

CHAPTER V
CONCLUSION, DISCUSSION, AND RECOMMENDATIONS
FOR PRACTICE AND FURTHER RESEARCH

Conclusion

The primary question raised in this study centered on the use of Thinking Maps® in the classroom to increase student achievement as measured by standardized tests. Given the data results from this study, using these students and these schools, no significant differences were found between the treatment group School A and the control group School B in regard to reading, mathematics, and language achievement. A significant interaction between race and previous achievement was found for the posttest reading scores. This result had no bearing on this study, and so was not explored further. There may be implications for further research related to this finding.

Discussion

A number of factors could have caused the results found in this study. Foremost among those factors was the size of the cells used to compute the data. Ensuring that only teachers in the treatment school who had been trained in the Thinking Maps® strategy were involved in the study limited the size of the sample in School A to two teachers and their classes. Given this number, the study group in School B had to be composed of two teachers and their classes. To measure increases in achievement, students in the study had to have been administered both the fall and the spring Stanford Achievement Test. Only 41 students from School A and 37 students from School B met these criteria. The 2x2x2x2 factorial design, spread over 78 students in the sample, created small cell sizes (see Table 10). This limitation of the design of the study may have contributed to the lack of significant findings in the investigation.

Another factor that may have played a part in reducing the probability of finding significant results between the study samples is the fact that the Thinking Maps® program is so new in the treatment school. Some researchers (Banerji & Malone, 1993) maintain that any new program should not be evaluated during the first year of implementation. The program needs time to build the power needed to affect such a strong variable as student achievement. Seven months of implementation does not appear to be a sufficient amount of time for this program to

demonstrate increased student performance on standardized measure such as the Stanford Achievement Test. The authors of the Thinking Maps® program explain that a common visual language has to develop within the school before the full potential of the maps can be reached. When the Thinking Maps® program is used in all the school's classrooms and becomes infused into all parts of the operation of the school, the authors believe the program can enhance student performance to a measureable degree. This infusion process is the critical element that enables the teachers to empower the students to gain the most benefit from the instructional strategy. The authors of Thinking Maps® acknowledge it may take more than a school year for this common visual language to develop within a school.

An additional factor that must be considered in interpreting the results of this study is the use of one form of measurement to derive the scores used to make the comparisons between the two schools. Although the authors of Thinking Maps® maintain that using this program will increase student achievement as measured by standardized tests, it may not be wise to base a final evaluation of the worth of the program upon one form of measurement such as the Stanford Achievement Test. Other means of evaluation should be employed in addition to the Stanford Achievement Test to determine if the program has merit. Criterion referenced tests, such as the Standards of Learning tests developed by the Virginia Department of Education, could be used to measure the achievement of students. Students' daily work and teacher made tests could be examined to provide more insight into how the program affects student achievement.

This study was conducted as a blind study to the teachers and students to ensure that the researcher did not contaminate the results. At no time during the course of the study did the researcher enter the classrooms or reveal the intent of the study to the participants. This design inherently does not correct for any variables that may have been introduced without the knowledge of the researcher. During seven months of public school many intervening variables could come into play in the classrooms chosen to participate in the study. While interviews with the teachers provided an opportunity to examine the curriculum and the instructional program, and conversations with the school principals indicated that nothing out of the ordinary occurred within the classrooms during the study period, the researcher acknowledges that unknown variables could have contributed to the results observed. No speculation is ventured as to the

degree or frequency of variables that which may have altered the outcome.

Recommendations for Practice

The researcher was impressed by the teachers' enthusiasm for the student use of the maps in the treatment schools. The interviews in School A quickly focused on how the students enjoyed using the maps in the classroom and displaying things they had learned in map format on the bulletin boards in the hallways outside of their rooms. The principal in the treatment school contributed to the positive climate for Thinking Maps® by encouraging their use in all facets of the school's curricula. Thinking Maps® appeared in the parent newsletter, in hallways, in the cafeteria, and the gymnasium. Public address announcements were made periodically to all students regarding how to use Thinking Maps®. A school-wide emphasis was placed on using these instructional tools.

The researcher can verify that the students in School A learned the proper usage of at least one Thinking Map® during the school year. After the study was completed, the researcher visited a third grade classroom to deliver a presentation. As part of the instruction, the researcher asked the students to design a way to compare two different things. Immediately the students suggested using the double-bubble map as a means of making the comparisons. Employing this map structure, the researcher was able to engage the class in a meaningful discussion.

Some benefit must be derived from the students' ability to assess so quickly what type of map structure would enable them to make the proper comparisons. The reaction of the researcher to the students' suggestion during the presentation mirrors that of the teachers participating in the study. The teachers found that the students liked working with the maps because they better understood the concepts required. The school principal described how teachers reported to her that the students were using the maps prior to writing activities to organize their thoughts. The papers that the students wrote attested to how the maps could be used to improve student performance. In Appendix C there are some examples of actual student-produced Thinking Maps®.

Evidence of the three themes of graphic organizer research cited by Moore and Readance (1984) was noted during the interviews with the teachers in School A. Teacher A2 described how she felt more confident that her students were learning the material by using Thinking Maps®.

Their perceived improved competence led her to feel that she was a better teacher because she could communicate the content to her students more effectively. This aspect of teacher efficacy was directly attributed to her use of the program in the instructional process.

Both of the teachers in School A reported that the students learned the material presented with Thinking Maps® more readily than with the conventional strategies they had employed before in their teaching. This evaluation of how Thinking Maps® work agrees with the second theme Moore and Readance (1984) found in their meta-analysis: Graphic organizers facilitate comprehension.

The third theme from the literature, that graphic organizers were viewed by students as an isolated activity not connected to what they were required to learn, was addressed by the teachers from School A as well. Although the program was new in the classroom, the teachers were surprised and encouraged by how easily the students adopted the Thinking Maps® organizers as tools to frame their understanding of the content. The researcher's experience with the third graders in School A demonstrates how the students were able to apply their knowledge of their use in a new context.

Recommendations for Further Research

Design changes that would most logically improve the study would incorporate additional numbers of teachers and students. As pointed out in the limitations of the study, few teachers and students were available for inclusion in the investigation. Expanding the sample groups would limit the threats to the internal validity of the improved study.

This study was conducted as a blind study. The concept of a blind study fit the needs of the quasi-experimental nature of this investigation. The design of the study was basically quantitative, geared to collect specific data and analyze results. Very little qualitative data was collected. To gain a better understanding of how such a graphic organizer program as Thinking Maps® works, a qualitative study allowing the researcher to investigate the workings of the Thinking Maps® lessons should be employed. Providing information on how the program is intended to work with students would assist in explaining the results of this study. A study that analyzes the power of the instructional strategy is needed to determine when the program can be expected to make a viable difference in student achievement scores on standardized tests like the

Stanford Achievement Test.

A case study format could be used to describe how the program affects the individual student. This type of study would enable the researcher to engage in a long-term investigation of the program and its impact on the classroom. The authors of Thinking Maps® believe that time is needed for the teacher and the students to become familiar with the use of the maps before the full potential of the program can be realized.

More time would help to build a data base of information about the program that the division's research department could assess to determine if the program was achieving the results desired. Collecting data on the numbers of teachers using the program, how many of the eight maps were used within the classroom, the frequency of map usage, and the quality of their usage would enable the division to make a better decision regarding expanding the program to other elementary schools. Examining such variable as how and when the students construct the maps, especially in situation where direct instruction in using the maps was not given, would be helpful in assessing their value. More investigation into how the students transfer their knowledge of map usage would be helpful in learning about how the maps function.

One area where this student transfer of knowledge concerning map usage occurred is connected to student writing. One of the teachers at School A reported that the students, without being instructed to do so, used the maps to organize their thinking prior to attempting to writing journal entries and essays required in class. The students selected the appropriate map to assist them in making sure they included the ideas they wanted to express in their writing. This action represents an acquired behavior that the teacher encouraged as a positive step to organizing their thinking; this is a desired outcome of the Thinking Maps® program. Since this aspect of Thinking Maps® usage is a valued outcome, it should be investigated in a future study.

As with most of the programs in schools designed to increase student achievement, it is difficult to construct a short-term experimental study that presents conclusive proof of improved achievement by finding significance between two groups of students. The research on graphic organizers is illustrative of how variant the findings can be. This study was designed to examine some of the independent variables that were reported as having mixed results in the literature. The findings of this study support those studies (Griffin, Malone, & Kameenui, 1995; Simmons,

Griffin, & Kameenui, 1998) that did not find that student performance was enhanced by the use of graphic organizers. Both of the studies cited above were also short-term studies (ten days and 17 days).

Researcher's Recommendations

Based on the cost of approximately \$6000.00 per school to implement the program, is the program worth the investment? The answer is yes. The researcher believes that this program holds promise for three reasons. First, the opportunity to develop the common visual language that the authors of the Thinking Maps® program describe has the potential to transform the school curricula. This transformation will not be fully realized until all the teachers in the school become familiar with and use the program in their classrooms. Teachers engaged in sharing ideas on how to use the maps helps to forge better communication within the school. Increased positive communication leads to a more positive instructional climate for the entire school.

Second, the program is focused on teaching students how to organize their thinking. This critical skill is needed at all grade levels across the curriculum. The Thinking Maps® program provides students with a readily understandable visual tool that they can use for improving, applying and transferring their thinking directly to content knowledge. In this same school division, teachers at the high school are reporting that students taking advanced placement tests are using the maps prior to writing their essay exams. The students use the maps to organize the content of the questions so they can respond in a better organized format. These teachers attribute improved scores on the tests to student use of Thinking Maps®.

Third, Thinking Maps® and other graphic organizers appeal to the visual learner. Students in classrooms today, due to the increased opportunity of visual stimulus in their environment, respond to visual tools. Some researchers estimate that forty percent of the students are visual learners (Dunn, K. & Dunn, R, 1992). Many reading programs, like Scott-Foresman, incorporate graphic organizers and visual tools into their curricula to take advantage of the power of visual stimuli.

While this study did not find statistical significance in the quantitative analysis of the findings, the researcher believes that there is good evidence from the limited qualitative information gathered to continue to study the Thinking Maps® program before dismissing its

value as another educational fad or over-hyped instructional tool. Only more investigation expanding the time frame of the study period and focusing on how the program works with students will enable educators to make a fair evaluation of the Thinking Maps® program.