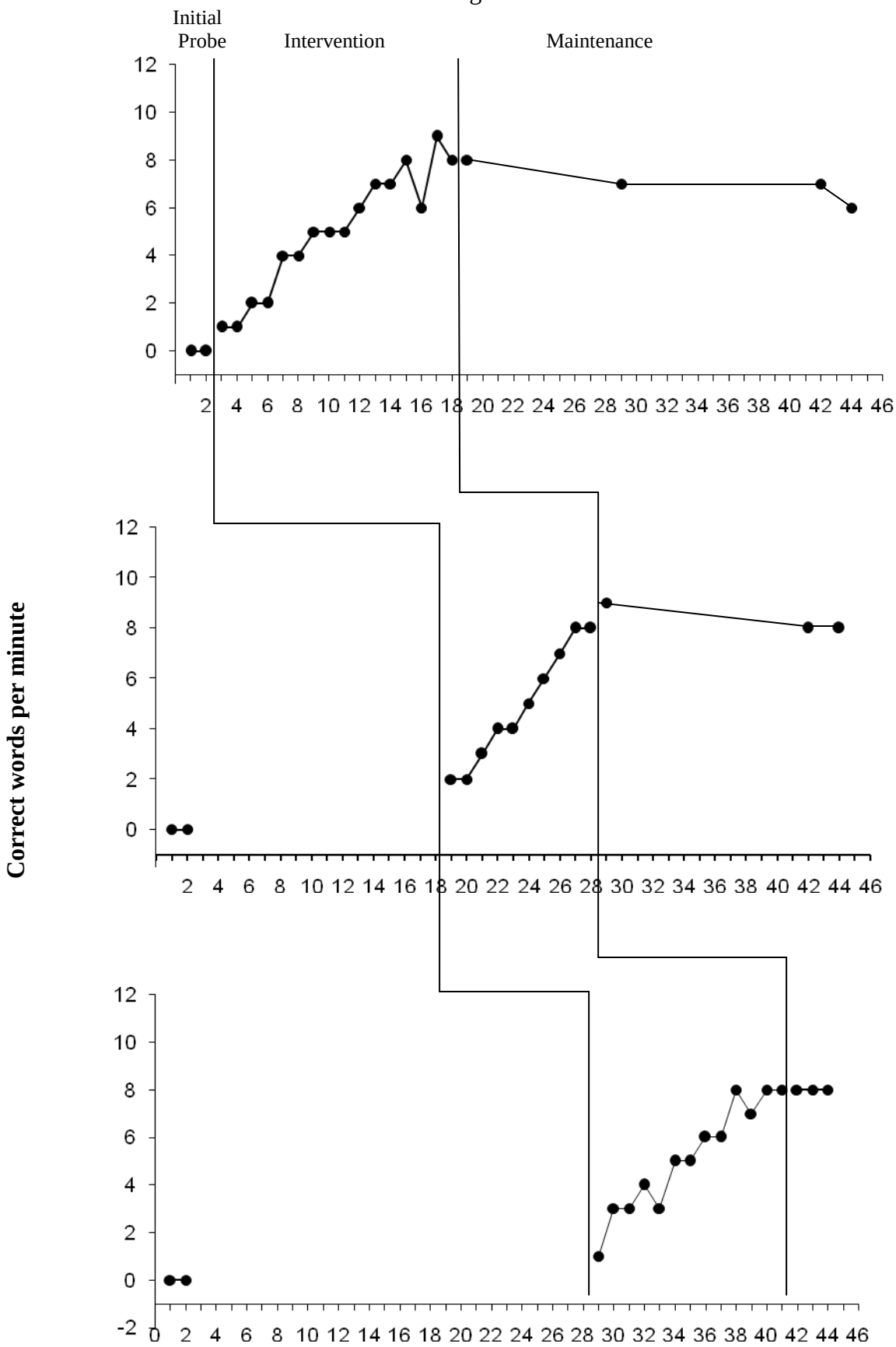


all three word sets even after periods of no practice. Brad scored an average of 8.33 when given follow-up maintenance probes one month after the study concluded. During the seventh day of intervention on word set two, Brad correctly answered 10 out of 10 questions correct in a one-minute time period. Brad was the only student in the study to reach 100% accuracy on a probe during the graphic organizer phase. He demonstrated a significant increase from the baseline phase to maintenance indicating that his fluency, or rate of response, increased over time, and he effectively maintained his new vocabulary for, at least, a month after intervention.

Martin. Martin was the last student to complete the study. He remained in the graphic organizer phase for 39 days; almost twice the length of the other two participants. The results for Martin appear in figure 3 and support efficacy of the intervention. Martin participated in the initial probe condition for two days. He was administered a probe for each set of words on the first day and again on the second day. Martin scored 0% correct during both initial probe phases. His initial probe scores were the same as those of the other participants in the study. On the third day of the study, Martin entered the intervention phase and remained there for 39 days. Once the graphic organizer intervention was introduced, an immediate increase in his scores was noted. Martin took 39 probes during the intervention phase and averaged 50% accuracy, an increase of 50 percentage points from his initial probes. A visual analysis of the data shows an accelerating trend in fluency.

Martin's mean rate of response in the initial probe condition was zero correct words per minute. Unlike the other two students, he attempted filling in some of the blanks because he said he did not want to turn the quiz in blank. His mean rate of response for the first, second, and third intervention conditions were 5, 4.9, and 5.15 respectively. During the intervention phase of the first word set, Martin exhibited 3 days of flat data. After the third day of scoring 5 out of 10

Figure 4. Martin



on his quiz, Martin was introduced to another type of graphic organizer (Appendix D). Martin was given more flexibility to creatively complete the graphic organizer in a way that helped him link to his own prior knowledge. After the introduction of the new graphic organizer, Martin's scores continued to increase. During the first word set, he was able to reach the criterion for mastery (8 out of 10). However, he only maintained this level of proficiency for one maintenance probe. His preceding maintenance probe scores were 7, 7, and 6. In word sets two and three, Martin met the criterion for mastery, and furthermore, remained at mastery for all maintenance probes for the two sets even after a period of no practice. The mean of all of Martin's maintenance probes was 7.7. His gains from the initial probe condition to the maintenance phase indicate that he effectively maintained the new vocabulary words for an extended period of time.

Social Validity

Students completed a social validity questionnaire (Appendix M). The questions were designed to determine if the students enjoyed using graphic organizers and precision teaching and if they felt they might benefit from using these procedures in other classes. All three students were positive in their responses.

All three students said that they understood that they were using cognitive organizers in order to improve their learning of World History vocabulary. They all found the cognitive organizers and precision teaching probes to be helpful and said they would recommend these strategies to other World History students. The students preferred the strategies used in the study to the traditional method of looking up definitions in the back of the book. When asked if they would like to use cognitive organizers in another class, two responded, "no," and the third said he would like to use graphic organizers in his biology class.

When students were asked how they felt about the use of one-minute probes, they reported mixed reactions. One student felt "nervous," another, "pressured" and the third, said he "didn't feel any different." Nevertheless, all three indicated that they would like to use the one-minute probes in other classes including United States History and literature.

In general, the students' reactions to the use of graphic organizers and one-minute probes tended to be positive. The major exception was their lack of a positive emotional response to the use of one-minute probes.

Overall, these results supported the hypothesis that cognitive organizers improve fluency and automatic recall of content-area vocabulary words among high school students with mild disabilities. Furthermore, the data demonstrated that the students were able to retain the new vocabulary words at a level of mastery for a minimum of one month after a period of no practice. The data demonstrated accelerating trends in number of correct responses in the cognitive organizer intervention phase. Once the intervention began, all three participants showed immediate gains in their fluency.

Student responses to the social validity questionnaire indicated that the students enjoyed using the cognitive organizers and preferred to be assessed using one-minute probes rather than traditional assessment methods when learning content-area vocabulary. All three students commented that they would like to use precision teaching in other high school classes. In conclusion, not only did their learning increase but their attitudes toward their learning were positive.

CHAPTER 5

DISCUSSION

Interpretation of Findings

The current study used a single subject multiple probe design (Kennedy, 2005) to evaluate the efficacy of cognitive organizers as a strategy for increasing rate of response in learning new vocabulary words and improving future retention. This study sought to answer three separate research questions: 1) If cognitive organizers are used each week with 10 new world history vocabulary, will students have a better understanding of vocabulary and in turn, increase their fluency or automatic recall of the words? 2) If a student demonstrates three or more days of flat data on a PT probe, will changing the instructional strategy e.g. switching cognitive organizers, allow that student to continue to move closer to the mastery of new vocabulary? and 3) Will the use of cognitive organizers allow participants to better retain new words after a period of no practice? The first question was the primary focus of the research.

The results of this study are consistent with the findings of similar research studies done with secondary students with disabilities. As with the previous studies (Gleason and DiCecco, 2002; Horton, Lovitt, and Bergerud, 1990; Griffin, Simmons, and Kane'enui, 1989; Rankin-Erickson, 2002; Boyle, 1996) the current study supported the efficacy of graphic organizers in improving students' fluency and comprehension. However, the current study went beyond the existing research which has been done primarily using group designs and combining students with and without disabilities.

The central focus of the study was question one: If secondary students with disabilities are taught 10 new world history vocabulary words per week using cognitive organizers, will they gain a better understanding of the vocabulary and increase their fluency or automatic recall of the words? Prior to the present study, only four other published studies were found that were done in the area of history Anders, Bos, & Filip (1984); Anders, Filip, & Jaffe (1989); Boon, Ayres, & Fore (2004); Boon, Burke, Fore, & Spenser (2006); Boon, Hagan-Burke, Fore, & Spenser (2007) and of those, only one study specifically addressed vocabulary acquisition, Anders, et al. (1984). A study conducted by Boon, Burke, Fore & Spencer (2006) examined the efficacy of computer-generated cognitive organizers using Inspiration 6 software versus traditional textbook instruction on students' comprehension of social studies content material using a pretest/posttest treatment control group design. The participants were 29 tenth-grade students in regular education and 20 students with learning disabilities. The study took place in a high school located in a large suburban area in the Southeast. The study used two inclusion classrooms that both contained regular education students and special education students. The experimental group was comprised of students in the graphic organizer condition, while the control group consisted of students in the traditional textbook. Both conditions were conducted over a three-week period. The dependent measures were a 35-item open-ended pretest/posttest test of social studies content. Results were analyzed using a one-way analysis of variance (ANOVA) on the 35-item pretest and posttest. Participants in the cognitive organizer condition scored significantly higher than those in the traditional textbook condition. The results between the pretest and posttest were statistically significant; illustrating how cognitive organizers can have a considerable impact on the acquisition of social studies knowledge.

As in the present study, Anders, et al. (1984) who used a group design found that students improved their vocabulary knowledge when using graphic organizers. In that particular study, a control group was used, and the graphic organizer group performed significantly better than the control group. In the other three studies (also group designs) done in the area of social studies, positive gains were made when graphic organizers were used, and students using graphic organizers performed significantly better than those taught using traditional methods. The present study supports previous findings regarding the gains of students with mild disabilities when using graphic organizers, however, the present study expanded the findings by using a single-subject design as opposed to the more traditional pretest/posttest treatment control design done with students with mild disabilities and students without disabilities.

The current findings show an increase in scores from the initial probes to the maintenance probes provides, thus indicating that students acquired additional vocabulary terms during intervention. After the cognitive organizers were introduced to participants, all students increased their fluency and automatic recall of words to the point of mastery for each set of vocabulary words. Although Martin, a student with the intellectual disability, took almost twice as long to reach mastery in each set when compared to Imelda, he was able to reach mastery across all sets and in two out of three words sets he was able to remain at mastery for maintenance probes that were given one month after the conclusion of the study.

The second question asked, if a student demonstrated three or more days of flat data on a PT probe, would changing the instructional strategy (i.e. switching cognitive organizers) allow that student to continue to move closer to the mastery of new vocabulary? Martin was the only student who exhibited three days of flat data throughout the study. During the intervention phase of the first word set Martin scored a five on days 10, 11 and 12. On the thirteenth day Martin

was introduced to a second cognitive organizer. This organizer gave Martin the flexibility to organize his vocabulary words in such a way that was meaningful to him. He commented that he liked the other cognitive organizer more because he knew exactly where he was supposed to put the vocabulary terms. After using the new graphic organizer for one day, Martin increased his score on the following probe to a 7, and he continued to use successfully that cognitive organizer until he met mastery five days later.

The third and final question asked if the use of cognitive organizers would allow participants to better retain new words at mastery level (8/10 correct) after a period of no practice. Participants were given a maintenance probe at the completion of each word set. Additionally, they were given follow-up probes one month after the termination of the study. With the exception of Martin, the students were able to maintain mastery on all maintenance probes for all words sets. Martin struggled with the first word set; his scores for the maintenance probes for word set one were 8, 7, 7, and 6. Given his intellectual disability and difficulty acquiring academic information, this was not surprising. The students completed the study in early December and when they returned from winter break in January they were given the follow-up probes for all three words sets. The students had not been given the materials to view over break nor had they been in World History classes where they could have been exposed to the material. The scores from the last set of maintenance probes indicated that the effects of the intervention were maintained for an extended period of time of no practice, a month.

Implications

The need to acquire large amounts of new vocabulary words from content area textbooks places an enormous demand on students at the secondary level. This demand can be especially daunting for mainstreamed students with mild disabilities. The current and previous studies on

the use of cognitive organizers in aiding secondary students with mild disabilities in memorization and retention of content area material are very promising.

Several implications for classroom teachers emerged from the present study on cognitive organizers and precision teaching. First, the results of this study indicate that students with mild disabilities do benefit from the use of cognitive organizer strategies in learning secondary level social studies vocabulary. Fortunately, it took minimal time and effort on both the student and teachers parts to learn and utilize cognitive organizers. Further, it is important to note that participants had positive attitudes towards the strategy and indicated that they preferred cognitive organizers to traditional instructional techniques for learning social studies vocabulary. They even said that they would like to use the strategy in other academic classes. An important finding in the present study was that when a student reached a learning plateau, he was able to move beyond the plateau when he was taught how to use a second type of cognitive organizer. This finding suggests that when teachers use cognitive organizers in the classroom, they should be prepared to use, at least, one other organizer with students who reach plateaus.

Precision teaching provided an effective direct measure of academic performance, allowed the researchers to discriminate among students who were able master and retain content-area vocabulary and those who could not reach mastery in a set period of time. Precision teaching is sensitive to small increments of learning, making it a valuable tool for teachers to use for monitoring daily student progress.

Precision teaching and cognitive organizers have been cited in the literature as effective means for increasing student achievement in the classroom. The current study goes further in showing the effectiveness of the two strategies when used in combination to teach and assess the achievement of secondary students with mild disabilities.

Future Research

Future research needs to address the extent to which other types of cognitive organizers would aid in vocabulary acquisition of content-area vocabulary words. For example, research including the present study have shown that learning is increased when students use Venn diagrams to compare/contrast content from passages and vocabulary terms (Boyle, 1996), however, it is not clear which other type of organizer would also be effective at teaching vocabulary.

Another area of research that needs to be explored further is the effectiveness of cognitive organizers with students with various disabilities. It would be helpful if more studies were done with each area of disability; it would enhance the possibility of being able to recognize patterns of learning and instructional needs for students with a particular disability.

Limitations

The study was limited in several respects. The participants represented only two categories of disabilities. Two of the participants did not have English as their first language. Further, the participants were limited to two Hispanics and one Caucasian, all three of whom were in the 9^{th} grade. Before attempting to generalize to secondary students with mild disabilities, further research needs to be done to include students across secondary grade levels and students with other types of mild disabilities who have English as their first language and students who represent a broader range of cultural/ethnic groups.

Another obvious set of limitations relates to the type of cognitive organizer used and the content area of the material. All cognitive organizers in this study were Venn diagrams. Further research is needed to validate other cognitive organizers such as webs, flow charts, and semantic organizers. Likewise, further research cognitive organizers to facilitate vocabulary acquisition

needs to be done in other content-areas such as Economics, Civics, Physical Science, and Environmental Science. It is not reasonable to generalize from World History to these other content-areas.

Summary

In summary, the results of this study provide support for the use of congitive organizers at the secondary level with students with mild disabilities in content area classes such as social studies. The results are consistent with results of prior studies that supported the efficacy of using cognitive organizers to improve vocabulary acquisition (Anders, Bos, & Filip, 1984; Anders, Filip, & Jaffe, 1989; Boon, Ayres, & Fore, 2004; Boon, Burke, Fore, & Spenser, 2006; Boon, Hagan-Burke, Fore, & Spenser, 2007). In addition, the current study extends the literature on the impact of cognitive organizers on students' rate of response or fluency by successfully using precision teaching to measure student progress. Because present and previous research have shown the effectiveness of cognitive organizers as an instructional technique for students with different types of mild disabilities in various areas of the curriculum at varying grade levels, there is strong support for continuing to research cognitive organizers across the population of students with mild disabilities and across the curriculum using a variety of cognitive organizers and research designs, both single-subject and group.

REFERENCES

Anders, P.L., Bos, C.S., & Filip, D.(1984). The effect of semantic feature analysis on the reading comprehension of learning disabled students. In J.A. Nile & L.A. Harris (Eds.), *Changing perspectives on reading/language processing and instruction* (pp.162-166). Rochester, NY: National reading Conference.

Bender, W. N. (2002). Differentiating Instruction for Students with Learning Disabilities: Best Practices for General and Special Educators. Thousand Oaks, CA, Corwin Press, 122-127.

Bender, W.N. (1998). Learning *Disabilities: Characteristics Identification and Teaching Strategies* (3rd ed.). Needham Heights, MA: Allyn & Bacon.

Binder, C., Haughton, E., & Van Eyk, D. (1990). Increasing Endurance by Building Fluency: Precision Teaching Attention Span. *Teaching Exceptional Children*, 22(3), 24-27.

Boon, R., Burke, M., Fore, C., & Hagan-Burke, S. (2006). Improving student content knowledge in inclusive social studies classrooms using technology-based cognitive organizers: A systematic replication. *Learning Disabilities: A Contemporary Journal*, 4(1), 1-17.

Boon, R., Burke, M., Fore, C., & Spenser, V. (2006). The impact of cognitive organizers and technology-based practices on student success in secondary social studies classrooms. *Journal of Special Education Technology*, 21(1), 5-15.

Boon, R.T., Fore, C., Ayres, K., & Spenser, V.G. (2005). The Effects of Cognitive

Organizers to Facilitate Content-Area Learning for Student with Mild Disabilities: A Pilot Study. *Journal of Instructional Psychology* 32(2), 101-117.

Bos, C.S.,& Anders, P.L. (1990). Effects of interactive vocabulary instruction on the vocabulary learning and reading comprehension of junior-high learning disabled students. *Learning Disability Quarterly*, 13, 31-42.

Bos, C.S.,& Anders, P.L. (1992). Using interactive teaching and learning strategies to promote text comprehension and content learning for students with learning disabilities. *International Journal of Disability, Development, and Education*, 39, 225-238.

Bos, C.S., Anders, P.L., Filip, D., & Jaffe, L.E.(1989). Effects of an interactive instructional strategy for enhancing reading comprehension and content learning for students with learning disabilities. *Journal of Learning Disabilities*, 22, 384-390.

Boulineau, T., Fore, C., Hagan-Burke, S., & Burke, M. (2004). Use of Story-Mapping to Increase the Story-Grammar Text Comprehension of Elementary Students with Learning Disabilities. *Learning Disability Quarterly* 27(2), 105-121.

Boyle, J. (1996). The effects of a cognitive mapping strategy on the literal and inferential comprehension of students with mild disabilties. *Learning Disabilities Quarterly*, 19, 86-98.

Boyle, J.R. (2000). The effects of a Venn diagram strategy on the literal, inferential, and relational comprehension of students with mild disabilities. *Learning Disabilities: A Multidisciplinary Journal*, 10(1), 5-13.

Boyle, J.R., & Weishaar, M. (1997). The effects of expert-generated versus student-

generated cognitive organizers on the reading comprehension of students with learning disabilties. *Learning Disabilities Research & Practice*, 12, 228-235.

Cohen, M.A. & Martin, G.L. (1971). Applying Precision Teaching to Academic Assessment. *Teaching Exceptional Children* 3(3), 147-150.

Darch, C., & Carnine, D. (1986). Teaching content area material to learning disabled students. *Exceptional Children*, 53, 240-246.

Darch, C., & Eaves, R. (1986). Visual displays to increase comprehension of high school learning-disabled students. *The Journal of Special Education*, 20, 309-318.

Darch, C., & Gersten, R. (1986). Direction setting activities in reading comprehension: A comparison of two approaches. *Learning Disability Quarterly*, 9, 235-243.

DiCecco, V.M., Gleason, M.M (2002). Using Graphic Organizers to Attain Relational Knowledge From Expository Text. *Journal of Learning Disabilities*, 35(4), 306-320.

Fore III, C., Scheiwe, K., & Boon, R. (2006). Teaching a story mapping procedure to high school students with specific learning disabilities to improve reading comprehension skills. *Learning Disabilities, A Contemporary Journal*.

Griffin, C.C., Simmons, D.C., & Kame'enui, E.J. (1991). Investigating the effectiveness of graphic organizer instruction on the comprehension of and recall of science content by students with learning disabilities. *Reading, Writing, and Learning Disabilities*, 7, 355-376.

Horton, S.V., Lovitt, T.C., & Bergerud, D. (1990). The effectiveness of graphic organizers for three classifications of secondary students in content area classes.

Journal of Learning Disabilities, 23, 12-22.

Individuals with Disabilities Education Act, 20 U.S.C. § 1401 (2004)

Jackson, F.B. & Madison, M (1998, March). *Teacher training: Providing instruction in a basic reading strategy in elementary rural general education settings.* Paper presented at Coming Together: Preparing for Rural Special Education in the 21st Century, Charleston, SC. .

Keel, M., Dangel, H., & Owens, S. (1999). Selecting instructional interventions for students with mild disabilities in inclusive classrooms. *Focus on Exceptional Children*, *31*(8), 1-16.

Lovitt, T.C., Fister, S., Freston, J.L., Kemp, K., Moore, R.C., Schroeder, B., & Bauernschmidt, M (1990). Using precision teaching techniques: translating research. *Teaching Exceptional Children*, 22(3), 16-19.

Lovitt, T., Rudsit, J., Jenkins, J., Pious, C., & Benedetti, D. (1986). Adapting science materials for regular and learning disabled seventh graders. *Remedial and Special Education*, 7(1), 31-39.

Mastropieri, M.A., Scruggs, T.E., & Graetz, J.E. (2003). Reading comprehension instruction for secondary students: challenges for struggling students and teachers. *Learning Disabilities Quarterly*, 26(1), 103-116.

No Child Left Behind Act , 20 U.S.C. § 6301 (2004)

Onachukwu, I., Boon, R., Fore, C., & Bender, W. (2007). Use of a story-mapping procedure in middle school language arts instruction to improve the comprehension skills of students with learning disabilities. *Insights on Learning Disabilities*, 4(2), 27-47.

Sinatra, R.C., Stahl-Gemake, J., & Berg, D.N. (1984). Improving reading comprehension of disabled readers through mapping. *The Reading Teacher*, 38(1), 22-29.

Sturm, J.M., Rankin-Erickson, J.L.(2002). Effects of hand-drawn and computer-generated concept mapping on the expository writing of middle school students with learning disabilities. *Learning Disabilities Research & Practice* 17(2), 124-139.

Vaughn, S. & Edmunds, M.(2006). Reading comprehension for older readers. *Intervention in School and Clinic* 41(3), 131-137.

White, O.R., (1986). Precision teaching, precision learning. *Exceptional Children*, 52(6), 522-534.

Williams, G., Haring, N., White, O., Rudist, J., & Cohen, J (1990). Early Identification and Remediation of Learning Problems: The PIRL Project. *Teaching Exceptional Children, 22*(3), 58-61.

Witt J. & Beck, R. (1999). One-minute Academic Functional Assessment and Interventions. Longmont, CO: Sopris West. 9 – 35

Wong, B. Y.& Jones, W. (1982). Increasing metacomprehension in learning disabled and normally achieving students through self-questioning training. *Learning Disability Quarterly*, 5(3), 228-240.

Appendix A

Terms and Definitions

Mediterranean Civilizations

1. **Democracy**- type of government by the people or "rule of many", developed by the Greeks
2. **Republic**- government established by the Romans in which the leader is not a King and certain citizens have the right to vote
3. **Aqueduct**- structures or bridges built by Roman engineers to carry water from the hills to Rome
4. **Triumvirate**- a Roman form of government by three people with equal power
5. **Epic Poem**- a long poem that tells the deeds of a great hero, such as the Iliad by Greek author Homer
6. **Polytheism**- belief in many Gods
7. **Oracle**- in ancient Greece, a sacred shrine where a god/goddess was said to reveal the future through a priest
8. **Aeneid**- a famous poem written by Virgil in honor of Rome
9. **Socrates**- a Greek sculptor who taught using a question-and-answer method
10. **Sparticus**- a gladiator who led a slave revolt and defeated several Roman armies

Appendix B

One-minute Probe Mediterranean Civilizations

1. _____ was a Greek sculptor who taught using a question-and-answer method.

2. In ancient Greece, a sacred shrine where a god/goddess was said to reveal the future through a priest was called a(n) _____.

3. A gladiator named _____ led a slave revolt and defeated several Roman armies.

4. _____ is the belief in many Gods.

5. What is the name given to the government established by the Romans in which the leader is not a King and certain citizens have the right to vote? _____

6. A Roman form of government by three people with equal power is known as a(n)_____.

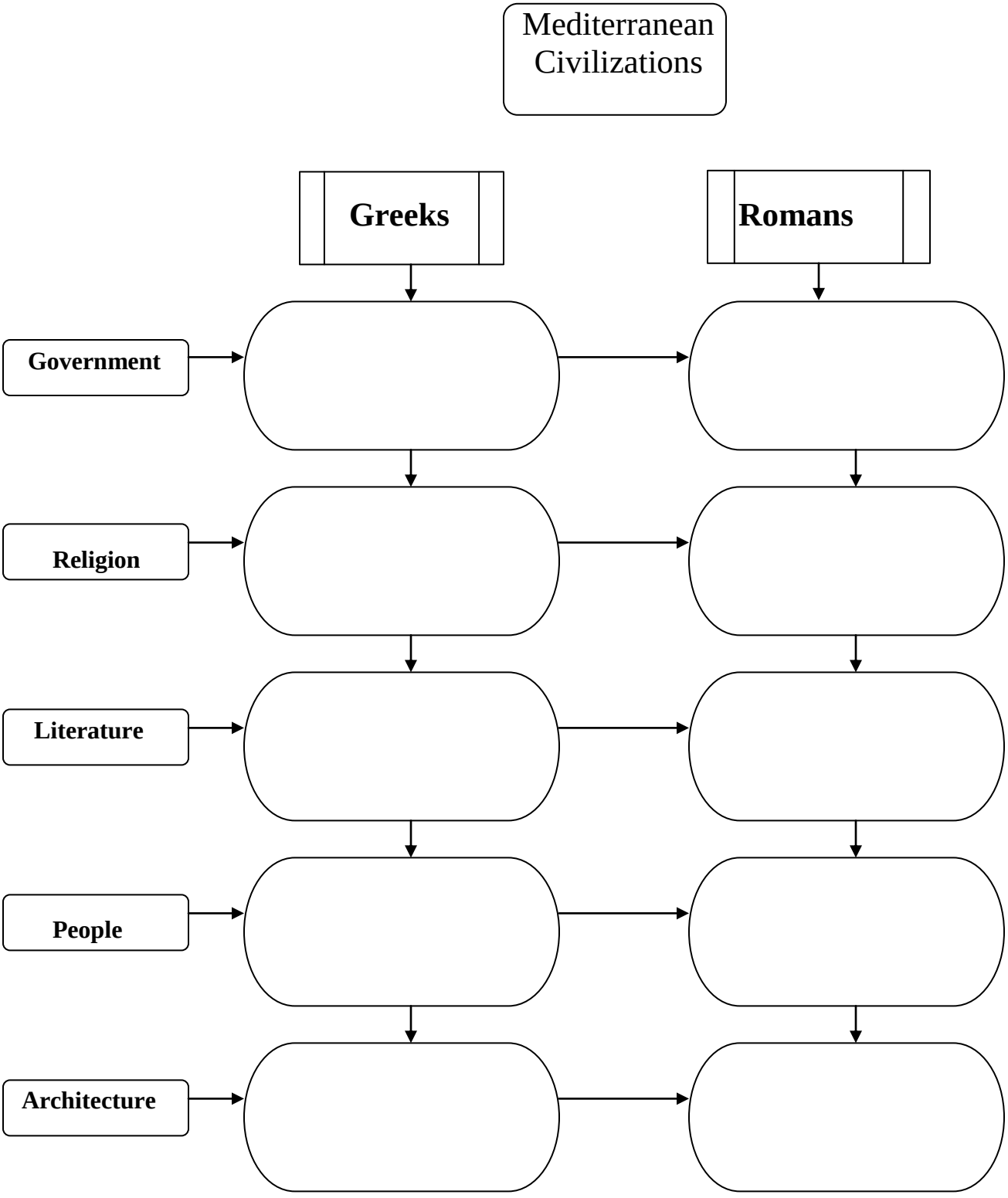
7. An _____ is a long poem that tells the deeds of a great hero, such as the Iliad by Greek author Homer.

8. A structure or bridge built by Roman engineers to carry water from the hills to Rome is also known as a(n) _____.

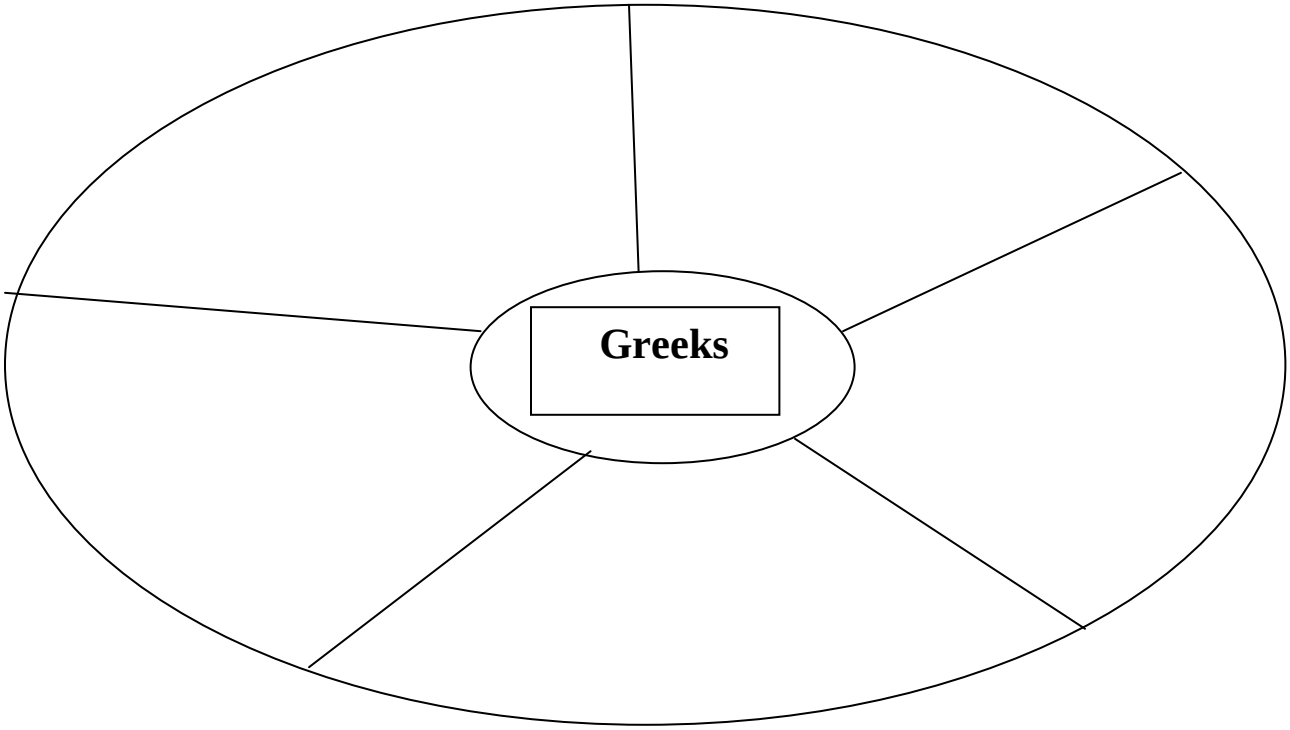
9. _____ is a type of government by the people or "rule of many", developed by the Greeks.

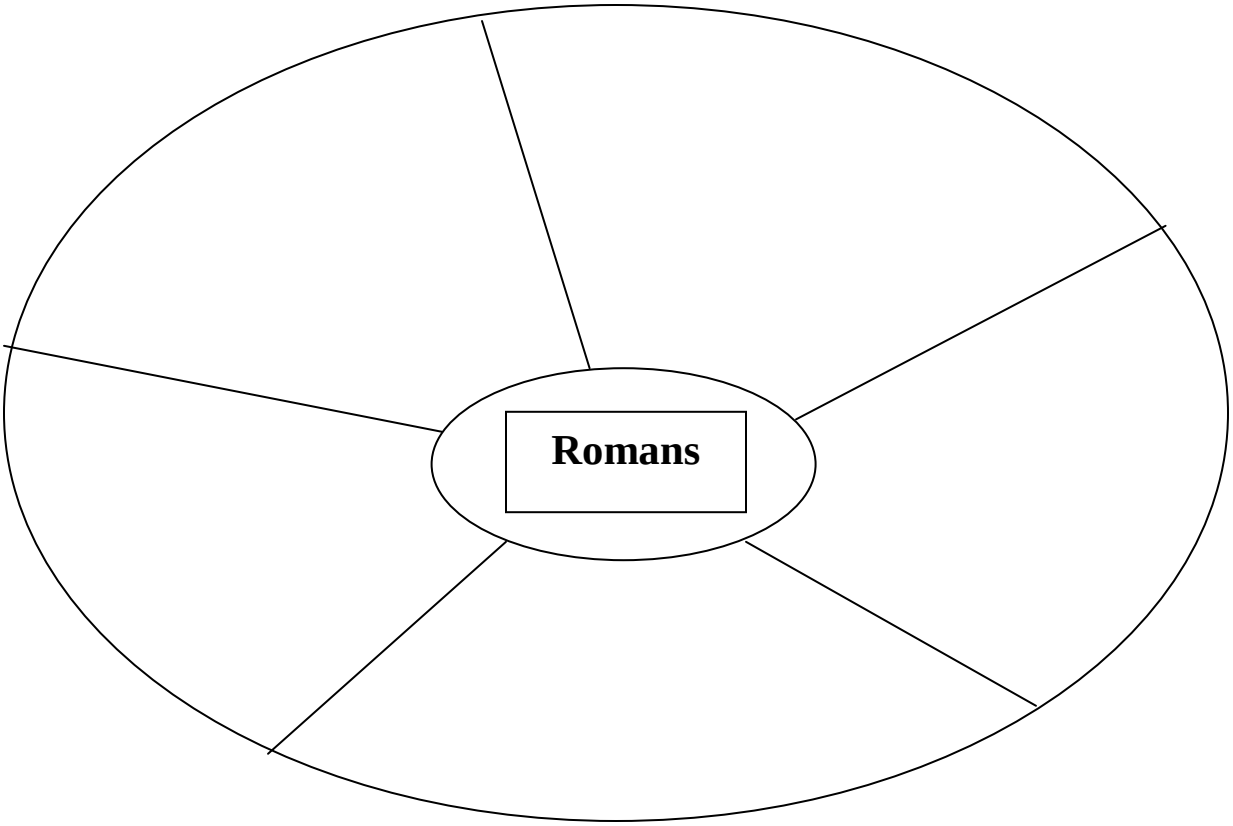
10. The famous poem, _____, was written by Virgil in honor of Rome.

Appendix C


Mediterranean Civilizations
Greeks
Romans
Government
Religion
Literature
People
Architecture

Appendix D
Mediterranean Civilizations 2





Appendix E

Terms and Definitions Mesoamerican Civilizations

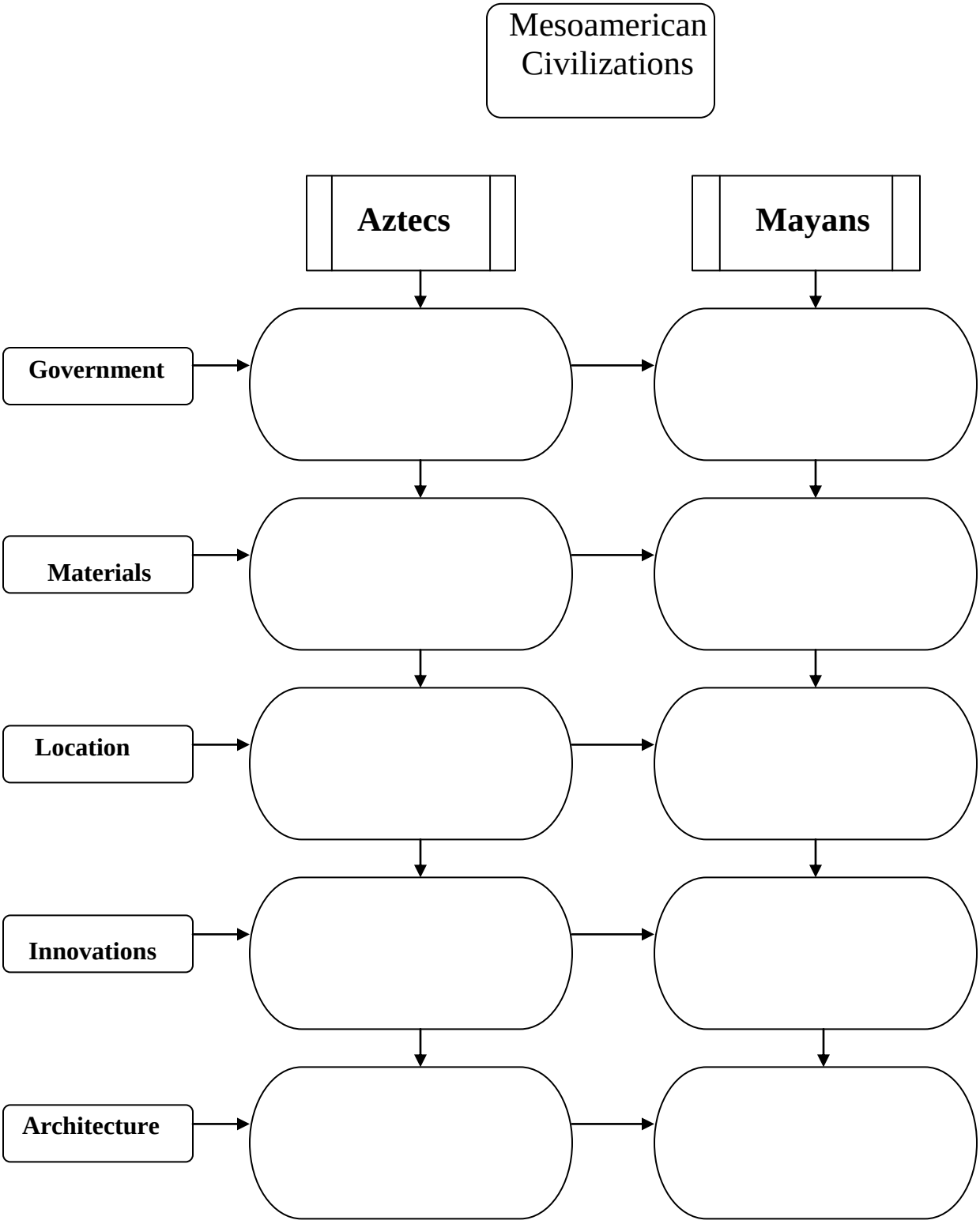
1. **Lake Texcoco, Mexico**- the location of the Aztecs
2. **Yucatan Peninsula**- where the Mayas were located
3. **Tenochtitlan**- a massive Aztec pyramid dedicated to the sun god
4. **Coba great pyramid**- highest Maya structure in the Yucatan
5. **Stucco**-building material used by the Incas
6. **Terra cotta**- art materials used by the Mayas
7. **Calpulli**- name of the Aztec government
8. **Primogeniture**- the form under which new Maya kings were chosen, as the king passed down his position to his son
9. **Chinampas**- floating Aztec gardens
10. **Steles**- name given to Maya pyramids

Appendix F

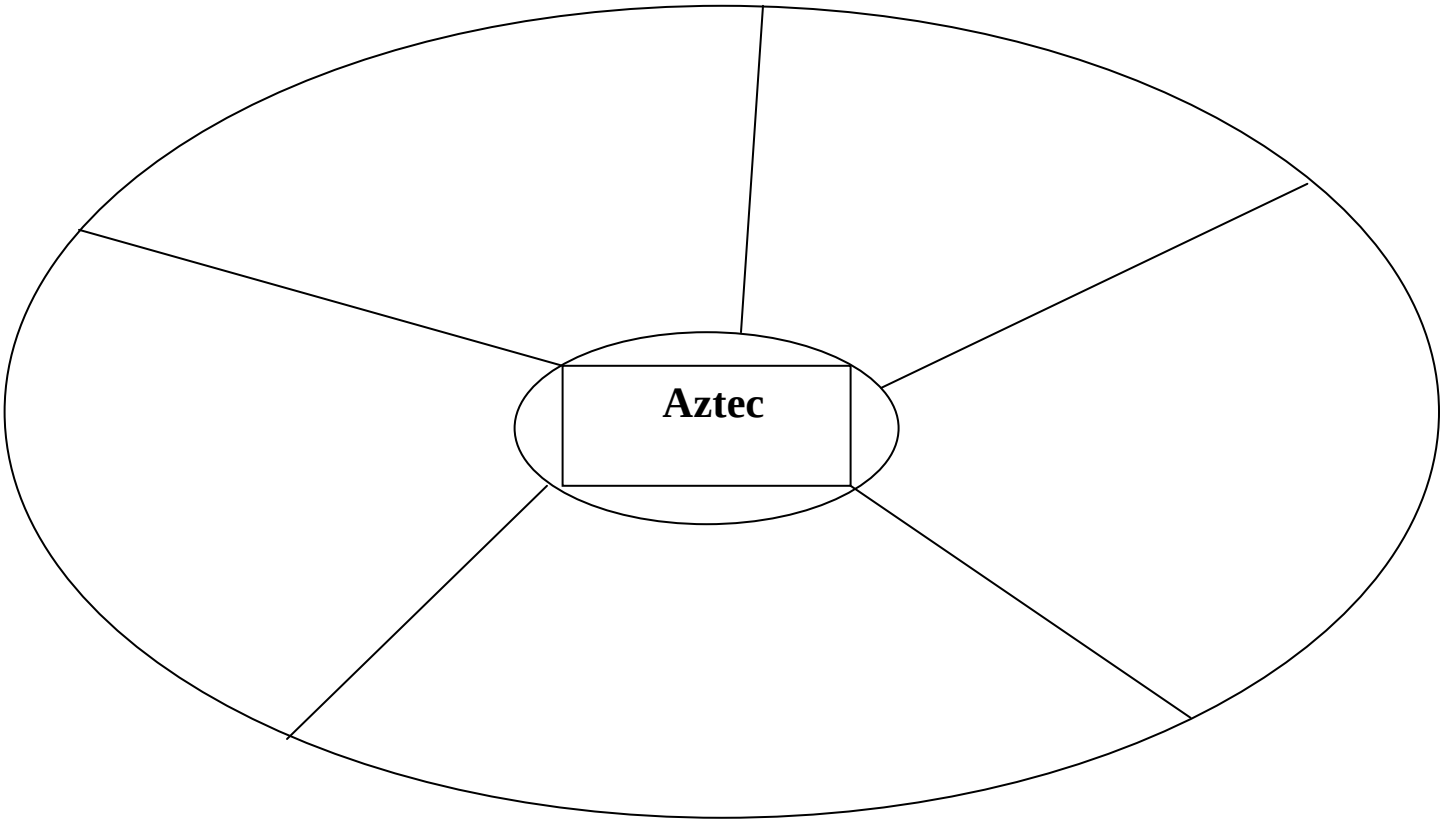
One-minute probe Mesoamerican Civilizations

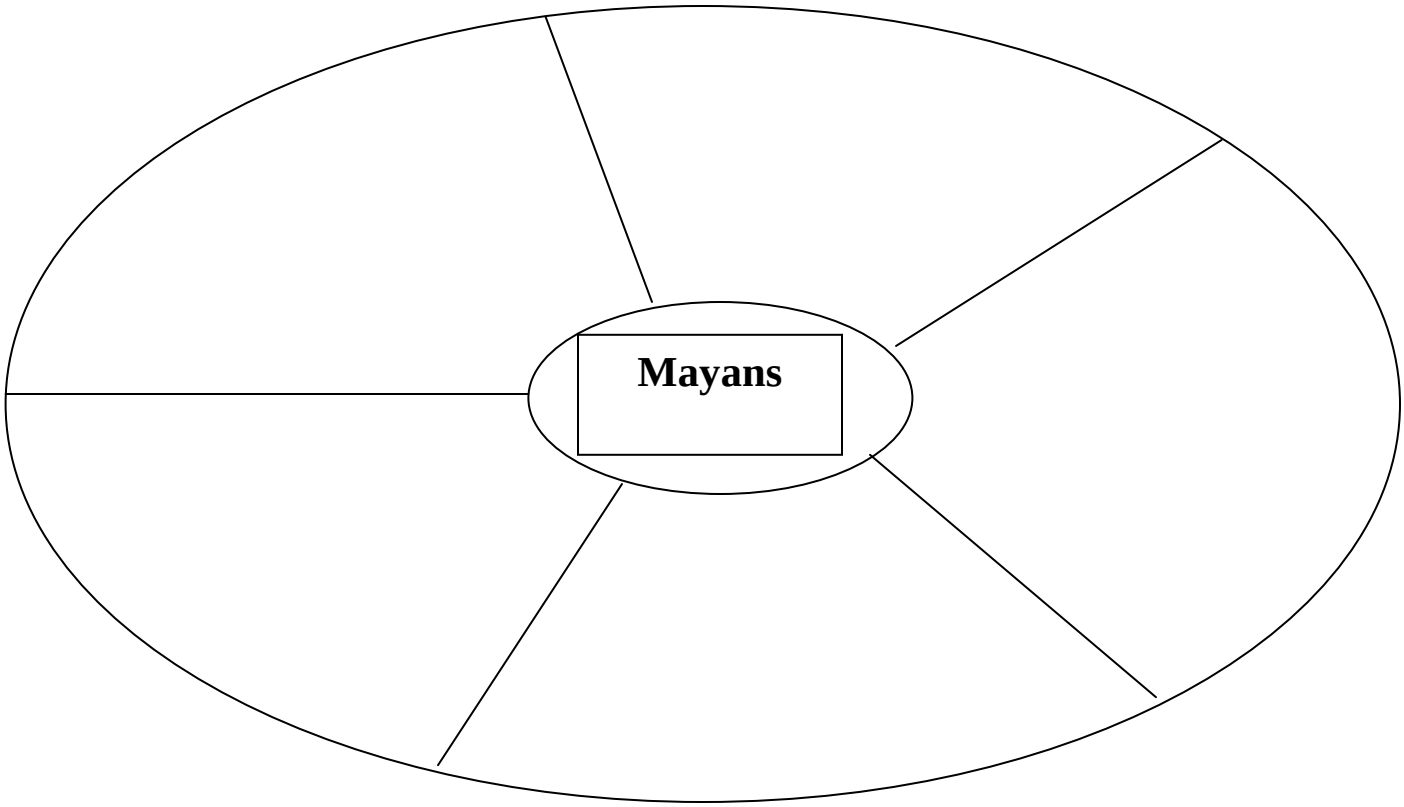
1. Floating Aztec gardens are known as _____.
2. Lake Texcoco, Mexico was the location of the _____.
3. _____ is an art material used by the Maya civilization.
4. Tenochtitlan is a massive Aztec _____ dedicated to the sun god.
5. _____ is the form under which new Maya kings were chosen as the king passed down his position to his son.
6. _____ was a building material used by the Mayas.
7. The word _____ refers to the Aztec government.
8. _____ Great Pyramid was the highest Maya structure in the Yucatan.
9. The Maya were located on the _____ peninsula.
10. Maya pyramids were known as _____.

Appendix G


Mesoamerican Civilizations
Aztecs
Mayans
Government
Materials
Location
Innovations
Architecture

Appendix H
Mesoamerican Civilizations 2





Appendix I

Terms and Definitions River Valley Civilizations

1. **Babylon**- the location of the Mesopotamians
2. **Harappa**- city where the Indus Valley civilization was located
3. **Mohenjo**-Daro- city where the Indus Valley civilization was located
4. **Ox-Drawn plows**- farming invention of the Mesopotamians
5. **Potter's wheel** – technology used by Indus valley people
6. **Dravidian language** –language of the Indus Valley
7. **Cuneiform**- written language of the Mesopotamians
8. **Epic Of Gilgamesh**- famous Mesopotamian literature
9. **Bhagavad Gita**- Sanskrit poem written by the Indus Valley civilization
10. **Polytheism**- the belief in many Gods

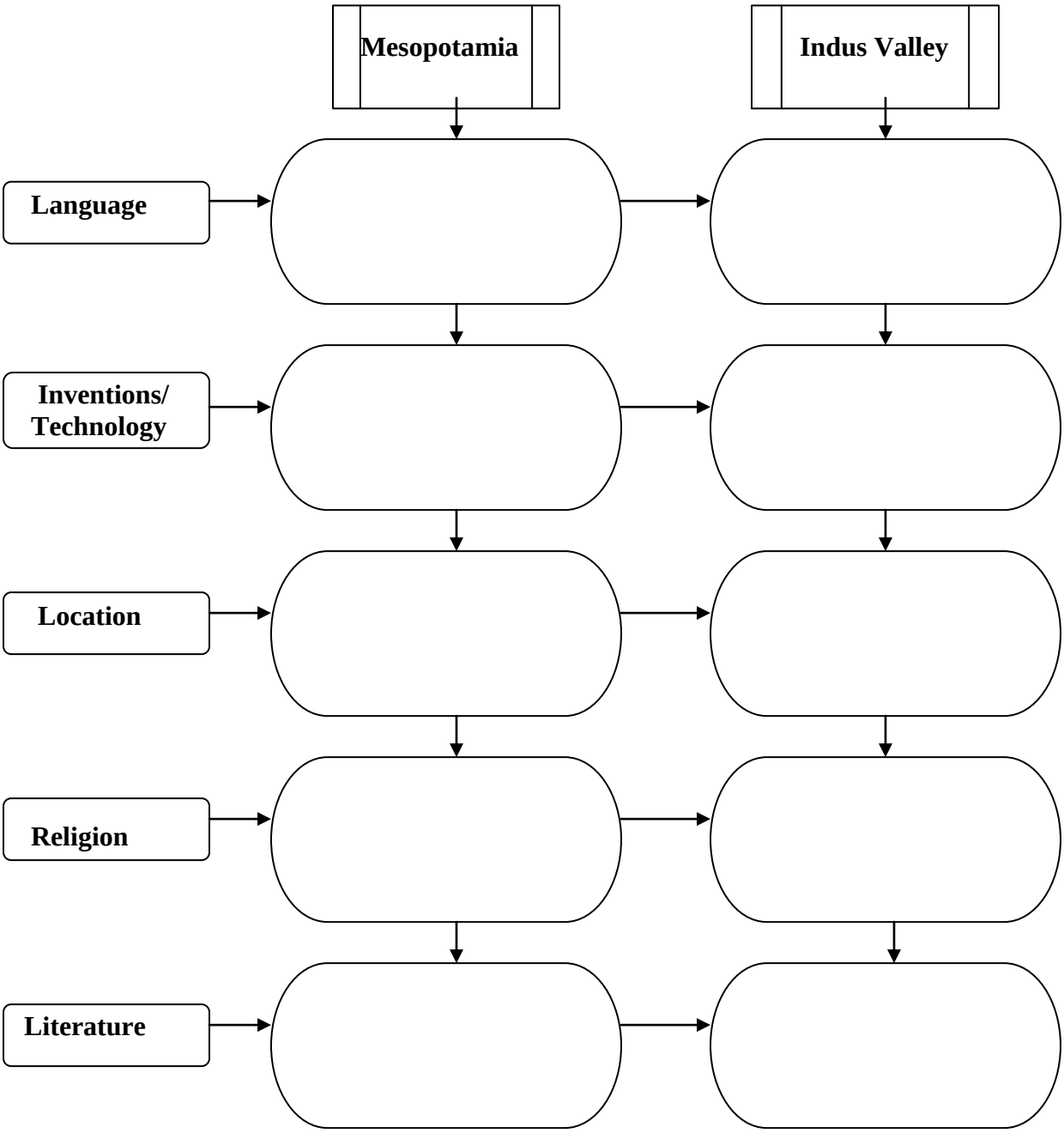
Appendix J

One-minute probe River Valley Civilizations

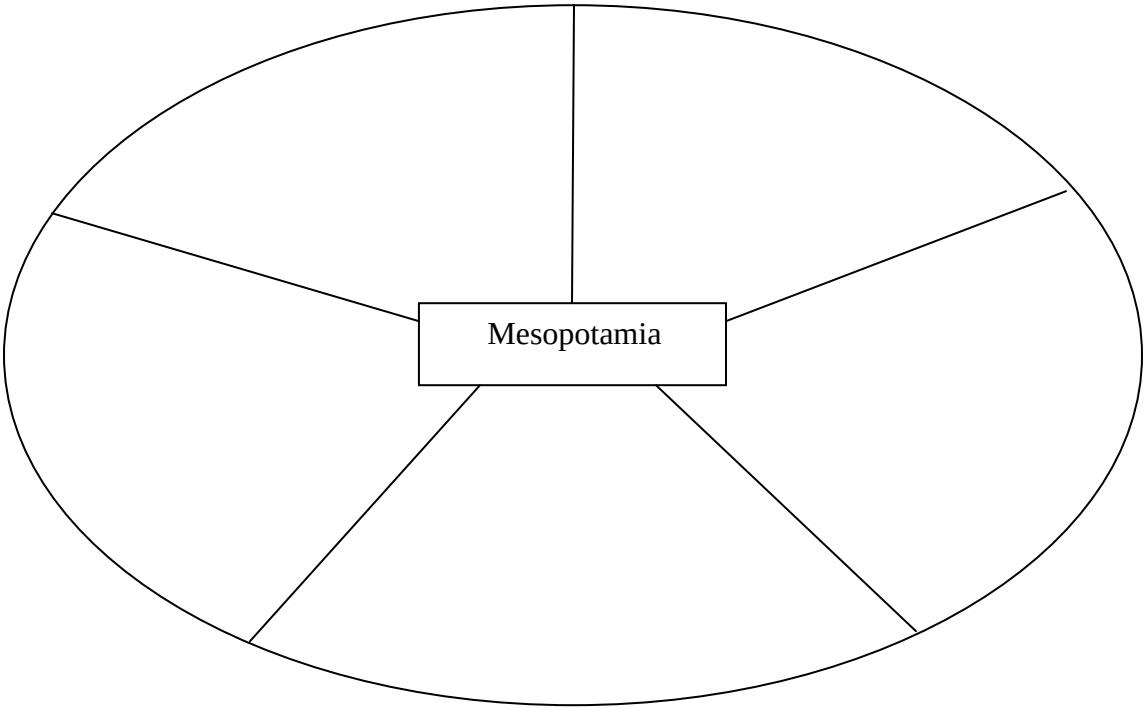
1. The _____ wheel is an example of technology used by the Indus Valley civilization.
2. Mohenjo-Daro was a city where the _____ civilization was located.
3. _____ refers to the written language of Mesopotamia.
4. The _____ plow was a farming invention developed by the people of Mesopotamia.
5. The _____ is an example of a Sanskrit poem from the Indus Valley civilization.
6. _____ is a famous city where the Indus Valley civilization was located.
7. People of the Indus Valley used the _____ language to communicate.
8. The Indus Valley civilization and the people of Mesopotamia shared similar religious beliefs; they were _____.
9. The Epic of Gilgamesh is a famous example of _____ literature.
10. The people of Mesopotamia were located in the city of _____.

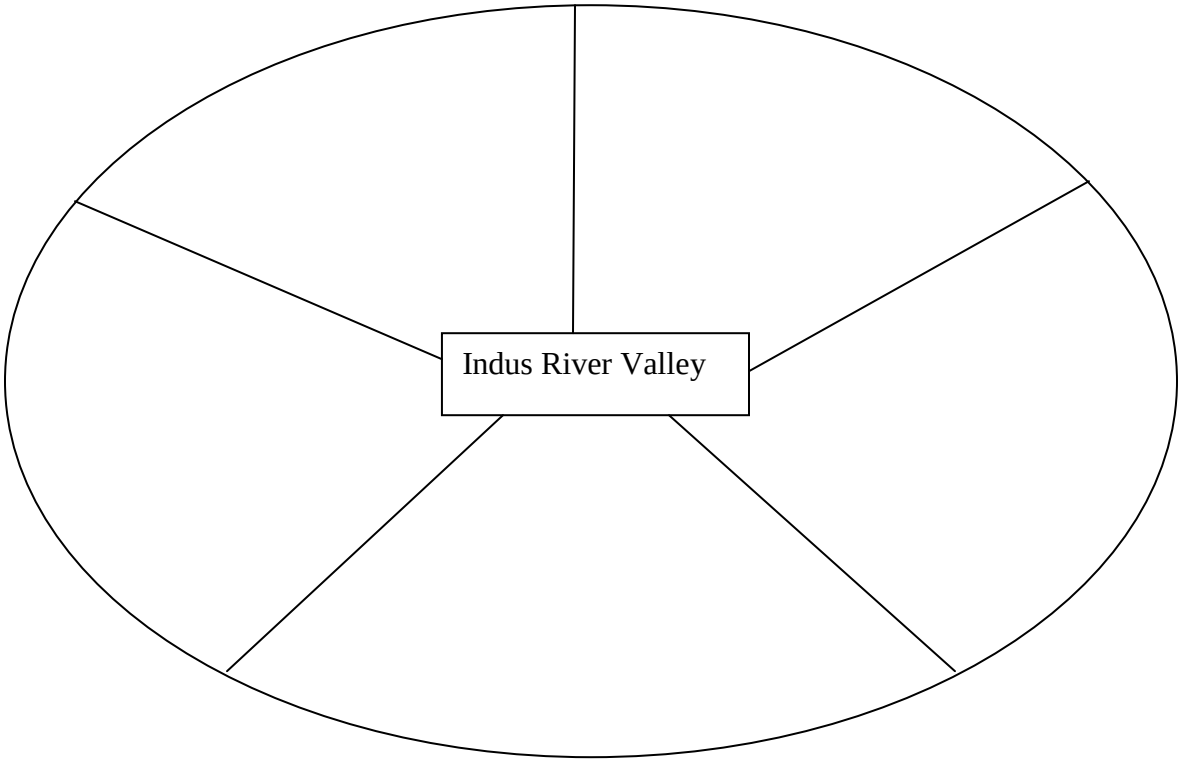
Appendix K

River Valley Civilizations



Appendix L





Appendix M

Social Validity Questionnaire

Directions: Please provide a brief answer for each of the following questions.

For Participant:

1. Would you recommend these strategies to other World History students? Why or why not?
   _____
   _____
   _____
   _____

2. Do you have a better understanding of the vocabulary terms after using graphic organizers? _____

3. How did you feel when you were trying to answer ten questions in a one-minute period?_____
   _____
   _____

4. Why do you think you were using graphic organizers?_____
   _____
   _____

5. Would you prefer to learn vocabulary by looking up definitions in the back of a book or by completing a graphic organizer?
   _____
   _____

6. Would you like to use graphic organizers in another class? If yes, which class?_____
   _____
   _____

7. Would you like to be tested using one-minute probes in another class? If yes, which class?
   _____
   _____
   _____

Appendix N

Data collection sheet

Student name:_____

Date:				
1. Set of vocabulary terms	Set 1 Set 2 Set 3	Set 1 Set 2 Set 3	Set 1 Set 2 Set 3	Set 1 Set 2 Set 3
2. Cognitive Organizer	Organizer 1a Organizer 1b Organizer 2a Organizer 2b Organizer 3a Organizer 3b	Organizer 1a Organizer 1b Organizer 2a Organizer 2b Organizer 3a Organizer 3b	Organizer 1a Organizer 1b Organizer 2a Organizer 2b Organizer 3a Organizer 3b	Organizer 1a Organizer 1b Organizer 2a Organizer 2b Organizer 3a Organizer 3b
3. Session type	Initial Intervention Maintenance	Initial Intervention Maintenance	Initial Intervention Maintenance	Initial Intervention Maintenance
4. Start time				
5. Score				

Appendix O
Fluency Graph Imelda

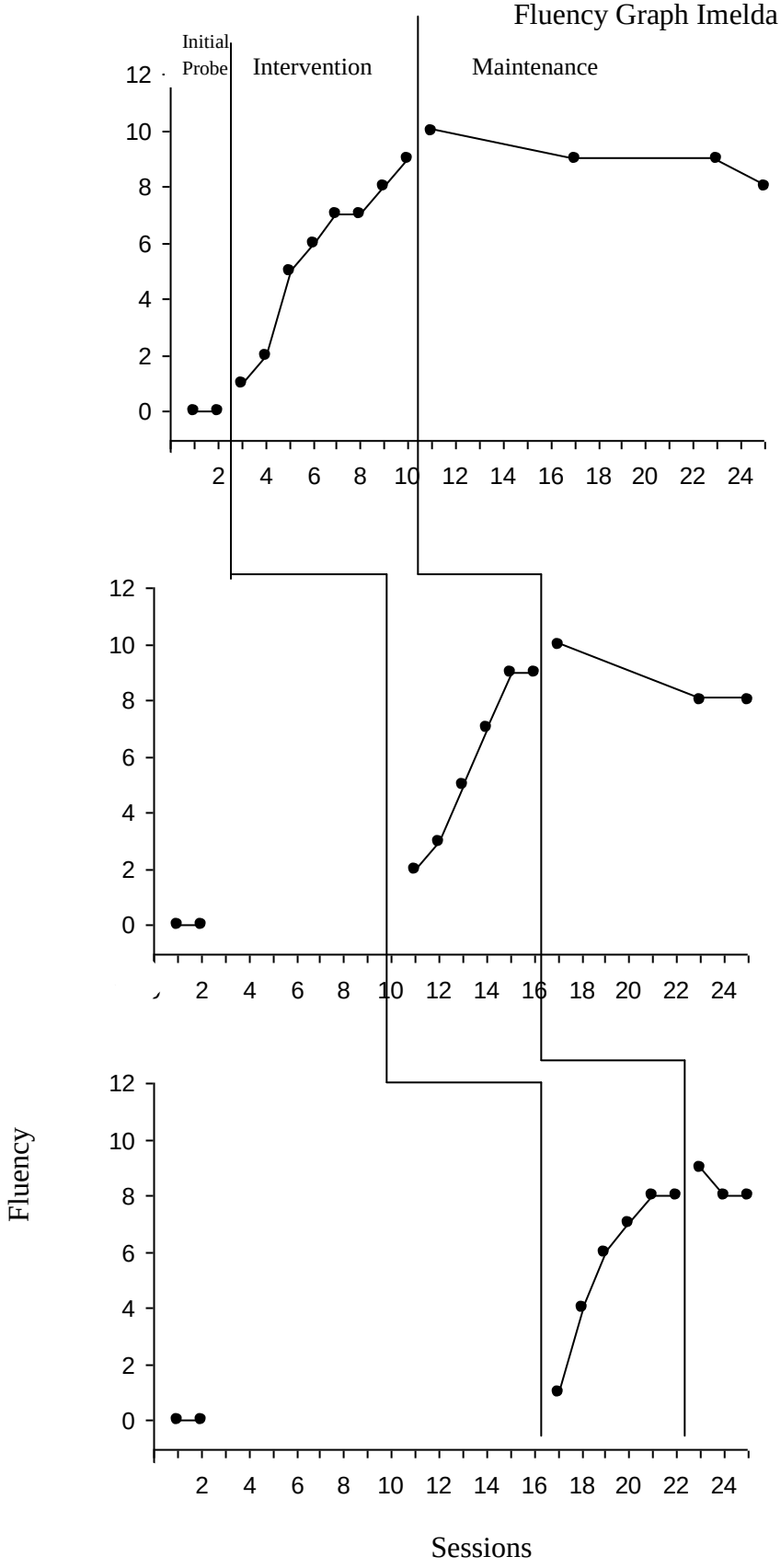


Figure 1. Imelda

Appendix P
Fluency Graph Brad

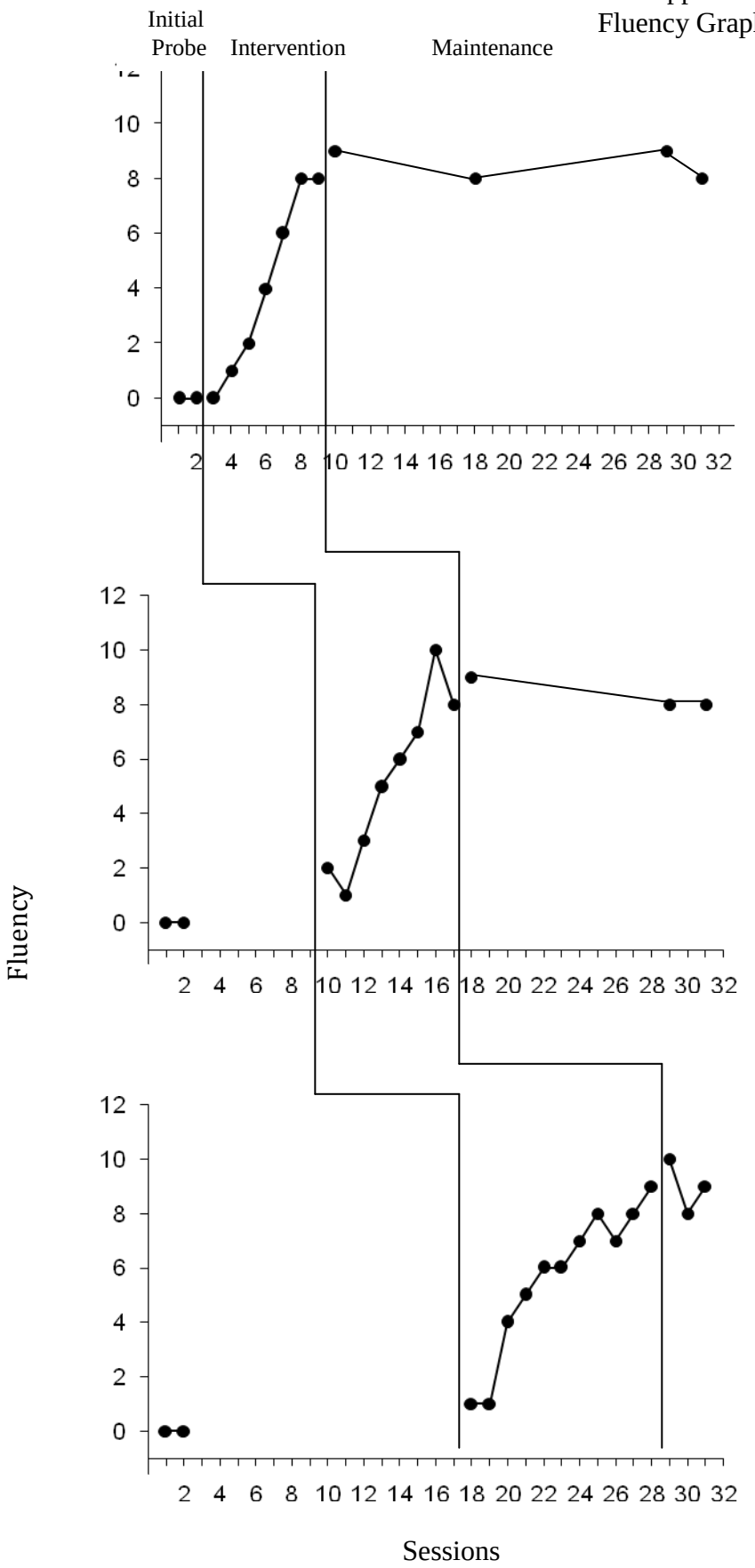


Figure 1. Brad

Appendix Q
Fluency Graph Martin

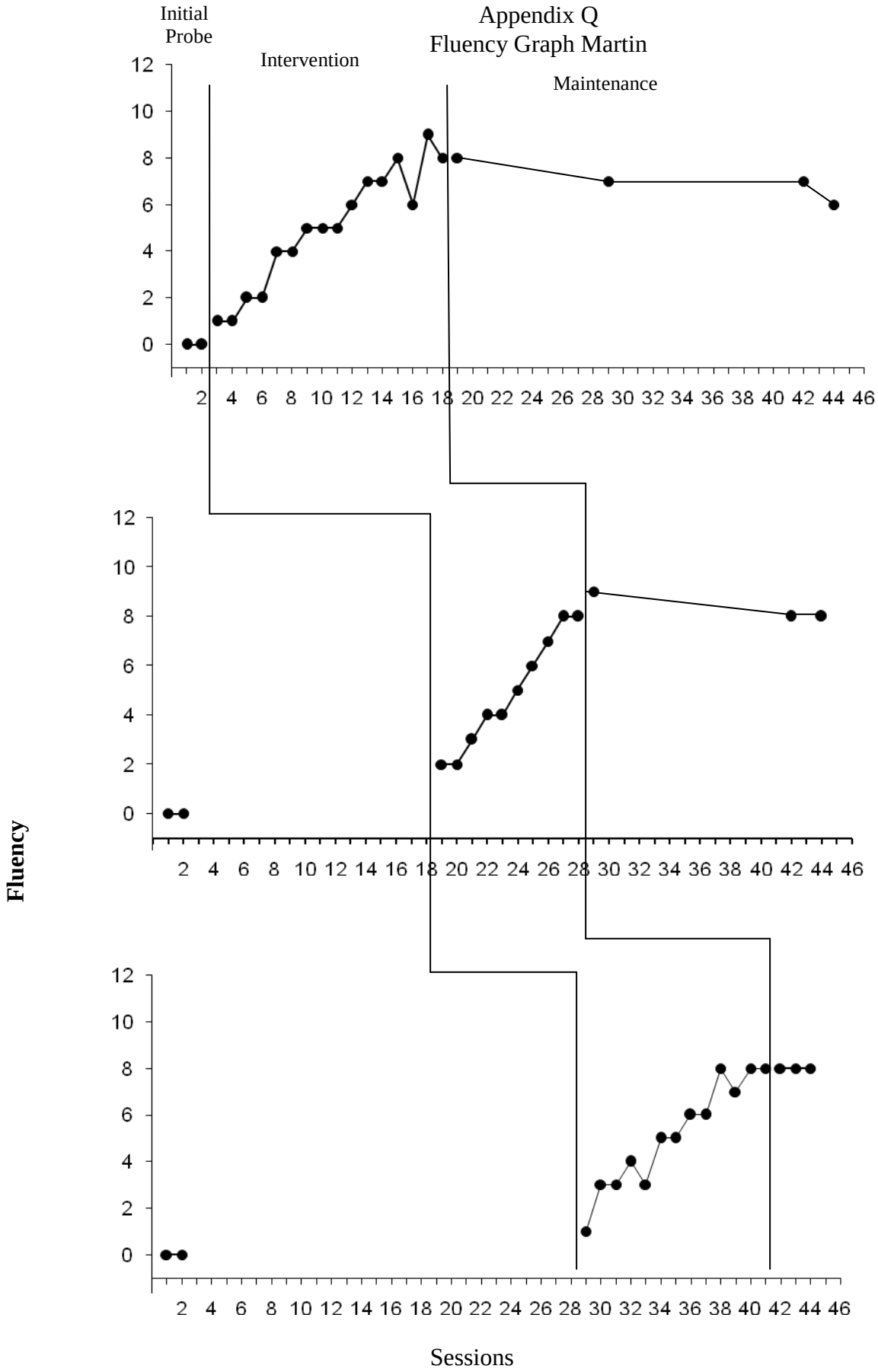


Figure 1. Martin

Appendix R

Parent/Guardian Permission Form

To whom it may concern:

I agree to allow my child, _____, to take part in a research study titled, "A study of cognitive organizer interventions and their effect on rates of response of content area vocabulary words for high school students with mild disabilities". The research will be carried out by Lisa Ulmer under the supervision of Dr. Cecil Fore III from the Special Education Department at the University of Georgia. I do not have to allow my child to be in this study if I do not want to. My child can stop taking part at any time without giving any reason, and without penalty. I can ask to have the information related to my child returned to me, removed from the research records, or destroyed.

The following points have been explained to me:

• The reason for the research is to help students increase their vocabulary skills in World History through the use of Precision Teaching and graphic organizers.

• The procedures will consist of students receiving 15 minutes of direct vocabulary instruction on 3 sets of 10 words. The instruction time will then be followed by a one minute quiz.

• Students will have an opportunity to demonstrate how fast they can learn vocabulary and how long they can retain the new vocabulary by taking four brief quizzes each week.

• No immediate psychological, social, legal, economic or physical discomfort, stress, or harm is expected for the participants. Furthermore, participation in this study is confidential and only first names will be used. Results of this study will only be released with the consent of the parents unless otherwise required by law.

• The investigator will answer any questions about the research, now or during the course of the project. Lisa Ulmer can be reached at (706)769-6655. Dr. Cecil Fore III can be reached at (706)542-4603.

• I understand the study procedures described above. My questions have been answered to my satisfaction, and I agree to allow my child to take part in this study. I have been given a copy of this form to keep.

Lisa Ulmer, Investigator _____ _____
Signature Date

Telephone: 706-769-6655
Email: lisah@uga.edu

_____ _____ _____
Name of Parent/Guardian Signature Date

Please sign both copies, keep one and return one to the researcher.

Additional questions or problems regarding your child's rights as a research participant should be addressed to Chris A. Joseph, Ph.D. Human Subjects Office, University of Georgia, 606A Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-3199; E-Mail Address IRB@uga.edu

Appendix S

Student Permission Form

I, _____, agree to participate in a research study titled "A study of cognitive organizer interventions and their effect on rates of response of content area vocabulary words for high school students with mild disabilities" conducted by Lisa Ulmer from the Department of Communication Sciences and Special Education at the University of Georgia (542-4561) under the direction of Dr. Cecil Fore III, Department of Communication Sciences and Special Education , University of Georgia (542-4603). I understand that my participation is voluntary. I can refuse to participate or stop taking part without giving any reason, and without penalty. I can ask to have all of the information about me returned to me, removed from the research records, or destroyed.

The reason for the research is to help students increase their vocabulary skills in World History through the use of Precision Teaching and graphic organizers. If I volunteer to take part in this study, I am agreeing that the following things have been explained to me:

- **The procedures will consist of students receiving 15 minutes of direct vocabulary instruction on 3 sets of 10 words. The instruction time will then be followed by a one minute quiz.**
- **Students will have an opportunity to demonstrate how fast they can learn vocabulary and how long they can retain the new vocabulary by taking four brief quizzes each week.**
- **No immediate psychological, social, legal, economic or physical discomfort, stress, or harm is expected for the participants. Furthermore, participation in this study is confidential and only first names will be used. Results of this study will only be released with the consent of the parents unless otherwise required by law.**
- **The investigator will answer any questions about the research, now or during the course of the project. Lisa Ulmer can be reached at (706)769-6655. Dr. Cecil Fore III can be reached at (706)542-4588.**
- **I understand the study procedures described above. My questions have been answered to my satisfaction, and I agree to allow my child to take part in this study. I have been given a copy of this form to keep.**

My performance during this study will not have any impact on my academics grades that are recorded by the high school. I understand that these procedures are not for diagnostic an academic grade.

The benefits for me are that I will be given extra instruction in the area of World History so that I may become more successful in the classroom. The researcher also hopes to learn more about how students with mild disabilities best acquire new vocabulary in content area classes at the high school level.

No individually-identifiable information about me, or provided by me during the research, will be shared with others without my written permission. I will only be required to give my first name on all materials used during the study.

The investigator will answer any further questions about the research, now or during the course of the project.

I give my permission for the researchers to release my results to my parents/guardians.
Circle one: YES / NO. Initial _____.

I understand that I am agreeing by my signature on this form to take part in this research project and understand that I will receive a signed copy of this consent form for my records.

Lisa Ulmer, Investigator	**Signature**	**Date**

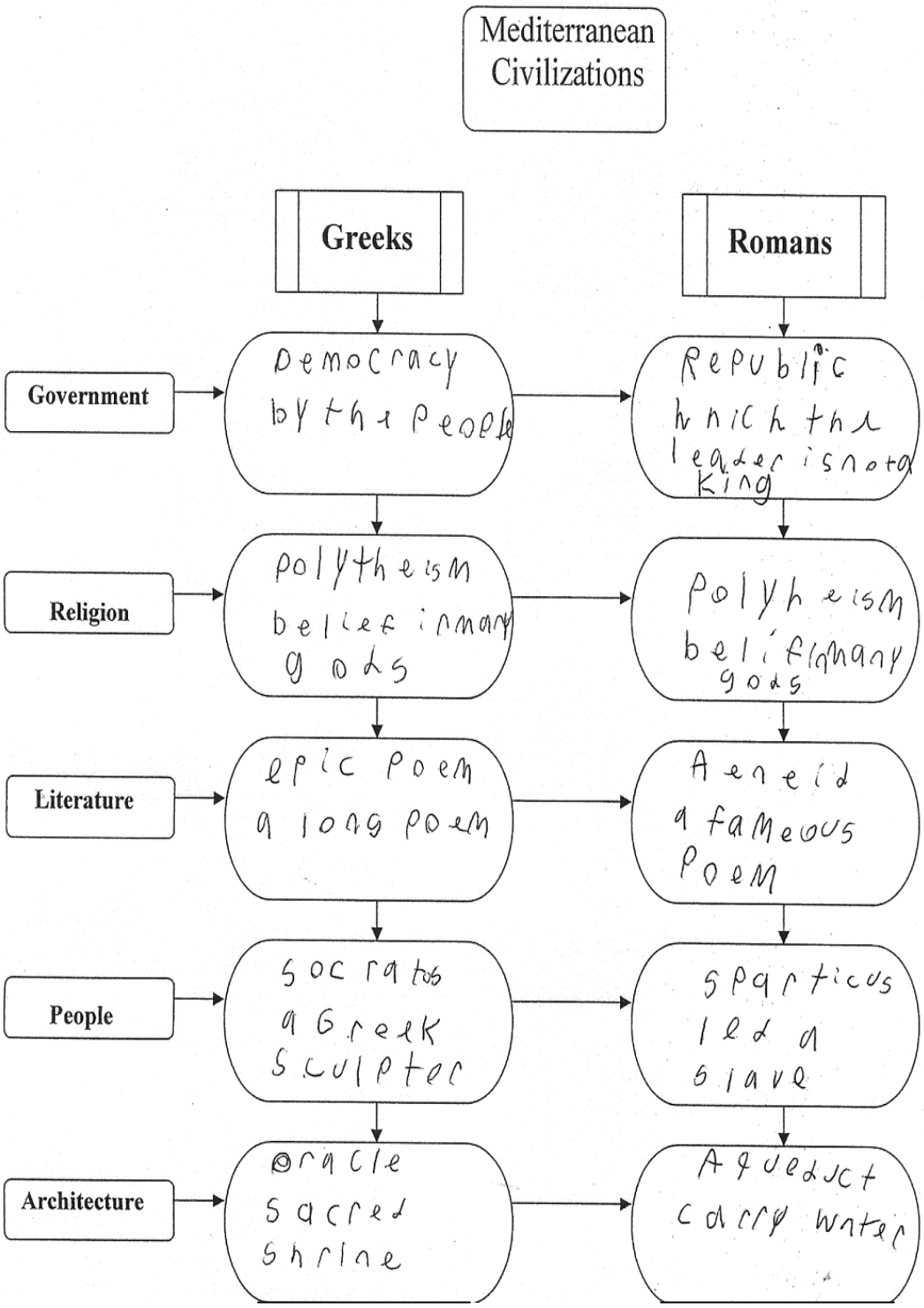
Telephone:706-769-6655
Email: lisah@uga.edu

Name of Participant	**Signature**	**Date**

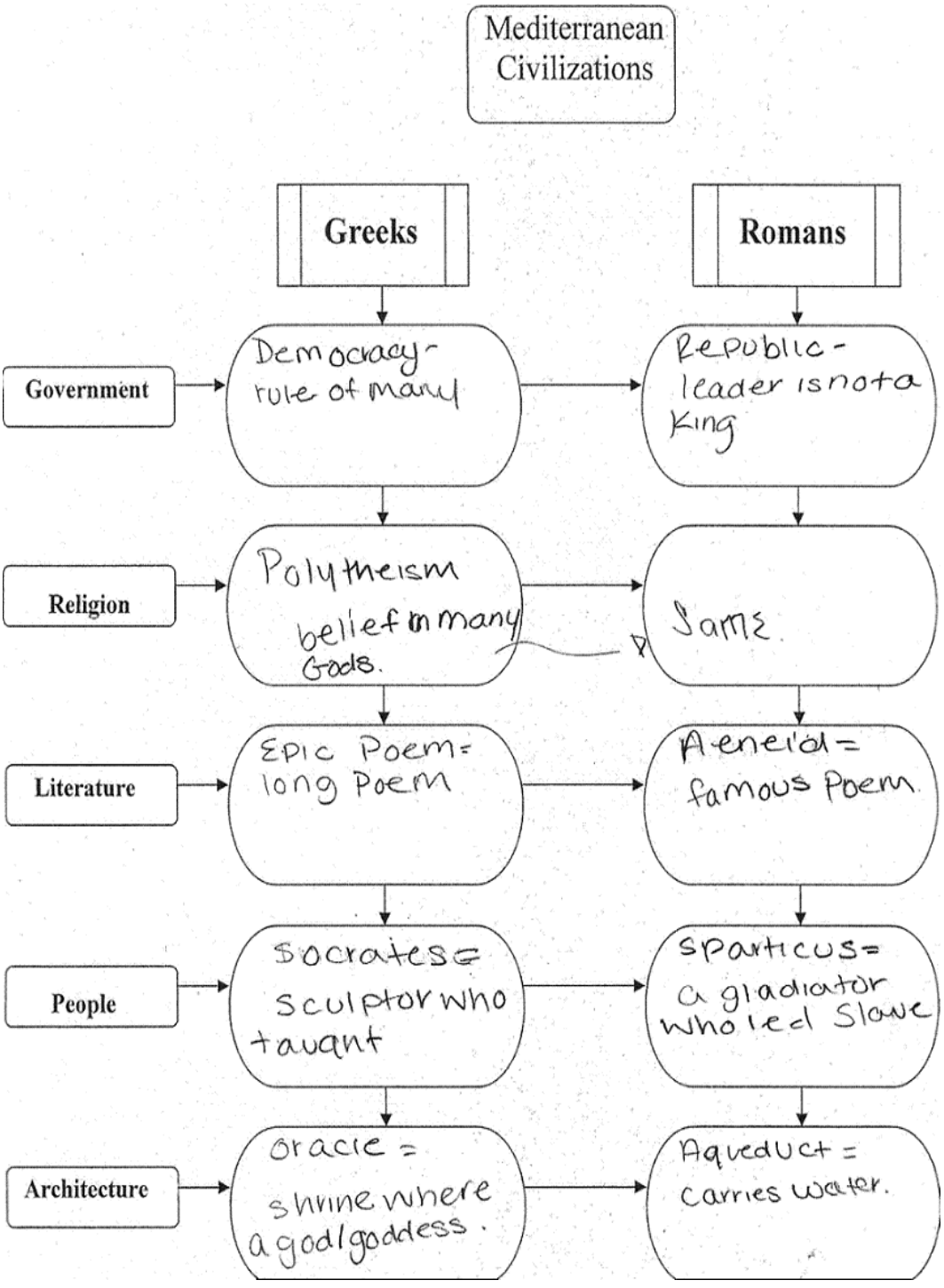
Please sign both copies, keep one and return one to the researcher.

Additional questions or problems regarding your rights as a research participant should be addressed to The Chairperson, Institutional Review Board, University of Georgia, 612 Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-3199; E-Mail Address IRB@uga.edu

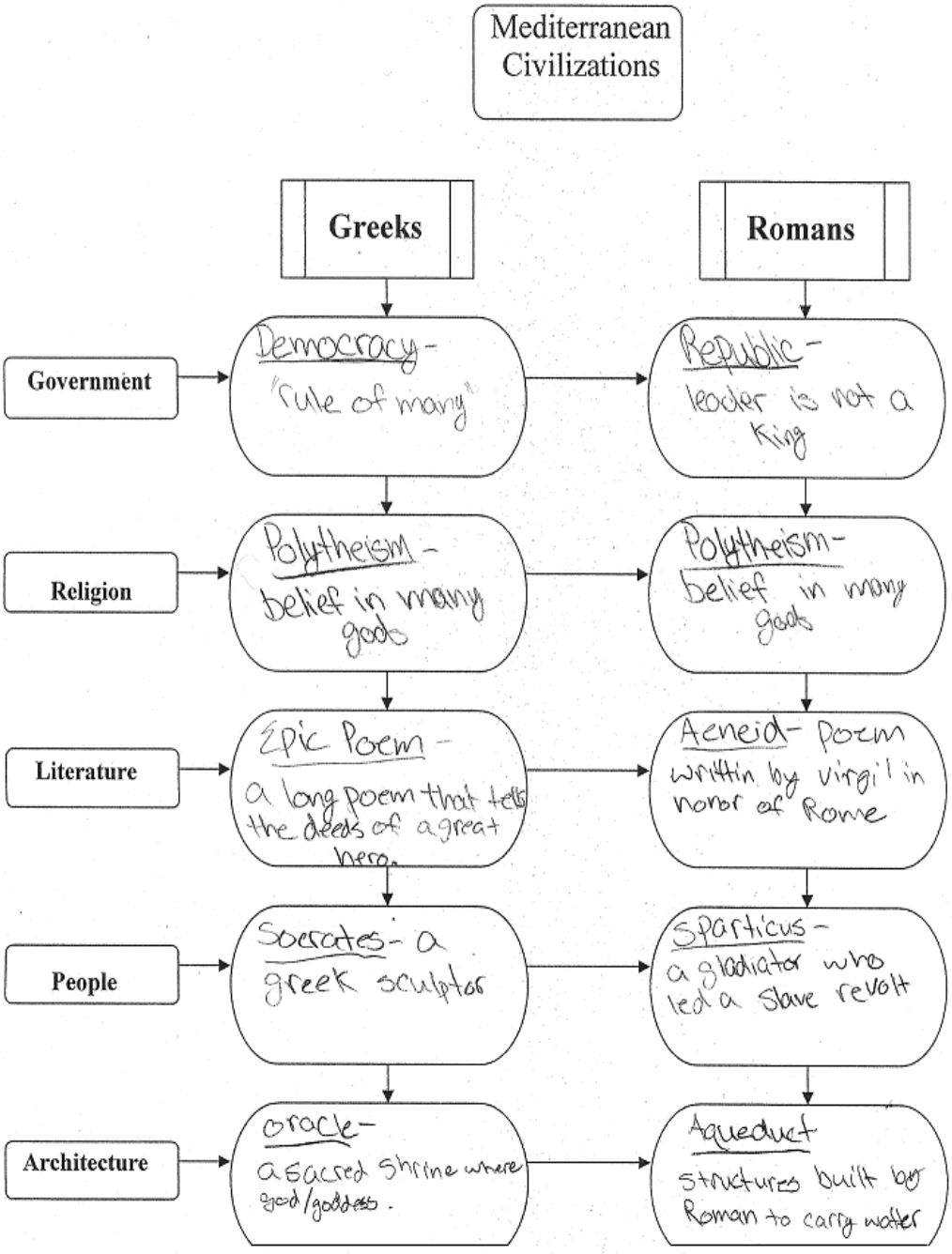
Appendix T
Martin's Cognitive Organizer



Appendix U
Imelda's Cognitive Organizer



Appendix V
Brad's Cognitive Organizer



VITA
Lisa Ulmer

Education & Work Experience

Degrees
MS, Florida State University in Special Education, 2003
BS, Florida State University in Communication, 2001

Professional Employment
Graduate Assistant, Florida State University in College of Education, 2000-2001
Special Education Teacher, Thomas County Central High School 2001-2003
Special Education Teacher, Oconee County High School, 2003- current

Publications

Bender, W. N., & Shores, C. (in press). *Response to Intervention: A Practical Guide for Teachers.* Thousand Oaks, CA: Corwin Press.

Baskette, M. R., Ulmer, L, & Bender, W. N. (2006). The Emperor Has No Clothes! Unanswered Questions and Concerns on the Response to Intervention Procedure. *The Journal of the American Academy of Special Education Professionals.* (Fall, 2006; Url: aasep.org), pp 4 - 24.

Presentations

Ulmer, L., Boon, R., Fore III, C, & Stone, R. (2007) *Use of Text Maps to Improve Reading Comprehension Skills Among High School Students with EBD*. A session presented at the annual Georgia Council for Exceptional Children Conference (March2-3).

Ulmer, L., Fore III, C., Boon, R., & Conner, L. (2007) *Teaching Spelling to Students with Learning Disabilities via the use of the Hyperstudio Tutorial Program*. A session presented at the annual Georgia Council for Exceptional Children Conference (March 2-3).

Baskette, M., Strickland, W., Ulmer, L. (2007) *Response to Intervention and Progress Monitoring: What Strategies Teachers Can Use in the Classroom*. A session presented at the annual Harvard Graduate School of Education Student Research Conference (February 23rd).

Bruno, J, Traore, R, Hawthorne-Ulmer, L., & Hartley, M (2003) *How Do We Reach Students Who Fell No Need to Understand Oppressions? A Search for Answers.* A session presented at the annual International Conference on Teacher Education and Social Justice. San Francisco (June13-15).