CHAPTER I

INTRODUCTION

Innovative programs are constantly being implemented in the schools with the purpose of improving a variety of factors that affect how students learn. Some of these programs propose to address the affective domain while others focus on the cognitive aspects of child development. Many of these programs claim high success rates through their connections to the emerging research from such prolific areas as brain-based and learning styles instruction (Bruer, 1997 & Gatewood, 1995).

Purpose and Significance of the Study

One such program, Thinking Maps®, uses graphic organizers to promote a common language for students to improve their organizational skills, thus improving their thinking skills and their academic performance. The creators of the Thinking Maps® program purport that schools employing this instructional strategy can increase their students' standardized test scores (Hyerle, 1996b). Thinking Maps® are presented as grounded in the brain-based research currently being conducted to link how the brain learns with improved classroom practice. This study focused on the effects that Thinking Maps® have on student achievement, specifically mathematics, reading, and language achievement at the elementary level.   The question the researcher posed was "How does participation in Thinking Maps® affect the mathematics, reading, and language achievement of fourth-grade students?"

Thinking Maps® can be an expensive proposition for school divisions and should be carefully examined before a school division commits to full implementation. For each school in a division, the average cost is $6,000.00 for the prescribed training, materials, and follow-up consultations. In larger school divisions, consisting of many schools, this can become a costly initiative. This investigation served as a pilot study for a large school division in Virginia considering the implementation of the program division-wide at the elementary level. The results of the study will be used to assist the school division in determining if it should continue to expend the amounts of money and effort required to place the Thinking Maps® program in each of its twenty-eight schools.

A research-based investigation of Thinking Maps® will add to the knowledge base pertaining to how graphic organizers can assist in improving student achievement. Graphic organizer research has been reviewed in the literature since the forerunner of the graphic organizer, the advance organizer was developed in the late 1960s (Ausubel, 1967). Studies on the effectiveness of graphic organizers in increasing student learning at the elementary level have shown mixed results, with some studies finding no advantage in using this instructional strategy (Griffin, Malone & Kameenui, 1995; Simmons, Griffin & Kameenui, 1988).   Other studies have concluded that graphic organizers can have a positive effect on student learning (Hawk, 1986; Moore & Readence, 1984). Recent studies have indicated that graphic organizers are an effective means to impact positively on student achievement (Dunston, 1992; Herbst, 1995; Monroe & Pendergrass, 1997; Wiegmann, Rewey, Dansereau & Pitre, 1992). The results of this study will provide additional information to researchers to assist in resolving the debate in the literature on the validity of graphic organizers as an effective instructional strategy to improve student achievement.

Thus far, the authors of Thinking Maps® are aware of only two investigations that have attempted to validate their claims through an organized research-based approach. Both of these efforts were limited to the master's thesis level of intensity and scope. This study marked the first time that their claims regarding the efficacy of the program has been conducted at the doctoral level of investigation.

The researcher contacted the authors of the Thinking Maps® program to discuss the feasibility of conducting a study of their program. They embraced the concept with certain reservations. Two main areas of concern emerged. Their first concern was expressed in regard to the effects that may occur due to any deviations from their prescribed program procedures as delineated in their training manual. They believe that any variation from these procedures would negate the effectiveness of the Thinking Maps® program.   Second, they were concerned about the time frame of the proposed study. They were not sure if the strategy could be adequately evaluated in a seven month window as allotted by this study. Their claims of increased student achievement have been based on the program's usage over the entire school year. The researcher has found evidence from the literature that other studies on graphic organizers were conducted

over shorter durations than that proposed in this study (Boothby & Alvermann, 1984; Hawk, 1986). The authors presume that any deviation in their program in terms of length of program application may diminish the positive significance the Thinking Maps® program would have on student achievement.

The researcher is especially interested in the connection the authors make for Thinking Maps® to the brain-based research. This aspect will be addressed in the review of the literature. The linkage the authors make to the brain-based research in support of how their program raises student's achievement scores on standardized tests is based on the work of Hyerle (1996a).

The brain-based research literature maintains that by understanding how the brain works, educators will be able to redefine learning through a different manner of teaching. Sylwester (1997) states:

> We are now confronting an explosion of new information about the workings of our brain that will profoundly affect educational policy and practice. Yet our profession, oriented as it is toward the social and behavioral sciences with only a limited understanding of biology and cognitive science, stands unready at the moment to take advantage of this learning revolution (p. 6).

In the preceding statement, Sylwester addresses the central focus of this study and provides the context for the significance the study will have for educators. He maintains that the gap between the research findings on the brain and the application of this information to the classroom will perplex those who hope to use the emerging field of brain-compatible learning to revolutionize the way educators approach instruction. What if teachers could rely on cognitive science to guide their practice like physicians rely on modern biology? Cognitive research on problem solving has revealed how we acquire and orchestrate knowledge and skills, gradually becoming more expert in the process, as we work in a subject area (Bruer, 1997). With the advances in neurological research, we do not have to adhere to Skinnerian models that explain everything we do through behavior alone (Wolfe, 1995).

However, this revolution of thinking about learning will present some key administrative issues that educators must confront in order to derive benefit from the abundance of research being conducted on the brain. New programs that promote their connection to the brain-based research are emerging to take advantage of the paradigmal shift in teaching and learning. The

subject of this proposed study, the Thinking Maps® program, purports to be derived from the recent findings in brain research (Implementation and Assessment Guide, 1997). The program's authors cite statistics to demonstrate the program's ability to improve student achievement, but they provide no accompanying data to allow for accurate evaluation of their claims (Hyerle, 1996b). No data exists to disaggregate how the program affects race, gender, or previous achievement level of students. Some studies in the literature involving graphic organizers deal with these variables (Stone, 1982; Herbst, 1995), but the authors of Thinking Maps® have not provided information on how their product impacts these domains. Therefore, this study will be designed to assist educators in evaluating the worth of programs like Thinking Maps®, which are increasing in popularity due to the educational communities interest in brain research.

<div align="center">Research Questions</div>

The central research question the investigator seeks to answer is, do Thinking Maps® function to improve student achievement? The overall research question becomes, is there a difference between groups (fourth-grade students using Thinking Maps® instruction and fourth-grade students not using Thinking Maps® instruction) with regard to student achievement in math, language and reading, as measured by the Stanford Achievement Test? Under that umbrella, additional research questions will be formulated to address each of the independent variables, gender, race, and previous achievement level.

What is the effect of the use of Thinking Maps® in fourth-grade classrooms on gains in math, reading, and language as measured by the Stanford Achievement Test?

What is the effect of the use of Thinking Maps® on previous achievement (low, middle, high) in fourth-grade classrooms on gains in math, reading, and language as measured by the Stanford Achievement Test?

What is the effect of the use of Thinking Maps® with respect to race on gains in math, reading, and language as measured by the Stanford Achievement Test?

What is the effect of the use of Thinking Maps® with respect to gender on gains in math, reading, and language as measured by the Stanford Achievement Test?

What are the effects of the use of Thinking Maps® on the interactions between the level of previous achievement and race, level of previous achievement and treatment, level of previous

achievement and gender, gender and treatment, gender and race, and treatment and race on gains in fourth-grade classrooms in math, reading, and language as measured by the Stanford Achievement Test?

<div align="center">Definition of Terms</div>

For the purposes of this study, the following terms are defined:

<u>Advance Organizer</u> - a specialized text passage introduced prior to the student's assignment of a reading lesson that includes information designed to assist the student in understanding the text to be read.

<u>Graphic Organizer</u> - (GO) a visual display of conceptual information designed to convey enhanced meaning or understanding of learned material.

<u>Thinking Maps®</u> - a systematic representation of a common language depicted by eight structured graphic organizers designed to enhance understanding of a concept or construct.

<u>Achievement</u> - as measured by the mathematics, reading and language scaled scores on the <u>Stanford Achievement Test (Ninth Edition</u>), a standardized test of achievement, employing national norms, used to assist in various educational practices such as student placement.

<u>Visual argument</u> - a process of transmitting ideas through a spatial arrangement of words, rather than through the written language.

<div align="center">Limitations</div>

The major limitation (Campbell & Stanley, 1963) of the study involved the small numbers in the samples and populations. Due to circumstances beyond the control of the researcher, additional teachers and students could not be included in the treatment group. This may pose a threat to the external validity of the study.

<div align="center">Outline of the Document</div>

Chapter One gives the reader an introduction to the purpose and significance of the study, with a brief explanation of the Thinking Maps® program. Chapter Two presents a review of the literature pertaining to the brain-based research to familiarize the reader with the context for understanding Thinking Maps®. In addition, an overview of the history of graphic organizers, the family of visual tools that led to the creation of Thinking Maps®, is presented. Along with this theme, an in-depth review of graphic-organizer research pertaining to the parameters of the

study was conducted.

In Chapter Three, the methodology section, an explanation of how the researcher proceeded to examine the Thinking Maps® program and test the hypotheses is explained. A quasi-experimental design (Campbell & Stanley, 1963) was used to determine if the Thinking Maps® program does improve student's standardized test scores as the authors of this instructional strategy claim. Interviews with the participating teachers were conducted at the conclusion of the study to determine classroom conditions. Attention was given to study design, samples and populations, treatment and control groups, and defining variables in this portion of the study.

Chapter Four addresses the results of the study, reports the findings of the research methods, and provides descriptive statistics in tabular form.

Chapter Five is concerned with discussion regarding conclusions, implications, and suggestions for future study emanating from this investigation.