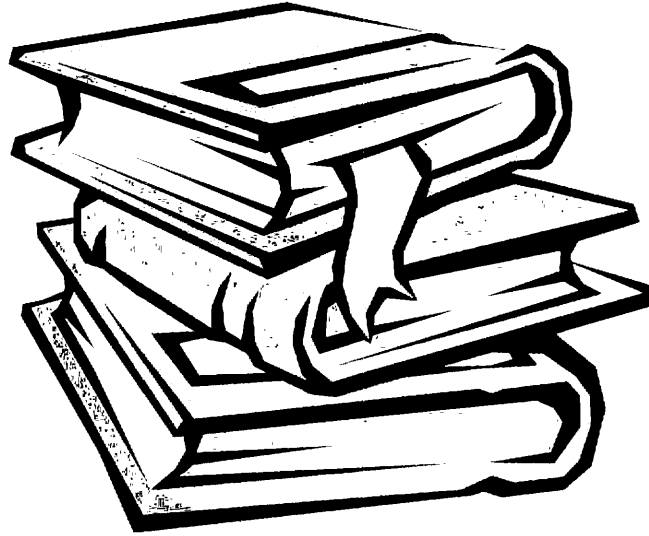


The Effects of “Thinking Maps” Implementation on Increasing Student Reading Achievement



**An Action Research Project Developed By:
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I. PROJECT OVERVIEW:

A. Investigated Issue and Rationale

Schools across the United States are constantly looking for ways to improve instruction and student achievement and Nebo Elementary is no exception. With N.C.'s Standards for Accountability, students in elementary grades three through six take End of Grade Tests in Reading and Math. In this high stakes environment, teachers and administrators have grown increasingly concerned about students who perform poorly on standardized assessments.

Teachers and administrators in this study are agreeing to do so as part of a collaborative effort to improve thinking skills and strategy instruction in the area of reading, a documented weakness at Nebo Elementary School. Kindergarten through sixth grade teachers as well as support personnel agreed to participate in staff development in “Thinking Map” training in an attempt to increase higher-level thinking skills necessary for reading achievement. The staff agreed to implement the eight thinking maps into their instructional strategies especially in the area of reading. Each of the eight maps is based on a fundamental cognitive skill:

- Comparing and Contrasting (Double Bubble Map)
- Sequencing (Flow Map)
- Classifying (Tree Map)
- Cause-Effect Reasoning (Multi-Flow Map)
- Contextual Clues (Circle Map)
- Part to Whole Relationships (Brace Map)
- Relating Factors within Analogies (Bridge Map)
- Describing (Bubble Map)

By investigating the correlation and impact of the utilization of Thinking Maps on student achievement in the area of reading, I hope to develop a strong rationale for the continued development and utilization of this instructional strategy and ultimately, increase reading achievement levels for the students of Nebo Elementary.

B. Research Literature

Recent research has proven that most of our students and most adults are visual learners, thus supporting the fact that graphics have become essential classroom tools. The following research articles support this assumption:

Caine, R.N. and G. Caine. (1991) Making Connections: Teaching and the Human Brain. Alexandria, Virginia: Association for Supervision and Curriculum Development.

- The brain makes sense of the world by constructing patterns.
- Understanding a subject results from perceiving relationships.
- Educators should provide students with experiences that allow students to perceive the “patterns that connect.”

Hyerle, David. (1988) Visual Tools for Constructing Knowledge. Alexandria, VA: Association for Supervision and Curriculum Development.

- Graphics are essential classroom tools that concretely supports patterning and networking of information, organizing information into knowledge from various sources, seeking meaning within prior knowledge and linking isolated pieces of information to whole interrelated systems.
- Visual tools reflect certain kinds of brain functioning.
- Chunking of information into logical and spatial arrangements is possible with graphic organizers.
- Thinking process maps are advantageous due to their consistent graphics and flexible use.

Ball, Marjann. (1999) “Results from a Reading Comprehension Study: A Dissertation on the Effects of Thinking Maps on College Students”. Mississippi.

- Research shows a highly significant correlation between the use of Thinking Maps and improved reading comprehension scores of college students as measured by the Stanford Diagnostic Reading Test.
- 85-90% of students reported that Thinking Maps were the most helpful tools for learning and transfer across other classes.

Hester, Joseph P., Hildebran, Wendy, Owen, Shirley, and Piekarski, Barbara (1995-96) "Thinking Maps: Enriching, Extending, and Integrating the Curriculum". Catawba County Schools. The North Carolina Middle School Journal Volume 17 1995-96.

- Research indicates that training whole faculties in the use of the Thinking Maps Program with extensive follow up is most effective.
- Evaluation of the Training Process for Thinking Maps is important in order to determine what kind and how much follow up is necessary.
- "Curricular integration and mapping" should be the ultimate goal of the Thinking Maps program within existing programs and content areas.
- Allowing students to make interconnections and use inferencing skills through the curriculum and Thinking Maps are key to language/reading development and ultimately learning
- Schools must develop long-range plans in order for Thinking Maps implementation to be successful.

C. Plan of Action

Teachers were given formal training in the use of the Thinking Maps in January 2002 with plans to introduce and utilize a new map each week as an instructional strategy with their students. Samples of maps and their integration with grade-level objectives were shared weekly during faculty meetings. A common area bulletin board was designated to display student work that incorporated the use of Thinking Maps, and administrators checked lesson plans for implementation of maps and did classroom observations as well to determine the extent to which Thinking Maps are being used. Follow –up Question and Answer Sessions were provided by trained trainers.

Focus for the 2002-2003 year will be on the continued utilization and integration of Thinking Maps and their effects on student achievement in reading. To assess the impact of this approach, we will examine the ways in which teachers implemented this strategy and how students responded. Given that standardized testing procedures prohibit the examination of actual responses, this study will investigate the responses of 75 elementary students from grades three through six to EOG-formatted comprehension passages and questions and the use of Thinking Maps. More specifically, the purposes of this study will be as follows:

- 1) To examine the ways that individual elementary students respond to an EOG-type reading passage with comprehension questions.
- 2) To analyze student perceptions of Thinking Maps as an instructional strategy designed to promote comprehension
- 3) To analyze teacher perceptions and utilization strategies of Thinking Maps as an instructional strategy to promote comprehension
- 4) To explore connections among responses to comprehension interviews, students' perceptions of strategies, teacher perceptions and utilizations of Thinking Maps strategies and EOG performance.
- 5) To look for the effects of Thinking Maps on Reading Achievement among a variety of student abilities.

After successfully introducing all eight Thinking Maps in 2001-2002, teachers in each grade level two through six have agreed to nominate 5 students from each 3rd through 6th grade classroom for an informal assessment of comprehension and Thinking Maps usage. Students will represent the range of achievement levels and the ethnic and gender composition of the class. From these nominations, 75 students will be targeted and test scores from the past two previous years will be documented. Students will be asked to complete surveys about their approaches to reading comprehension questions, their use of Thinking Maps, and the use of Thinking Maps by their teachers. Participating teachers will also be asked to complete a questionnaire about their instruction of Thinking Maps as a reading strategy and to provide student scores on six-weeks reading tests and work samples as needed.

D. Research Questions

The following questions will be the guiding factors in my action research plan:

- 1) To what extent do teachers utilize Thinking Maps as an instructional strategy for increasing reading comprehension skills?
- 2) To what extent will the utilization of Thinking Maps increase student achievement on the EOG Reading Test in Grades 3-6?
- 3) To what extent will students independently utilize Thinking Maps as a part of their personal reading comprehension strategies?
- 4) Does the use of Thinking Maps affect students of varied abilities differently in terms of success on the Reading EOG Test?

E. Nebo Elementary School Profile and Data Used to Develop Project Focus

MISSION

Nebo Elementary School's mission has always been to allow all students to develop the knowledge and skills necessary to become responsible, productive citizens. Recognizing that the ability to read is such an integral part of future successes and productivity, Nebo is constantly working to provide improvements in our instructional practices and resources so that all students can achieve this worthwhile goal.

OUR STUDENTS

Students at Nebo Elementary School are diverse in their backgrounds and abilities and thus belong to a variety of demographic groups and participate in many different programs especially as seen in those related to reading improvement:

- 6.5% are members of an ethnic minority group
- 48% qualify for free/reduced lunch
- 6.6% qualify for services from our Learning Resource Program
- 8.3% are targeted for Title I Reading Assistance
- 5.4% are selected for participation in the Academically/Intellectually Gifted Program
- 2% have excessive absences and must attend Attendance Make-Up Sessions after regular school hours
- 20 % receive remedial tutoring in reading during and after school
- 60 % of our students meet goals set for our Reading Incentive/ Accelerated Reading Program

Currently, Nebo serves approximately 590 students K-6, many of who show significant discrepancies in Reading and Math achievement. For example, 2002 EOG Scores showed that 86% of students in grades 3 through 6 were on grade level in Math and only 76% were on grade level in Reading.

When examining the data collected for 2000, 2001 and 2002, the following **at-risk** groups have been targeted:

- 3rd and 4th Grade Asian Girls and 5th And 6th Grade Asian Boys Score Lower in Reading Than Other Students in Those Grade Levels
- All 4th Grade Girls Scored 15 Percentage Points Lower Than Their Male Counterparts
- Boys in the 6th Grade Scored up to 10 Percentage Points Lower Than Girls in that Grade Level
- AIG Students in Grades 4-6 Showed Considerably Less Growth in Reading Than Other Students in Those Grade Levels
- Students Who Were Required to Attend Attendance Make-Up Session Due to Excessive Absences Did Not Meet Expected Growth in Reading
- Students Who Score in the Upper Level 3 and 4 Ranges Tend to Show Little Growth

In addition, analyzing data has shown the following **strengths** in Reading Achievement:

- Title 1 and Learning Resource Students Made Significant Gains in Reading
- Targeted Students Who Received Remedial Tutoring During and After School Exhibited Expected Growth in Most Cases
- Teachers Who Have Taught for At Least 5 but not more than 15 years Appear to Have the Most Success in Teaching Reading as Shown By Scale Score Growth of Students in Their Classes
- Students Who Participated in Our Reading Incentive/Accelerated Reader Program Showed More Evidence of Growth Than Students Who Did Not Participate

CURRICULUM AND INSTRUCTION

In an effort to make changes in instruction in order to increase achievement, Nebo has elected to utilize the following strategies:

1. Implementation of “Saxon Phonics” Program in Grades K-2
2. Use of “Thinking Maps” in Grades K-6
3. Block Scheduling/Departmentalization of 6th Grade Classrooms
4. Staff Development Activity Involving Reading of Professional Literature on Improving Classroom Instruction Based on Research
5. Implementation of After-School Book Clubs for Higher Level Readers
6. Further Development of Reading Incentive Activity in Conjunction with Accelerated Reader Program

Nebo’s current reading programs and practices vary somewhat by grade level. The following chart summarizes the practices that are in place for each grade level based on teacher responses to interview questions and surveys. It is very important to note that although almost every grade level uses a basal text, the publisher of that basal text is different for almost every grade level in the school.

<p>Kindergarten</p>	<ul style="list-style-type: none"> • Emphasis on phonetic awareness through the use of Saxon Phonics programs. • Focus on Reading Readiness Skills • Provide Exposure to Text using Leveled Books depending on student abilities • Use of Title I Assistant to target students who are significantly lacking in readiness skills • Whole Group Instruction Including the weekly use of Thinking Maps • Continuous Assessment using Kindergarten Assessment and Running Records • Participation in school-wide incentive reading program
<p>First Grade</p>	<ul style="list-style-type: none"> • Continuation of Saxon Phonics Program, Readiness Skills, and Leveled Books • Provide Title I Services through “First Steps” Program as needed • Use of a variety of Small Group Guided Reading Sessions using basal texts based on student abilities • Whole Group Instruction including the weekly use of Thinking Maps • Continuous Assessment using 1st Grade State Assessment and Running Records • Participation in school-wide reading incentive program
<p>Second Grade</p>	<ul style="list-style-type: none"> • Continuation of Saxon Phonics Program • Whole group instruction including the weekly use of Thinking Maps • Reading Incentive Program using Accelerated Reader • Use of a variety of Small Group Guided Reading Sessions using basal texts based on student abilities
<p>Third Grade</p>	<ul style="list-style-type: none"> • Whole Group Instruction including the monthly use of Thinking Maps • Participation in school wide reading incentive program with strong emphasis on Accelerated Reader Program • Use of a variety of Small Group Guided Reading Sessions using basal texts based on student abilities • Use of at least 3 trade books for whole and/or small group instruction • Focus on and use of EOG formatted materials throughout the year and for 6

	weeks assessment purposes
Fourth Grade	<ul style="list-style-type: none"> • Whole Group Instruction including the monthly use of Thinking Maps • Participation in school wide reading incentive program with little emphasis on use of Accelerated Reader Program • Use of at least 2 trade books for whole and/or small group instruction • Use of Basal Text for Whole Group Instruction (This Basal Program includes leveled books that are not consistently used by this grade level) • Mid-year focus on EOG Formatted Materials
Fifth Grade	<ul style="list-style-type: none"> • Whole Group Instruction including the weekly use of Thinking Maps • Participation in Reading Incentive Program including the use of Accelerated Reader • Use of at least 3 trade books for whole and/or small group instruction • Use of Literature Circles and other small group guided reading sessions • Focus on EOG Formatted Materials throughout the year and for 6 weeks assessment purposes • Title 1 Assistant provides reading assistance as directed by classroom teacher • Use of after school "Book Clubs"
Sixth Grade	<ul style="list-style-type: none"> • Whole Group Instruction including the bi-monthly use of Thinking Maps especially in language arts classes • Participation in school wide reading incentive program with emphasis on Accelerated Reader Program • Use of at least 3 trade books for whole group instruction • Focus on EOG formatted materials especially in the last semester with EOG formatted tests each 6 weeks • Use of remedial reading teacher assistant to target low level 3 readers • Title I assistant provides inclusive support to 2 targeted level 2 students in each Language Arts Classroom • Modified "Block Scheduling" in which 2 out of 4 grade level teachers are responsible for language arts instruction

***All grade levels received extensive training in applying Marzano's Taxonomy of Inquiry (as seen in the North Carolina Standard Course of Study Thinking and Reasoning Skills sections) to their instructional strategies in the middle of the 2002-2003 school year. These levels of questioning and thinking have been**

easily correlated with the Thinking Maps program and have helped especially in the area of reading comprehension.

ACHIEVEMENT

Tables 2, 3 and 4 and the following graph show weaknesses as outlined by EOG Reading Test Score Analysis in the spring of 2000, 2001, and 2002. This data supports Nebo's need for focusing on strategies to increase reading achievement. It is also important to note that 4th grade reading scores have shown less growth for the past 3 years, whereas 5th grade has shown much improvement in student growth in reading for the past 2 years.

Table 1 contains the most recent EOG Reading Test Score Analysis for spring of 2003. These results show a significant increase in scale score growth across grade levels

Table 1 Reading EOG Test Score Analysis 2002-2003
(With 1 Year of Documented Thinking Maps Implementation and Follow-Up)

Grade Level	Percent of Students At or Above Grade Level	Scale Score Growth
3	80.8	10.1
4	87.3	4.7
5	90.6	6.9
6	82.8	3.1

Table 2 Reading EOG Test Score Analysis 2001-2002
(With 1/2 Year of Documented Thinking Maps Implementation)

Grade Level	Percent of Students At or Above Grade	Scale Score Growth
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	Level	
3	77.1	0.5
4	71.3	-2.7
5	80.2	1.3
6	74.7	-0.8

Table 3 Reading EOG Test Score Analysis 2000-2001
(Prior to Thinking Maps Instruction Implementation)

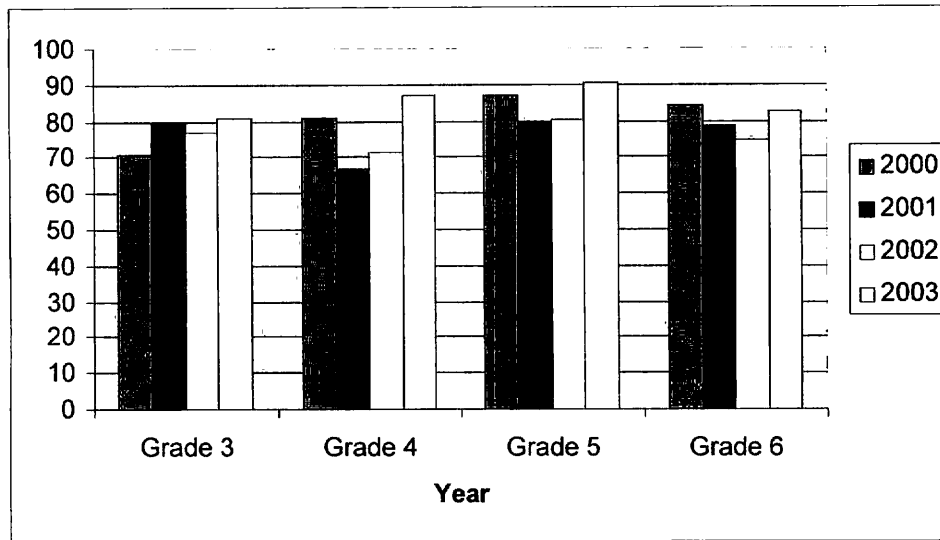
Grade Level	Percent of Students At or Above Grade Level	Scale Score Growth
3	80	1.3
4	67	-3.0
5	79.7	-0.6
6	78.7	-1.3

Table 4 Reading EOG Test Score Analysis 1999-2000
(Prior to Thinking Maps Training and Implementation)

Grade Level	Percent of Students At or Above Grade Level	Scale Score Growth
3	71	1.4
4	81	-2.1
5	86.9	1.9
6	84.3	0.4

Percentages of Students in Grades 3- 6 Scoring at a Level 3 or 4 on the NC End of Grade Test

2000-2003



The above graph shows the percentage of students at each tested grade level who scored at or above grade level over the past 4 years, Table 4, located below, “follows” groups of students as they progressed through individual grade levels.

Table 4: Targeted Scale Score Growth of Selected Student Groups’ Progression Through Grade Levels

Student Group	2000	2001	2002	2003
Group A	3 rd (+1.4)	4 th (-3.0)	5 th (+1.3)	6 th (+3.1)
Group B	4 th (-2.1)	5 th (-0.6)	6 th (-0.8)	NA
Group C	5 th (1.9)	6 th (-1.3)	NA	NA

TEACHERS

With a continual increase in student enrollment, Nebo usually acquires at least one new certified staff person each year. The following list shows the percentage of teachers within each category of experience:

- Initially Licensed -- 9%
- Less than 5 years of Experience -- 24%
- 5-10 Years of Experience -- 15%
- 11-15 Years of Experience -- 27%
- 16 –20 Years of Experience --3%
- Over 20 Years of Experience --24%

SCHOOL CLIMATE

Many students who attend Nebo, especially those in grades 4 through 6 who have not reached grade level benchmarks and achievement levels in reading, have negative attitudes toward reading which puts an increasingly larger number of them at risk for failure in reading. Several incentive programs have been implemented to assist in the development of reading skills and attitudes necessary for achievement of reading goals. Nebo's climate supports the promotion of reading across grade levels and content areas through the use of such programs as the "Go for the Gold" reading incentive program which encourages students to read a selected number of books or page numbers as assigned by their grade level in order to meet monthly goals and gain rewards. Restructuring of the Title 1 Program so that assistants are working directly with small groups of students within the context of the regular classroom reading instruction also allows targeted students to be a part of the regular classroom and at the same time receive the extra help they need. The implementation of Book Clubs provides exposure to quality literature with after-school book discussion groups based on student choice. The staff is committed to providing an atmosphere at the school that supports a love of reading and a variety of opportunities for students with diverse abilities to feel and be successful.

II. METHODOLOGY

The purpose of this action research project is to determine the impact of the “Thinking Maps” program on the instructional practices of all certified staff and student achievement in grades 3 through 6 at Nebo Elementary School. The data collection procedures are outlined below.

Research Questions	Data Collection Strategy	Criteria	Timeline
To what extent do teachers utilize Thinking Maps as an instructional strategy for increasing reading comprehension skills and achievement?	<ul style="list-style-type: none"> Teacher Thinking Maps Needs Assessment Survey Student Thinking Maps Survey Teacher and Student Interviews 	To what extent do teachers use thinking maps in their instructional practices? (How often are they used? How many maps are used? What subjects are maps used in? What are teacher perceptions related to Thinking Maps?)	<p>Distribute Teacher Surveys in January</p> <p>Conduct informal interviews related to survey questions as time permits</p> <p>Do student surveys and interviews related to survey questions in grade level specific groups in January and February</p>
To what extent will the utilization of Thinking Maps increase student achievement on the EOG Reading Test in Grades 3-6?	<ul style="list-style-type: none"> EOG Reading Test Scores from: 2001 (Prior to Thinking Maps Implementation) 2002 (With _ year of Thinking Maps Implementation) 2003 (With 1 full year of implementation) 	Analysis of end of grade reading test scores and comparison of scores to the extent of teacher implementation of Thinking Maps as an instructional strategy	<p>Will use scores from 2000, 2001, 2002 for analysis immediately</p> <p>Follow up with 2003 scores for complete analysis in May/June</p>
To what extent will student independently utilize Thinking Maps as part of their personal reading comprehension strategies?	<ul style="list-style-type: none"> Student Surveys and Interviews Student Work Samples Teacher Interviews 	How often do students choose to independently use Thinking Maps as a reading comprehension strategy? Do student work samples show examples of this utilization?	<p>Distribution of surveys in Jan/Feb</p> <p>Analysis of Responses Feb/March</p> <p>Observation of work samples and student portfolios</p>
Research Questions	Data Collection Strategy	Criteria	Timeline
Does the use of Thinking Maps affect students of varied abilities differently in	<ul style="list-style-type: none"> Student and Teacher Surveys and Interviews 	How do teachers rate the benefits of Thinking Maps among sub groups such as	Distribution and Analysis of Survey Responses by Feb/ March

terms of success on the Reading EOG?	<ul style="list-style-type: none">• EOG Test Scores• Student Work and Portfolios Examples	ESL, AIG, Learning Resource, etc? How do students in those sub groups respond to survey questions and show use of Thinking Maps in work samples?	
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III. PROJECT FINDINGS

Research Question 1: To what extent do teachers utilize Thinking Maps as an instructional strategy for increasing reading comprehension skills?

Using the Teacher “Thinking Maps Needs Assessment Survey” (See Appendix) data was collected related to the extent to which teachers used Thinking Maps as part of their instructional practices. Special attention was given to teachers’ use in Reading and Content Areas that required strong reading skills. The chart in the Appendix shows teacher responses to survey questions. It is important to note that there are 33 certified staff members at Nebo Elementary School, however only 19 of them participated in the survey. Therefore, responses reflect the practices, views, and perceptions of only 58% of certified staff members at the school.

Teacher responses to survey questions indicated the following:

- **58%** of the teachers surveyed used Thinking Maps **weekly** as an instructional strategy
- **32%** of the teachers surveyed used Thinking Maps at least **once a month** as an instructional strategy
- **11%** of the teachers surveyed used Thinking Maps **daily** as an instructional strategy
- **Grades K-2** and **grade 5** teachers practiced using Thinking Maps more often than other grade levels
- Teachers who used Thinking Maps the most indicated that they used them most often in **Reading and Writing** Instruction
- **53%** of the teachers surveyed felt that Thinking Maps were **very effective** in increasing Reading Comprehension Skills
- **32%** of the teachers surveyed felt that Thinking Maps were **somewhat effective** in increasing Reading Comprehension Skills

In interviews and open-ended survey questions, teachers indicated that they felt that there were significant benefits in using Thinking Maps to increase student thinking and higher level comprehension skills; however, many felt that they had not been able to successfully implement the use of Thinking Maps in their classroom.

Data from interviews and surveys show that teachers with **less than 5 to 10 years** are more likely to attempt to incorporate new programs such as Thinking Maps into their instructional strategies. They were also more willing to participate in the survey and interview process and showed interest in the effects of their practices on student achievement.

Seventy-Five Students from Grades 3-6 also completed surveys and answered informal interview questions related to the surveys given. Their responses are broken down by grade level to allow analysis of scores versus implementation of the Thinking Maps Program. Student responses were as follows:

Grade 3:

- **87%** of the students survey reported using Thinking Maps **Monthly**
- **13%** of the students surveyed reported using Thinking Maps **Weekly**
- The majority of these students (98%) reported using Thinking Maps most often in **writing** lessons.

Grade 4:

- **85%** of the students surveyed reported using Thinking Maps with their teacher **monthly**
- **15%** of the students surveyed reported using Thinking Maps with their teacher **weekly**
- Survey results indicated that Thinking Maps were used equally among **Reading and Writing Lessons**

Grade 5

- **20%** of the students surveyed reported using Thinking Maps with their teachers **monthly**
- **80%** of the students surveyed reported using Thinking Maps with their teachers **weekly**
- The majority of these students reported that Thinking Maps were used equally among **Reading, Writing and Reading in the Content Areas of Social Studies and Science**

Grade 6

- **65%** of the students surveyed reported using Thinking Maps with their teachers **monthly**
- **35%** of the students surveyed reported using Thinking Maps with their teachers **weekly**
- The majority of the students surveyed used Thinking Maps most often in **Reading and Writing**. It is important to note that this grade level uses a blocking practice in which 2 of the 4 teachers are responsible for language arts instruction. Students indicated that Thinking Maps were used only in their Language Arts classes.

Generalizations about Thinking Maps Taken from All Students Surveyed in Grades 3-6:

- When asked to indicate the ways in which teachers should use Thinking Maps to help them, students responded in a variety of ways that included almost all of the choices given in the question (See Student Survey Question #5 in Appendix). Students were given the opportunity to indicate that Thinking Maps should not be used at all by making no choice on question # 5. None of the students chose to decline to make choices indicating that all students surveyed feel that Thinking Maps are helpful when used in instruction.
- It is important to note that only 2 students of the 75 who were surveyed indicated that Thinking Maps were helpful in Math instruction. All other subjects seemed to benefit from the use of Thinking Maps as seen by the students.

- Student Comments related to Reading and Thinking Maps included:

"They [Thinking Maps] help me especially in Reading"

"They [Thinking Maps] help you break down the story"

These comments were made by At-Risk students who participate in remedial reading programs.

- AIG Students across all grade levels reported that they did not like using Thinking Maps and/or thought they were not helpful.

Research Question # 2: To what extent will the utilization of Thinking Maps increase student achievement on the EOG Reading Test in Grades 3-6?

Using information gained from answers to Research Question # 1, a comparison has been made of grade level achievements versus extent of Thinking Maps

implementation. Grades that reported the most consistent use of Thinking Maps in their reading programs, clearly showed the most EOG Scale Score Growth.

Table 5: Relating Thinking Map Usage to Student Achievement*

Grade Level	Frequency of Thinking Maps Usage	Percentage of Students Scoring At or Above Grade Level in 2001	Reading Scale Score Growth	Percentage of Students Scoring At or Above Grade Level in 2002	Reading Scale Score Growth	Percentage of Students Scoring At or Above Grade Level 2003	Reading Scale Score Growth
5	Weekly	79.7	-0.6	80.2	1.3	90.6	6.9
3	Bi-Monthly	80	1.3	77.1	0.5	80.8	10.1
6	Bi-Monthly	78.7	-1.3	74.7	-0.8	82.8	3.1
4	Monthly	67	-3.0	71.3	-2.7	87.3	4.7

*Grade levels are ranked in the chart with the grade level utilizing Thinking Maps most frequently and consistently at the top.

It is important to note that the scores used above were taken from the 2001-2002 year in which only four of the eight Thinking Maps had been implemented into classroom practices. However, it should be cited that much emphasis was placed on their implementation during those 5 months with several follow up discussions of Thinking Map usage at faculty meetings and many opportunities to share examples from all grade levels. Scores from 2001 allow for a comparison of growth in these grade levels prior to Thinking Maps training and/or implementation.

Grade 5 clearly shows higher scale-score growth than other grade levels. This grade level also clearly indicated in teacher and student surveys that they had adapted the use of Thinking Maps easily into their reading programs and used the maps consistently and more frequently than other grade levels. It is also important to note that third graders were second highest in terms of scale score growth. Although their third grade teachers did not appear to use Thinking Maps as much in reading instruction, K-2 teachers reported using the Maps consistently and on a weekly basis --- a practice that students could easily carry from one grade level to the next.

Also included in the chart are scores from the 2002-2003 school year to allow for a continued comparison of growth in the various grade levels related to the consistency of Thinking Maps implementation. It is very clear that the school has increased the frequency and consistency with which all of its staff members utilize Thinking Maps, however, grade levels that previously indicated a greater usage of the Maps continue to show increased student performance in the area of reading achievement.

Research Question #3: To what extent will students independently utilize Thinking Maps as part of their personal reading comprehension strategies?

A random sample of students was chosen to complete a student survey and interview. This sample included a total of 75 students with 5 from each 3rd, 4th, 5th, and 6th grade classroom. Teachers were responsible for making student selections and each class sample included a variety of sub groups including average, AIG, Learning Resource, Title 1 and ESL students. The student survey and interview indicated the following:

- **13%** of the students in the 3rd Grade indicated that they **used Thinking Maps on their own** and without their teacher asking them to in order to complete an assignment
- **87%** of the 3rd Grade students **NEVER used Thinking Maps on their own** and without their teacher asking them to in order to complete an assignment
- **3%** of the 4th Graders **used Thinking Maps on their own** and without their teacher asking them to in order to complete an assignment
- **97%** of the 4th Graders **NEVER used Thinking Maps on their own**
- **35%** of the 5th Grade students surveyed reported that they **used Thinking Maps on their own** and without their teacher asking them to in order to complete an assignment
- **65%** of the 5th Grade students surveyed reported that they **NEVER used Thinking Maps on their own** and without their teacher asking them to in order to complete an assignment
- **100%** of the surveyed 6th Grade students indicated that they **NEVER used Thinking Maps on their own** and without their teacher asking them to in order to complete an assignment

Based on these findings evidenced in surveys distributed in January 2003, it is evident that most students in Grades 3-6 at Nebo Elementary have not internalized the practice of using Thinking Maps independently as a learning tool or strategy. In order to get a more accurate assessment of independent student usage, it will be important to closely examine student work samples and/or portfolios.

Research Question #4: Does the use of Thinking Maps affect students of varied abilities differently in terms of success on the Reading EOG Test?

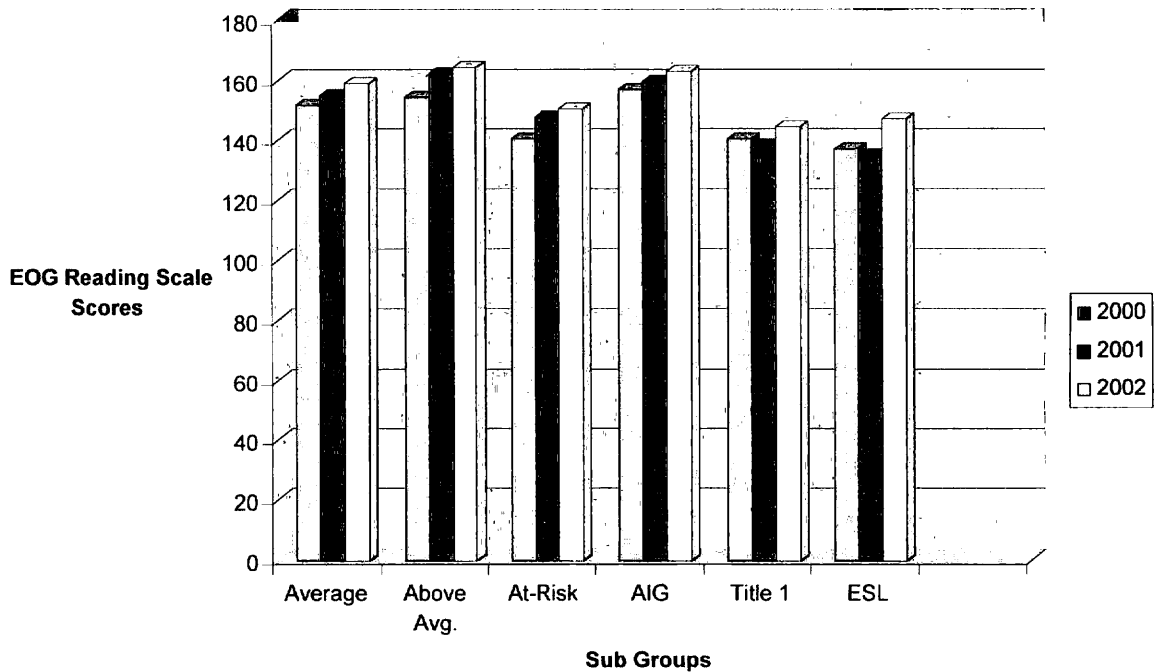
In order to address answering this question, a group of 20 sixth-grade students were selected. This group allowed a closer analysis of Reading EOG Test scores from the years 1999-2002 because these students had taken the test as 3rd graders, 4th graders and 5th graders. This sample group was chosen from four different sixth grade classrooms and students levels were indicated by teachers using the following labels: Average, Above Average (Not AIG), AIG, Learning Resource, At-Risk (This could be related to achievement levels, attendance issues, behavior, and motivation), ESL, and Title 1. The charts and graphs below indicate the findings.

Table 5: Student Sub Group EOG Reading Test Score Analysis

Student	2000 3rd Grade Reading EOG Scale Score (Before Thinking Maps)	2001 4th Grade Reading EOG Scale Score (Before Thinking Maps)	Growth Measured	2002 5th Grade Reading EOG Scale Score (With _ Year of Thinking Maps)	Growth Measured
Student 1(Avg)	156	160	+4	162	+2
Student 2(Resource)	137	145	+8	150	+5
Student 3 (Above Avg)	157	157	-	161	+4
Student 4 (At-Risk)	157	163	+6	162	-1
Student 5 (Retained-Gr. 4)	133	146	+13	146	-
Student 6 (Resource)	142	143	+1	150	+7
Student 7 (Avg)	153	159	+6	162	+3
Student 8 (AIG)	152	153	+1	161	+8
Student 9 (AIG)	160	169	+9	168	-1
Student 10 (AIG)	158	161	+3	163	+2
Student 11 (AIG)	162	164	+2	165	+1
Student 12 (Title 1/ESL)	137	135	-2	147	+12
Student 13 (Avg)	143	145	+2	153	+8

Student	2000 3 rd Grade Reading EOG Scale Score (Before Thinking Maps)	2001 4 th Grade Reading EOG Scale Score (Before Thinking Maps)	Growth Measured	2002 5 th Grade Reading EOG Scale Score (With _ Year of Thinking Maps)	Growth Measured
Student 14 (Resource)	124	134	+10	Computer Adaptive Test	
Student 15 (Title 1)	143	141	-2	147	+6
Student 16 (AIG)	151	152	+1	156	+7
Student 17 (At-Risk)	151	152	+1	156	-
Student 18 (At-Risk)	140	140	-	154	+14
Student 19 (Above Avg)	151	161	+10	166	+5
Student 20 (Avg)	153	156	+3	159	+3

Student Sub Group Achievement



- **AIG students** felt that Thinking Maps helped them most in the area of Writing with Social Studies and Reading taking 2nd and 3rd places in the ranking. They felt that Thinking Maps should be used sparsely as an instructional strategy.
- **ESL and Title 1 Students** felt that Thinking Maps helped them most in Writing.
- **Average Students** indicated that Thinking Maps were most helpful for them in Reading
- **Above Average Students** felt that Thinking Maps helped most in content areas such as Social Studies and Science
- **Learning Resource Students** had more exposure to Thinking Maps because their resource teacher uses them. These students used maps to help them in Reading.
- **At Risk Students** felt that Thinking Maps helped them most in Reading and this group indicated that teachers should use maps in a wide range of activities (see Question # 5 on student survey in Appendix). This group seemed to be the strongest advocates for teacher use of the Thinking Maps program.

*** It is important to indicate that in the year 2002-2003, as No Child Left Behind Legislation required examining the performance of sub groups within the nation's schools, Nebo Elementary had 15 targeted goals within the following sub group areas: all students, white students, economically disadvantaged students, and students with disabilities. The school met 15 out of 15 (or 100%) of the target goals and, therefore, met Adequate Yearly Progress as defined by the NCLB legislation.**

IV. IMPLICATIONS

By examining and analyzing a variety of data, inferences and conclusions related to the true extent to which teachers and students at Nebo Elementary have grasped the use of Thinking Maps have been made. The school can truly begin to assess the effectiveness of the use of Thinking Maps and the extent to which students' achievements are increased. It is very apparent that some grade levels and/or teachers place a greater emphasis on the use of the Thinking Maps program as it relates to student achievement and success. It is evident that student achievement has been affected by the use of Thinking Maps, and for that reason it is important that Nebo Elementary commit to a further study of the effects of the utilization of Thinking Maps within their instructional practices. With this study comes the need to honestly assess the current practices and strategies for using Thinking Maps with students and to make the changes necessary to encompass the Thinking Maps program within Nebo's goals to improve student achievement. It is also apparent that teacher perceptions of the effects of using Thinking Maps are somewhat different than student perceptions and ultimately student performance especially when looking at sub group analyses. Sub groups of students have been affected differently---a fact that cannot be dismissed. This will be an important consideration with the No Child Left Behind accountability model. Nebo's faculty must commit themselves to getting the maximum benefit from a proven worthwhile program.

Reflections/ Implications After Findings of Original Report:

The original findings were an “eye-opener” for teachers, administrators and trainers. The project allowed us to see that Thinking Maps can and do increase student achievement and that we needed to assess and redirect our focus on the use of the maps as well as our follow-up practices and staff development so that all grade levels, teachers and students were using the Maps effectively and consistently.

V. NEXT STEPS

To truly assess the effects of Thinking Maps Program on Student Achievement, it will be important to follow up with a careful analysis of this year’s EOG scores as this is the first full year of using all eight of the Thinking Maps in providing instruction. Nebo’s faculty and/or School Improvement Team, must develop long range and on going plans for implementing and using Thinking Maps to the fullest so that students can gain the maximum benefits. It will be important to provide professional development related to Thinking Maps such as the follow up sessions that were part of the school’s initial training. Teachers need to understand and be given opportunities to develop important connections between the use of Thinking Maps and reading instruction so that students can do the same. Nebo must address WHY its teachers feel that they have not successfully implemented the use of Thinking Maps although most of them saw the program as being very effective. Staff members who are instrumental in providing reading instruction must decide if they are willing to truly commit to adopting the Thinking Maps program and then act upon that program adoption by continuously evaluating their practices related to Thinking Maps as well as student performance in the context of the program.

After carefully examining the results of this study and sharing our findings openly and honestly with the staff at Nebo Elementary, we made clear plans for more extensive follow-up training and staff development activities in order to increase

teacher knowledge of and comfort level when using the maps in their classrooms. The principal strongly encouraged the use of the maps by requiring grade level planning sessions so that teachers could work together to create and discuss ways of integrating the use of Thinking Maps into the day-to-day life of the school as well as teacher instructional practices. The school's trained trainer is also providing weekly support through the use of a "Thinking Maps" newsletter and brief sessions during the weekly faculty meetings. A walk down the halls of the school and into the classrooms shows effective, exciting uses of the maps. All grade levels have increased the frequency with which they use the maps and therefore, teachers and students are more easily internalizing the thought process connections encouraged by Thinking Map usage. The school has plans to issue teacher and student surveys for comparison in January of 2004.

Appendices

Thinking Maps Needs Assessment Teacher Survey



How often do you and your students construct a Thinking Map? (Circle One)

Daily Weekly Monthly

During a typical lesson, how many Thinking Maps do you and your students use? (Circle One)

One Two or Three Multiple Maps

MAP KNOWLEDGE

Complete the following tree map by classifying your comfort level with each map according to the categories given. You may add your own category as needed.

All of the Time Thinking Maps I Use Rarely or Never
Some of the Time

CONTENT APPLICATIONS

Rank the content areas that you use Thinking Maps from (1) for the most often to (5) seldom/never.

____ Reading ____ Other (Please Specify _____)
____ Math
____ Science
____ Social Studies
____ Writing

EFFECTIVE INSTRUCTION

How do you use Thinking Maps? Circle any that apply.

Morning Warm-Up

Other _____

Review

During Direct Instruction

Student Processing

Teacher Directed Whole Group

Small Groups

Projects/Reports

Assessment

How effective do you feel Thinking Maps are in increasing the Reading Comprehension Skills of your students? (Circle One)

Very Effective

Somewhat Effective

Not Effective

Unsure

In your opinion and based on student performance in your classroom, do you find that Thinking Maps affect students of varied abilities differently? If so, please rank the following groups according to this effect with (1) for the group who appears to benefit most from the use of Thinking Maps to (5) for the group who seems most unaffected.

_____ Academically Gifted

_____ Learning Resource

_____ ESL

_____ Unmotivated Students

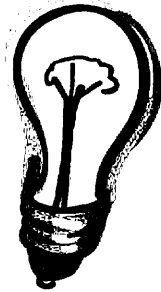
_____ Title I

_____ Other (Please describe _____)

COMMENTS:

Name _____ **Grade Level** _____

*Survey Modified from Survey Distributed by Innovative Sciences, Inc. 2001



**We Want to Know What YOU Think About “THINKING MAPS”!
Please complete this Student Survey.**

How often do you and/or your teacher create a Thinking Map in your classroom? (Circle One)

Every Day Once or Twice a Week Once or Twice a Month

In a usual lesson, how many Thinking Maps do you and your teacher use?

One 2 or 3 More than 3

Think about the Thinking Maps that you have been taught to use. In the tree map below please fill in the spaces by listing the 8 Thinking Maps in the branch of the tree that best shows how often you use each map.

Thinking Maps I Use

All of the Time

Some of the Time

Not Often or Never

Think about the subjects that you have in school. In which subject does using Thinking Maps help you the most? Put a 1 beside that subject. In which subject does Thinking Maps help you the least? Put a 5 beside that subject. Fill in the other subjects with the numbers 2-4 depending on how much Thinking Maps help you in that subject.

_____ Reading
_____ Math

_____ Social Studies
_____ Writing

_____ Science

How often do you use Thinking Maps, on your own and without your teacher asking you to, in order to complete an assignment? (Circle One)

Every Day Once or Twice a Week At Least Twice a Month Never

How Do You Think Teachers Should Use Thinking Maps to Help You? Circle all of the Ways that You Agree Should Be Used.

- To Introduce a New Lesson
- To Review
- To Help You Prepare for a Test
- To Teach a Lesson
- To Check Your Understanding of a Lesson
- As a Test
- As a Project
- In Group work
- In Individual Assignments
- In Reading
- In Math
- In Science
- In Social Studies

Please tell us any information that you think we should know about what you think about THINKING MAPS.

Name _____ Grade _____ Teacher _____

*Survey Modified from Survey Distributed by Innovative Sciences, Inc. 2001

Results of Teacher Surveys

Teacher/Grade Level	Frequency of Use	% of Students Passing Reading EOG in 2002	*Most Frequently Used Maps	*Rarely Used Maps	Reading Ranking in Terms of Use of TM	How TM are Used in Instruction	Effectiveness	Student Sub Group that Benefits the Most	Student Subgroup that Benefits the Least
T. Gaddis/ Resource	Monthly	NA	C,B, MF,DB	BRA	2	Direct & Sm. Group	Very	Learning Resource	ESL
W. Gaffigan/Guidance	Monthly	NA	C,B,DB,F	BRA	NA	Review, Direct & Sm. Group	Very	Learning Resource	Title I
G. Young/ AIG	Monthly	100%	DB,T,BR	C,MF	1	Review, Direct, Sm. Group	Somewhat	No Comment	No Comment
J. Robinson/K	Weekly	NA	Circle	DB,MF,BR	1	Review, Direct, Student Processing	Very	Unmotivated	Title 1
M. Bristol/K	Weekly	NA	Circle	T	1	Warm-Up, Review, Direct Whole & Sm. Group	Somewhat	ESL	AIG
M. Bradley	Daily	NA	C, T,F, B	BRA, MF	2	Review, Direct Whole & Sm. Group, Student Proc.	Somewhat	Learning Resource	Unmotivated
M.Milliren/1	Bi-Weekly	NA	C,B,DB, BR,F	BRA, MF	2	Direct, Sm. Group, Student Processing	Unsure	AIG	Unmotivated
S. Brewer/2	Daily	NA	T,F,B,DB,C	None	1	Review, Direct, Student, Projects	Very	AIG	Unmotivated
P. Blanton/2	Weekly	NA	DB,C	BRA, MF	2	Direct Whole Group	Very	Resource, Unmotivated, ESL	None
C.Creson/2	Weekly	NA	C,B, F,T,DB	None	2	Whole & Sm. Group			
A. Helms/4	Monthly	72.7	B,DB	BRA, BR, MF	4	Whole & Sm. Group	Not	AIG	Unmotivated
L.Neal/4	Monthly	73.9	C,B,DB	BRA,MF,BR	1	Direct, Student, Whole & Sm. Group	Somewhat	AIG	Learning Resource

Teacher/Grade Level	Frequency of Use	% of Students Passing Reading EOG in 2002	*Most Frequently Used Maps	*Rarely Used Maps	Reading Ranking in Terms of Use of TM	How TM are Used in Instruction	Effectiveness	Student Sub Group that Benefits the Most	Student Subgroup that Benefits the Least
J. Slone/4	Weekly	68.2	C, B, DB	BRA, BR, MF	1	Warm-Up, Review, Direct Whole & Sm. Group, Projects.	Very	AIG	Unmotivated
M. O'Neill/4	Weekly	70	C,DB,F,B	BRA, MF	1	Warm-up, Student Processing, Sm. Group, Assessment	Very	AIG	Unmotivated
L. Boggs/5	Weekly	77.3	C,B,DB,T	BR, F, MF	4	Direct Whole & Sm. Group, Student Processing	Somewhat	AIG	Unmotivated
T. Dayton/5	Weekly	79.2	C,B,DB,F,T	MF, BRA	2	Student, Whole & Sm. Group	Somewhat	Learning Resource	Unmotivated
S.Pool/5	Weekly	69.6	B,DB,BR	MF, BRA	1	Student, Direct, Projects	Very	Unmotivated	Title 1
M. Elliott	Weekly	95.5	C,B, DB, T, F, MF	BRA	2	Review, Direct, Whole Group, Projects, Assessment	Very	Learning Resource	AIG
R. Fleming	Weekly	88	C, B,DB,F	BR, BRA	2	Review, Direct, Whole & Sm. Group	Very	Title 1	ESL

*Thinking Maps in these sections are coded with a C for circle maps, B for bubble maps, DB for double bubble, T for tree, F for Flow, MF for Multi-Flow, BRA for brace, and BR for bridge maps.

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