



PROJECT CRISS®: EVIDENCE OF EFFECTIVENESS

BY CAROL M. SANTA, PH.D.

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Project CRISS, **CR**reating **I**ndependence through **S**tudent-owned **S**trategies, is an interdisciplinary program which helps teachers incorporate reading, writing, and studying strategies into their regular content instruction. This report summarizes a major research project examining the effects of Project CRISS in several Utah school districts during the 2001-2002 and the 2002-2003 academic years. The studies were conducted by an outside educational agency, O'Neil & Associates.

BACKGROUND INFORMATION

Project CRISS was originally developed in the late 1970s by Dr. Carol Santa and a team of elementary, middle, and high school teachers from Kalispell School District #5 in Montana. Lynn Havens, a former Kalispell secondary math and science teacher and a member of the original development team, has served as the Project CRISS Director and co-author of CRISS materials for nearly twenty years.

Project CRISS received approval by the National Diffusion Network program in 1985 and again in 1993. The program continues to be revised to incorporate new techniques and research about learning processes. Based on principles of cognitive psychology and brain research, it is designed for all learners. The program has been used effectively across the curriculum in elementary classrooms and in middle and high school math, science, social studies, language arts, fine arts, technology, and physical education classes. It has been equally successful in urban and rural settings.

Basically, Project CRISS is a professional development program for teachers designed to help students in grades 3-12 become more proficient readers, writers, and learners. Teachers incorporate CRISS principles and philosophy as part of their regular classroom instruction. Project CRISS is based on the philosophy that comprehension and learning can be improved when students build on prior knowledge and are actively involved in the learning process through organizing information, discussion, and writing. Students incorporate this philosophy as they apply strategies for learning content and gain a metacognitive understanding of when and how to use them. After students become comfortable with the strategies, their teachers encourage them to select their own learning goals and to use the strategies that work best for them. Through common vocabulary and activities, CRISS works to integrate curriculum across content and grade levels.

STAFF DEVELOPMENT

A twelve to eighteen-hour in-service training prepares teachers and administrators to implement Project CRISS principles and instructional strategies within their own curriculum. The workshop is organized around a set of CRISS Strategic Learning Plans that serves to integrate principles and strategies.

Participants learn ways to help their students interact with text, understand patterns and structures, have productive discussions, engage actively in the learning process, organize for learning, write to learn, write reports and essays, and learn new vocabulary. Teachers also learn how to help students become more reflective (metacognitive) about their learning processes. By having process conferences as part of instruction, students begin to see how they can apply strategies in a flexible manner and how to monitor their learning.

Participants in Project CRISS workshops receive a teacher resource guide (over 300-page book) that assists them in developing learning plans within their classroom contexts. During the workshop, teachers experience how the CRISS principles and strategies fit into these CRISS Strategic Learning Plans.

RESEARCH STUDY

During the 2001-2002 and 2002-2003 school years, O'Neil & Associates, an independent contractor, conducted extensive evaluations of Project CRISS in two large Utah school districts: Granite School District and Iron County School District. The first year study (2001-2002) included experimental and control schools at the elementary school level (grade 4), middle school level (grade 7), and high school level (biology classes) in Granite School District. During the 2002-2003 academic year, the study encompassed other content classrooms (social studies and English classes) in Granite School District and included a replication study in Iron County School District involving high school level English and earth science classes.

As will be noted in the "Results and Discussion" section of this report (page 5), the outcomes from each of these studies were remarkably consistent. Students in the experimental groups, regardless of grade level or subject, consistently demonstrated more improvement in learning from text than did control students.

PARTICIPANTS AND SETTING

The following tables identify the experimental and control classrooms participating in the studies by grade levels and content areas.

Granite School District, First Year Study (2001-2002).

Experimental

Control

| | | |
|---------------|---|---|
| Elementary | Academy Park Elementary School Grade 4 | Bennion Elementary School Grade 4 |
| Middle School | Kennedy Junior High School Grade 7: Utah Studies | Jefferson Junior High School Grade 7: Utah Studies |
| High School | Hunter High School Biology | Granger High School Biology |

Granite School District, Second Year Study (2002-2003).

Experimental

Control

| | | |
|---------------|---|--|
| Middle School | Evergreen Junior High Grade 7: English | Bonneville Junior High Grade 7: English |
| High School | Granite High School Social Studies | Granger High School Social Studies |
| High School | Granite High School English | Granger High School English |

Iron County School District, First Year Study (2002-2003).

Experimental

Control

| | | |
|-------------|--|---|
| High School | Canyon View High School English | Cedar City High School English |
| High School | Canyon View High School Earth Science | Cedar City High School Earth Science |

EXPERIMENTAL PROCEDURE

All of the studies utilized the same pre-test and post-test experimental design. The experimental teachers attended a CRISS in-service training in the fall and incorporated the Project CRISS principles and strategies into their instruction for the remainder of the year. Teachers of the control classrooms did not attend a CRISS in-service training. All students took the test in the fall, before the experimental teachers had attended a CRISS workshop, and again in the spring, 7 to 8 months later. Consequently, the students in the experimental classes learned strategies for reading, writing, and learning as part of regular classroom instruction. Students in the control classrooms received no systematic instruction in learning strategies.

During the year, teachers in the experimental classes also participated in a variety of follow-up sessions held during and after school. These included from three to five after school sessions where teachers had opportunities to share ideas and talk about how they were implementing the project. Project CRISS staff facilitated some of these sessions. Experimental teachers also kept a binder of student examples documenting how students were implementing the principles and strategies.

Reading Assessment. Student evaluation included two consecutive days of testing in the fall and two consecutive days of testing in the spring. For both testing periods, the first day involved students at each of the grade levels reading age-appropriate selections (four to eight pages in length) on a science or history topic. Students read and studied the material by any method of choice. Time to read and study the selection varied by grade level from thirty minutes in grade 4 to forty minutes in junior high and high school. At the close of the reading period, all study materials were collected. The next day, students took a free-recall test where they wrote down all of the information they remembered from the selection. During this session, they did not have access to the reading selection they had read the previous day. The fall and spring testing situations were identical. Both experimental and control students read the same selections in the pre-tests and post-tests.

The assessment materials and procedures mirrored as closely as possible ordinary classroom practices where students are frequently asked to read and study an assignment followed by a test on the next day. Free-recall turns out to be a pure measure of comprehension and learning since there are no clues about content in the assessment procedure. With essay or multiple choice questions, the content of the questions can trigger memories for specific text information. With free-recall testing, all that students have are a pen or pencil and a blank sheet of paper, where they write down in list or phrase form anything they remember from the previous day's reading. Moreover, measuring student retention after a 24-hour delay provides an assessment of long-term retention which more closely reflects goals for learning in school.

CRISS Learning Strategies Survey. To determine the specific use of CRISS strategies, students in the experimental groups also responded to a CRISS Learning Strategies Survey administered during spring testing. After completing the free-recall test, the evaluator gave each student a survey to complete. Experimental student survey responses were summarized to determine strategy use and to examine how students were internalizing CRISS principles and philosophy. For Granite School District results see pages 10-12. Iron County School District results are in Appendix B.

In addition, experimental teachers completed a similar survey indicating the various aspects of the project they implemented in their classes. They took the survey twice—before participating in the CRISS workshop in the fall and again in the spring at the same time their students took the post-test. This information turned out to be important for determining what teachers knew about strategic instruction before beginning the project. Asking the experimental teachers to respond to the same survey at the end of the experimental period provided insights about changes in teaching perspective, as well as information about whether or not teachers were systematically implementing the project. The data from all of the junior high and high school experimental teachers in both the Granite School District and in the Iron County School District are summarized in Appendix A of this report.

One experimental class (high school mathematics) was dropped from the 2002-2003 study because answers to the pre-test and post-test surveys were virtually the same, indicating little teacher change. This lack of implementation became evident as the year progressed and was further documented by the teacher's responses to the survey taken in the spring. This problem was compounded by the small number of students in the class that had complete data sets. Due to attrition, only eight students had complete test protocols by the end of the year. Given both factors, the lack of implementation and the attrition, the researchers felt justified in dropping this class from the final analysis.

RESEARCH HYPOTHESES

The first hypothesis was that students in both experimental and control conditions would do somewhat better on the second test administered in the spring because of increased familiarity with the reading selection—they would be reading their designated articles for the second time. The second hypothesis was that gains in post-test performances would be more substantial for the experimental students because they used CRISS strategies for the prior 7 to 8 months and would apply this learning to the reading selections. The expectations were for significant Group-by-Trial interactions for the experimental groups. The final hypothesis was that the experimental students would use a variety of strategies while attempting to learn the information on the post-test reading selection.

SCORING

For each reading selection, scoring grids were developed which listed all probable content that could be recalled from the fourth grade, middle school, and high school reading selections. These grids were developed separately by two CRISS staff members who read each selection and listed the selection's content. Then, after independently making these content lists, they jointly decided which items would be included on the final scoring protocols. This process resulted in three different answer keys, one for each of the three age-appropriate reading selections.

Employees of O'Neil & Associates administered all the free-recall tests. One employee scored all of the free-recall assessments. This person scored the protocols blind—without knowing whether subjects were from experimental or control classrooms. Twenty percent of the free-recall protocols for each study were scored again by a second evaluator to verify scoring consistency. The interrater-reliability measures ranged from $r = 0.93$ to 0.95 , indicating consistent scoring agreement.

DATA ANALYSIS

Two classrooms taught by different teachers within a subject area or grade level participated in each of the experimental and control conditions. Combining classrooms was necessary for providing a sufficient number of subjects for each condition. In every experimental and control school, approximately one-fourth to one-half of the students participating in the fall pre-test were not available for the post-test the following spring because they had either moved, were absent, or had transferred to other classes. Therefore, it was necessary to combine classrooms within the same content area or grade level for all of the experimental and control classrooms. Only subjects with complete data sets (those taking both the pre-test and post-test) were included in the final analysis.

An Analysis of Variance (ANOVA) was run with "Test" (items recalled) as the dependent variable and "Group" (experimental versus control) and "Trial" (pre-test and post-test) as independent variables. The data for each study were submitted to a 2 (Group) x 2 (Trial) ANOVA with repeated measures on the Test factor.

RESULTS AND DISCUSSION

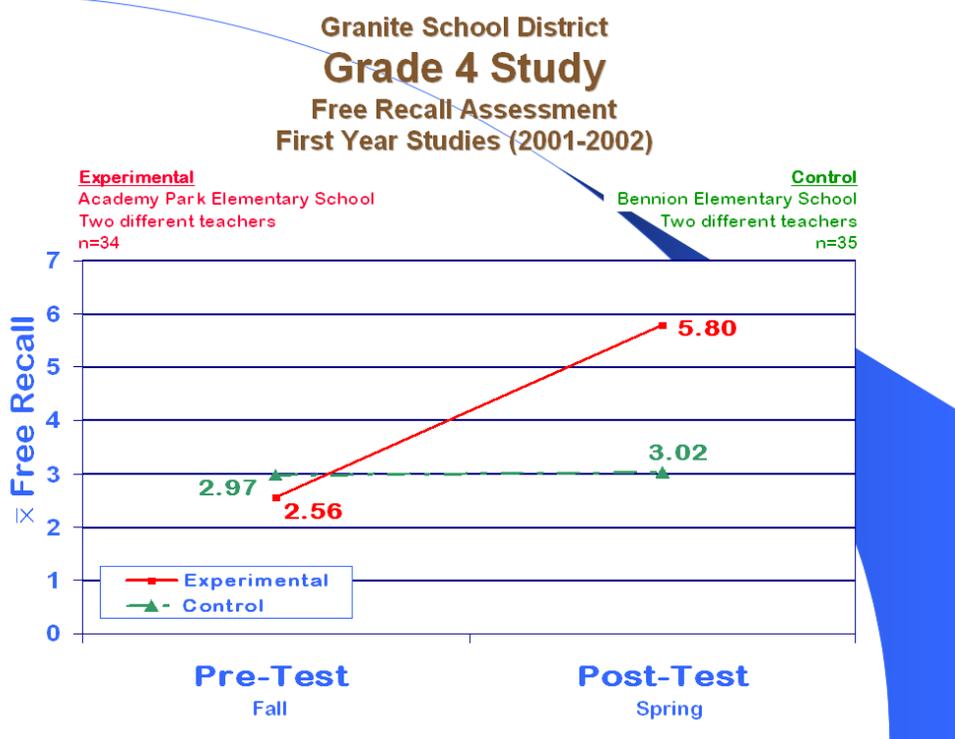
Teacher Effects. The experimental teachers responded to the Learning Strategies Survey before taking the CRISS workshop ("Pre-Test" results) and again at the end of the school year ("Post-Test" results). Summaries of the Pre-

Test and Post-Test experimental teacher survey responses (found in Appendix A) confirm that the experimental teachers implemented Project CRISS principles and teaching strategies during the study.

Student Effects. The results of the free-recall analysis for two years of studies in the Granite School District and one year of study in the Iron County School District are presented and discussed in the following text. Each study in the Granite School District is one year in length with different subjects in each study. As a result, this research includes a total of three one-year studies.

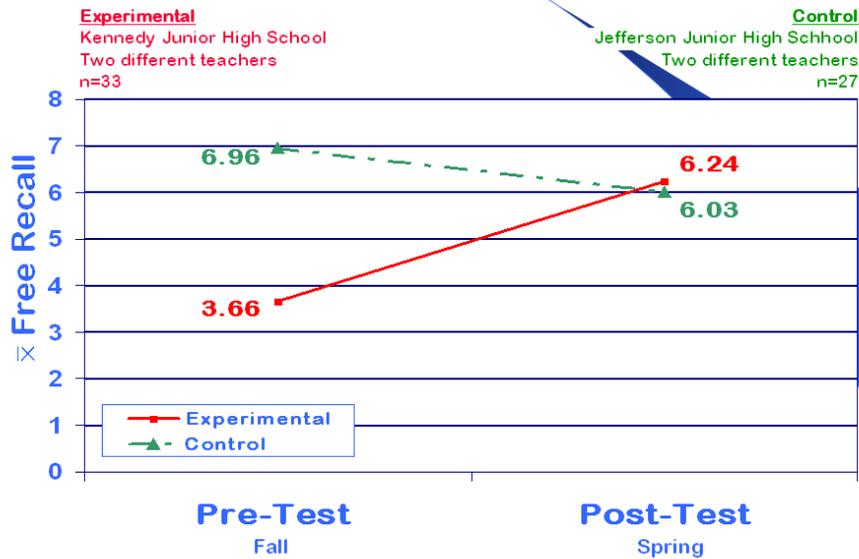
The results of the experimental students' response to the Learning Strategies Survey at the end of the school year (May 2003) for Granite High School, Granite School District, are presented on pages 10 through 12 and discussed on pages 13 and 14. The results of the same survey at the end of the school year (May 2003) for Canyon View High School, Iron County School District, are listed in Appendix B, at the end of this report.

Granite School District Student Results.



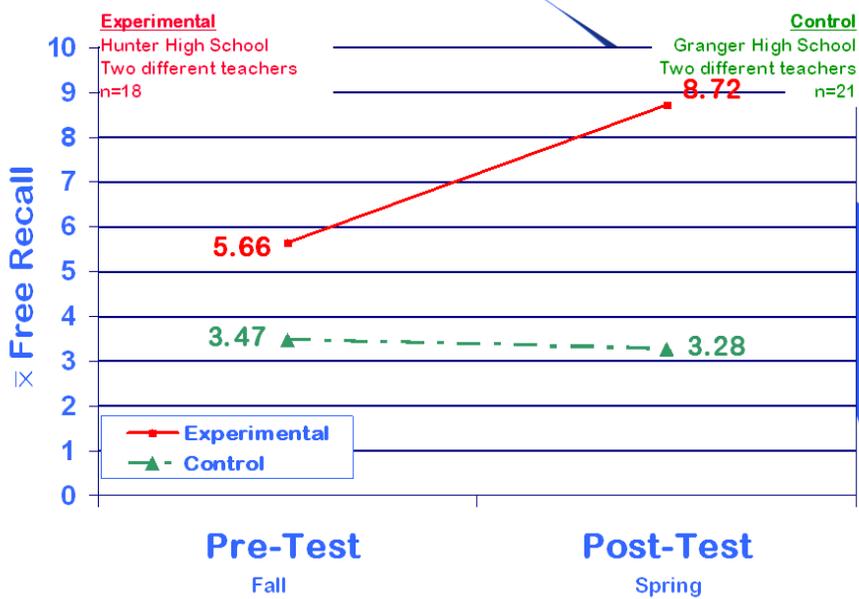
A significant difference was found between the experimental and control groups with the experimental group performing better on the free-recall measure. However, the effect worth noting is the significant Group-by-Trial interaction, $F(1, 67) = 24.38, p < 0.001$. As predicted, the fourth grade experimental students made significantly more gains in reading and learning content information than did their counterparts in the control classes.

Granite School District
Grade 7 Study: Utah Studies
Free Recall Assessment
First Year Studies (2001-2002)

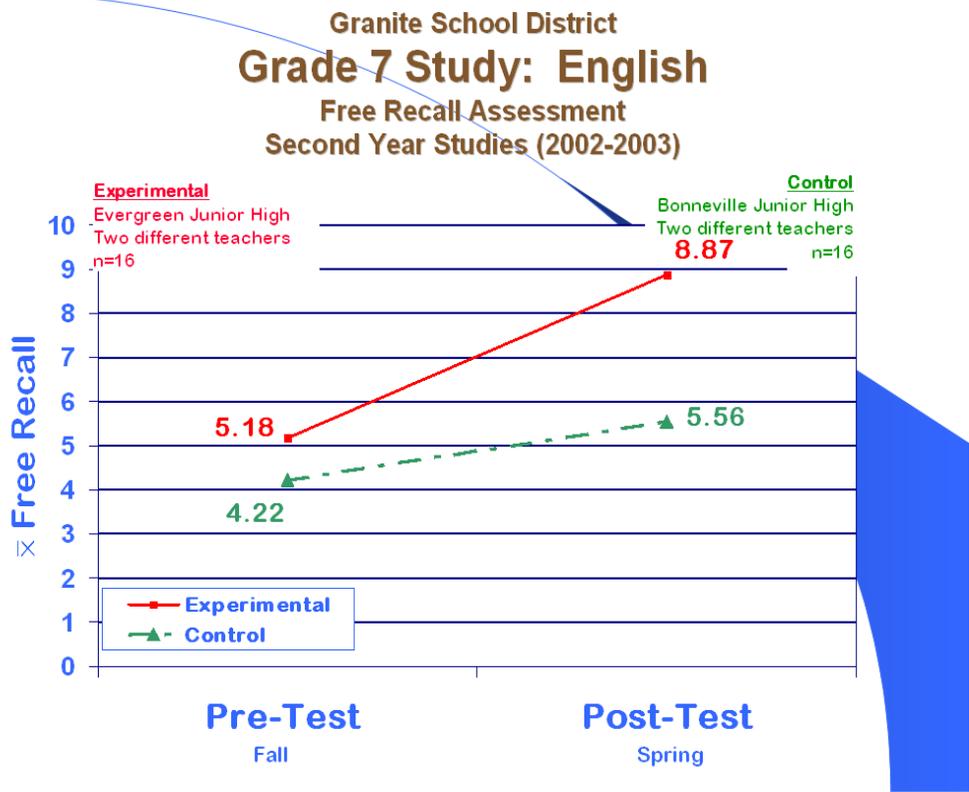


While the control classes began this study with a higher average score on the pre-test, this difference was no longer apparent in the post-test results. The experimental students, who initially performed considerably lower than the control students, surpassed the performance of the control group on their post-test. This again resulted in a significant Group-by-Trial interaction $F(1, 59) = 30.54, p < 0.0001$.

Granite School District
High School Study: Biology
Free Recall Assessment
First Year Studies (2001-2002)

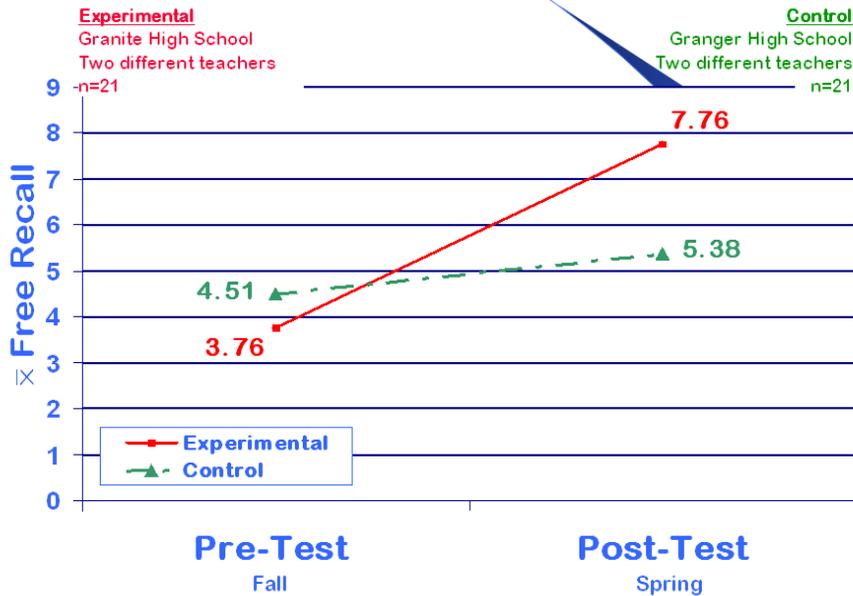


The data again indicate a more significant free-recall increase for the experimental students, $F(1, 37) = 23.01$, $p < 0.001$, than for the control students. The control group showed virtually no change in performance compared to the improvement made by the experimental group.



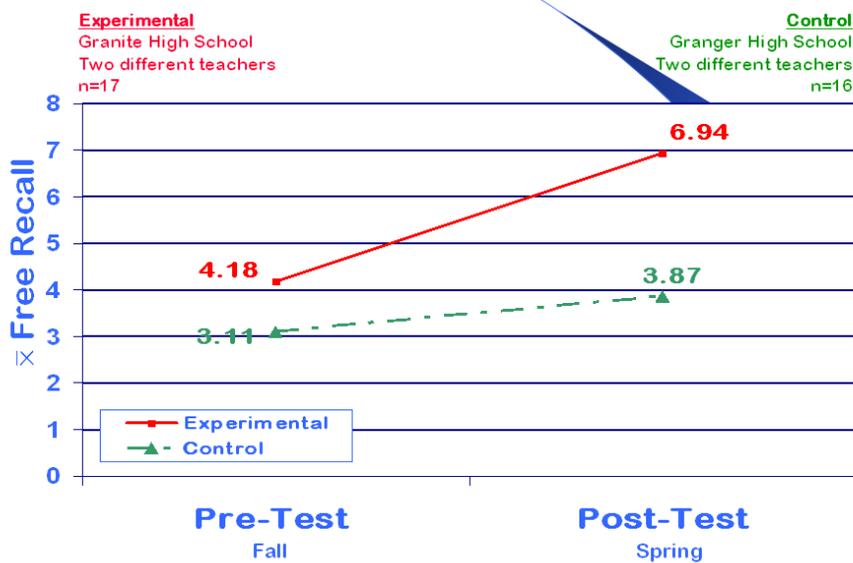
Again, the effect of interest is the significant Group-by-Trial interaction, $F(1, 35) = 4.22$, $p < 0.05$. The experimental group demonstrated significantly more improvement as measured by the free-recall assessment than did students in the control group.

Granite School District
High School Study: Social Studies
 Free Recall Assessment
 Second Year Studies (2002-2003)



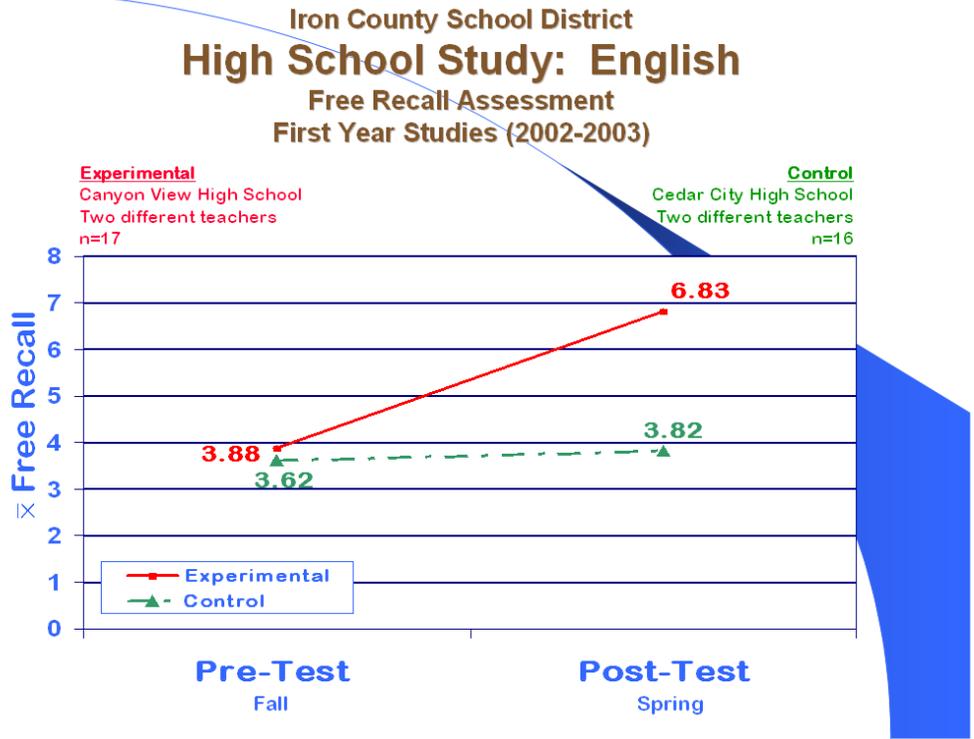
The experimental students made significantly more progress than did the control students as indicated by the Group-by-Trial interaction, $F(1, 36) = 11.8, p < 0.001$.

Granite School District
High School Study: English
 Free Recall Assessment
 Second Year Studies (2002-2003)



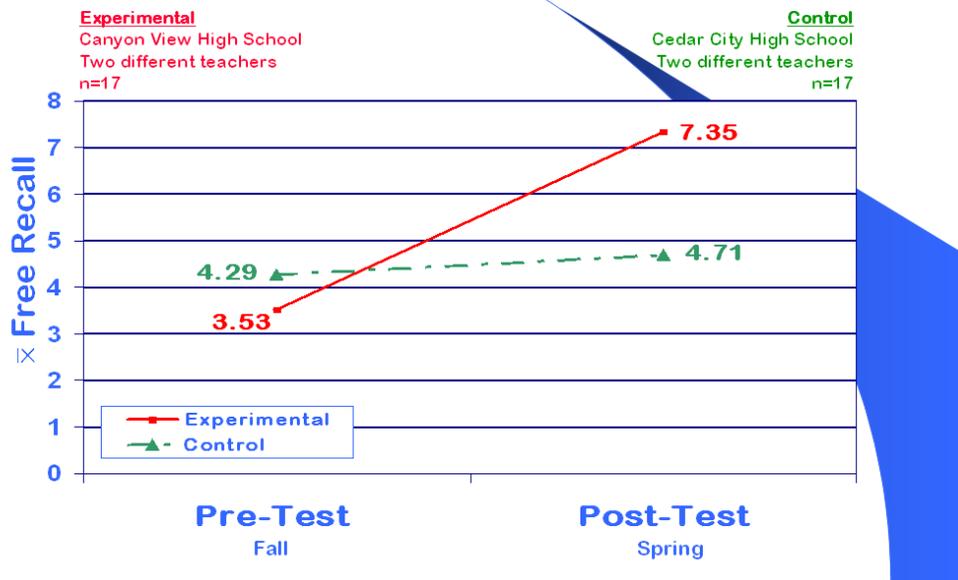
Students in the experimental group made significant growth in performance compared to the control group which showed no significant change: Group-by-Trial interaction, $F(1, 31) = 4.8, p < 0.04$.

Iron County School District Student Results.



Students in the experimental group made more improvement than did students in the control group as indicated by the significant Group-by-Trial interaction, $F(1, 31) = 16.23, p < 0.001$.

Iron County School District
High School Study: Earth Science
 Free Recall Assessment
 First Year Studies (2002-2003)



The ANOVA revealed a significant Group-by-Trial interaction, $F(1, 33) = 14.62, <0.001$ confirming that the experimental group made significantly more gains on the free-recall assessment than did the control group.

Discussion of Student Results. These data clearly show staff development offered by Project CRISS leads to improvement in reading comprehension and learning from text. Student effects are consistent irrespective of grade level and content area. Results are remarkably similar across nine different studies. Students participating in CRISS classrooms have learned strategies leading to improved comprehension and learning of content information.

One way to explain these effects is to examine how students responded to the CRISS Learning Strategies Survey. While the student results for each school district and grade level are summarized on the previous pages, it makes sense for brevity's sake to focus our discussion on only one site, the survey data from the experimental classes at Granite High School (pages 10-12). Granite High School is a good choice, because every teacher, including the entire administrative staff, participated in a CRISS workshop at the beginning of the 2002 school year. (Note: The experimental student survey results for Canyon View High School, Iron County School District, are summarized in Appendix B.)

The following results include all student participants from social studies and English classes. Only students with full data sets, those completing both the pre-test and post-test assessments, were included in this descriptive analysis.

The data summaries include the **percentages** of students responding in each category (never, rarely, etc.) per item. In addition, the **average** was calculated for each item based on the numerical values: never = 1, rarely = 2, sometimes = 3, usually = 4, and always = 5. The **n** listed after each statement represents the number of students responding to a specific item. Not all students in the sample responded to every item. The responses to Items 4, 8, and 9, which evaluate strategy use, indicate the number of students who use each strategy.

**Experimental Student Survey Results of the Learning Strategies Inventory, Granite School District,
Granite High School, May 2003.**

Never Rarely Sometimes Usually Always

| | | | | | |
|--|----------|----------|----------|----------|----------|
| 1. Before reading, I think about what I already know and want to learn about a topic. (n=30) | 1 10% | 2 20% | 3 50% | 4 20% | 5 0% |
| Average: 2.9 | | | | | |
| 2. Before reading, I know what I am looking for and what I should be taking notes on. (n=31) | 1 1% | 2 30% | 3 39% | 4 20% | 5 10% |
| Average: 3.0 | | | | | |
| 3. I use organizational clues and the author's style (titles, introductory statements and paragraphs, bold print, italicized words, and summary statements) to help me understand the assignment. (n=32) | 1 0% | 2 11% | 3 32% | 4 38% | 5 19% |
| Average: 3.6 | | | | | |

| | |
|--|---|
| <p>4. I use a variety of organizational strategies to help me understand and remember information.</p> <p><i>The data show the number of students indicating they use a particular strategy.</i></p> | <p>Check the strategies you use: Content Frames—3 KWL or KWL Plus—3 Mapping (Power, Free-Form, etc.)—7 Opinion-Proof Notes—3 Power Notes—21 Problem-Solution Notes—4 Selective Underlining—10 Sticky Notes—8 Story Plans—1 Two-Column Notes—15 Venn Diagram—0</p> |
|--|---|

Never Rarely Sometimes Usually Always

| | | | | | |
|--|----------|----------|----------|----------|----------|
| 5. When I don't understand, I know what to do to help me learn. (n=29) | 1 0% | 2 14% | 3 34% | 4 38% | 5 14% |
| Average: 3.5 | | | | | |
| 6. I have the opportunity to discuss in pairs and groups, what I am learning. (n=31) | 1 0% | 2 16% | 3 38% | 4 36% | 5 10% |
| Average: 3.4 | | | | | |
| 7. I write in journals and/or learning logs about what and how I am learning. (n=30) | 1 45% | 2 36% | 3 14% | 4 3% | 5 2% |
| Average: 2.1 | | | | | |

| | |
|--|---|
| <p>8. I plan before doing any formal writing by putting information into an organizational format.</p> <p><i>The data show the number of students indicating they use a particular strategy.</i></p> | <p>Check the strategies you use: Mapping–13 Opinion-Proof Notes–6 Power Notes–23 Spool Paper Organizer–2 Story Plans–5 Venn Diagram–8 Word Maps–6</p> |
| <p>9. To learn new vocabulary, I do more than copy the words and memorize definitions.</p> <p><i>The data show the number of students indicating they use a particular strategy.</i></p> | <p>Check the strategies you use: Draw a picture–10 List synonyms–1 Write the word in a sentence–12 Use the word in discussions–5 Make word maps–4 List examples–8 List antonyms–1</p> |

Never Rarely Sometimes Usually Always

| | | | | | |
|---|-----------------|-----------------|------------------|------------------|------------------|
| <p>10. I learn a variety of learning strategies by watching my teachers demonstrate them. (n=27)</p> | <p>1 0%</p> | <p>2 5%</p> | <p>3 37%</p> | <p>4 47%</p> | <p>5 11%</p> |
| <i>Average: 3.4</i> | | | | | |
| <p>11. When assignments and tests are returned, I think about how I studied and how I could improve. (n=25)</p> | <p>1 7%</p> | <p>2 6%</p> | <p>3 20%</p> | <p>4 47%</p> | <p>5 20%</p> |
| <i>Average: 3.7</i> | | | | | |
| <p>12. When given a reading assignment, I know how to read, learn, and remember the important information without my teacher’s help. (n=27)</p> | <p>1 0%</p> | <p>2 7%</p> | <p>3 37%</p> | <p>4 33%</p> | <p>5 23%</p> |
| <i>Average: 3.7</i> | | | | | |

Discussion of Experimental Students’ Inventory Results. The responses to the survey provide some insights about what aspects of Project CRISS students have or have not internalized as part of their learning process. (Note: The key words in bold indicate a CRISS principle of learning.)

The first two items of the survey tap into **background knowledge** and **purpose setting**, two key principles of Project CRISS. Responses to both of these items are somewhat surprising—average responses 2.9 and 3.0 respectively. Both averages hover around the response “sometimes.” One would expect “CRISS” students to have a better understanding of why background knowledge and purpose setting are so critical to comprehension. Perhaps, they had not really internalized these principles in their own learning.

The responses, however, were quite different regarding Item 3 (average 3.6). Most students acknowledged their use of the **author’s craft** for attaining meaning from text. They seem to know attention to written structure helps with comprehending and organizing new information.

As indicated in the response to Item 4, most were using a variety of CRISS strategies. It is interesting to note, however, the degree to which students were using **organizing strategies**, such as Power Notes, Two-Column Notes, and Selective Underlining. Teachers had obviously taught these strategies to the point that students were applying them on their own, which may help explain the results of these studies. Responses to Item 4 also provide some valuable insights about strategies that students were not using, such as Opinion-Proof Notes, Problem-Solution Notes, Content Frames, and

Venn Diagram. Students either had not yet been taught these approaches or did not yet feel competent in using them. This information should be useful to teachers at Granite High School as they begin their second year of CRISS implementation.

Item 5 deals with a student's confidence as a learner. One of the main goals of Project CRISS is the development of confident, strategic readers. A small percentage, only 14% responding to this item, revealed they weren't sure what to do if they were not understanding. On the other hand, over 50% expressed confidence in knowing what to do to fix up misunderstandings. (The overall average was 3.5.) This item taps into the CRISS principle of **metacognition**. Competent readers know when they know and when they do not know. They also know what to do to fix their misunderstandings. While the responses to this item indicate most students were metacognitive, the data also show students may need more help in this critical area.

Discussion is another of the key principles of Project CRISS. The student response to Item 6 indicates most students, 84%, take advantage of the opportunity to talk in pairs and small groups while they are learning. These instructional conversations, where students ask questions and have an opportunity to elaborate on their own thinking, are important for comprehension and retention.

The idea students may need more metacognitive guidance is also revealed by the response to Item 7 where most students, 81%, indicated they were not writing about what or how they were learning. Because **writing** is so critical to knowing whether or not one is understanding, this response provides further evidence students still need considerable work in this area. These data, in fact, are somewhat surprising. One would predict a far more positive response since writing-to-learn is such a key facet of Project CRISS. Placing greater emphasis on writing-to-learn would be a logical goal for on-going implementation in Granite High School.

Student responses to Item 8 about **organizing** strategies for pre-writing show solid implementation of Project CRISS. Power Notes came out on top, again, followed by Mapping, Venn Diagram, and Opinion-Proof Notes.

Effects are also prevalent in the responses to Item 9 about learning new vocabulary. Students wrote their words in sentences, drew pictures, and listed examples, all of which lead to a deeper understanding of a word than merely memorizing definitions.

Average student responses for these first nine items, except for Item 7, are all above 3, which indicates most students are actively involved in their learning. **Active involvement** means they are thinking about the concepts to be learned and transforming the new ideas. They do not sit back and let the teacher do all of the work. They are engaged learners who know how to build on their prior knowledge and to set purposes for reading and learning. They identify the Author's Craft in the materials they read and use it to help them learn. They use a variety of organizational strategies for reading comprehension and writing. They discuss information to be learned in pairs and small groups, and they monitor their comprehension and know what to do if they are having problems.

A majority of students indicated they learn strategies by watching their teachers demonstrate them as shown in Item 10 (average 3.4). **Teacher modeling and guided practice** of strategies is an instructional model forming the basis of CRISS teaching. From the responses here, it appears as if students definitely value this approach to teaching.

The last two items, Items 11 and 12, tap aspects of **metacognition**. Metacognitive learners are reflective; they constantly examine themselves as learners. They also are confident learners, who have the skills to figure out what they need to do to learn on their own. A majority of students responded positively (average 3.7) indicating that they were reflective. When assignments and tests were returned, most thought about how they studied and how they could improve. When given a reading assignment, they knew how to read, learn, and remember the important information without much help from their teacher (Item 12—average 3.7). In other words, they admitted feeling quite confident.

It appears as if the experimental students had internalized key aspects of the project which offers a logical explanation of the experimental effects. Most used the principles and strategies of the project in their own learning. Important information regarding the next steps of project implementation can be learned from this survey. Analyzing student responses to the survey will help schools like Granite High School make plans for additional staff development.

APPENDIX A

EXPERIMENTAL TEACHER SURVEY RESULTS

Subjects. Data are based on the responses of twelve experimental teachers (n=12), all junior high and high school teachers from Granite and Iron County School Districts.

Scoring of Questions 1 Through 3. Teachers had five response choices for each survey question: never (=1), rarely (=2), sometimes (=3), usually (=4), and always (=5). The results reported below are averages of the twelve participating teachers' responses.

| Survey Items | Pre-Test | Post-Test |
|--|----------|-----------|
| 1. I give my students direct instruction in generating background knowledge about a topic or concept before reading or learning about it. | 3.5 | 4.0 |
| 2. I help my students set goals and determine a purpose before a reading or learning activity. | 3.0 | 3.7 |
| 3. I teach my students to use the author's style and organizational clues (titles, introductory statements and paragraphs, bold print, italicized words, and summary statements) to help them understand a reading assignment. | 2.7 | 4.3 |

Scoring of Question 4. Teachers had two response choices for the following strategies, either yes (=1) or no (=0). The results reported below are the sum of the twelve participating teachers' responses.

| 4. I teach a variety of organizational strategies to help them remember and understand information, including: | Pre-Test | Post-Test |
|--|----------|-----------|
| Content Frames | 1 | 4 |
| KWL or KWL Plus | 5 | 10 |
| Mapping (Power, Free-Form, etc.) | 4 | 9 |
| Opinion-Proof Notes | 0 | 5 |
| Problem-Solution Notes | 0 | 5 |
| Selective Underlining | 3 | 6 |
| Sticky Notes | 3 | 6 |
| Story Plans | 0 | 2 |
| Two-Column Notes | 4 | 10 |
| Venn Diagram | 5 | 10 |

| | | |
|---------------|-----------|-----------|
| Word Maps | 4 | 6 |
| TOTALS | 29 | 73 |

Scoring of Questions 5 Through 7. Teachers had five response choices for each survey question: never (=1), rarely (=2), sometimes (=3), usually (=4), and always (=5). The results reported below are averages of the twelve participating teachers' responses.

| Survey Items | Pre-Test | Post-Test |
|--|----------|-----------|
| 5. I help my students become metacognitive. They were aware when they did not understand and they knew what to do to gain understanding. | 2.6 | 2.9 |
| 6. I provide opportunities for my students to discuss, in pairs and groups, what they were learning. | 4.3 | 4.3 |
| 7. I expect my students to write in journals and/or learning logs about what and how they were learning. | 2.6 | 4.1 |

Scoring of Questions 8 and 9. Teachers had two response choices for the following strategies, either yes (=1) or no (=0). The results reported below are the sum of the twelve participating teachers' responses.

| | | |
|--|-----------------|------------------|
| 8. I teach a variety of organizational formats to help my students with their formal writing assignments, including: | Pre-Test | Post-Test |
| Mapping (Power, Free-Form, etc.) | 4 | 10 |
| Opinion-Proof Notes | 0 | 6 |
| Power Notes | 0 | 8 |
| Spool Paper Organizer | 1 | 4 |
| Story Plans | 0 | 1 |
| Venn Diagram | 5 | 10 |
| Word Maps | 2 | 4 |
| TOTALS | 12 | 43 |

| | | |
|---|-----------------|------------------|
| 9. I give my students direct instruction in a variety of ways to learn vocabulary concepts (rather than memorizing definitions), including: | Pre-Test | Post-Test |
| Draw a picture | 4 | 10 |
| List synonyms | 7 | 4 |

| | | |
|--------------------------|-----------|-----------|
| Write word in a sentence | 7 | 10 |
| Use word in discussions | 0 | 8 |
| Make word maps | 0 | 5 |
| List examples | 5 | 9 |
| List antonyms | 4 | 3 |
| TOTALS | 27 | 49 |

Scoring of Questions 10 Through 12. Teachers had five response choices for each survey question: never (=1), rarely (=2), sometimes (=3), usually (=4), and always (=5). The results reported below are averages of the twelve participating teachers' responses.

| Survey Items | Pre-Test | Post-Test |
|---|----------|-----------|
| 10. I model learning strategies until my students could do them on their own. | 3.5 | 4.7 |
| 11. When I return students' assignments and tests, I give them opportunities to talk and think about how they learned and how they might improve. | 2.7 | 3.7 |
| 12. My students know how to read, learn, and remember the important information without my help. | 2.3 | 2.4 |

APPENDIX B

EXPERIMENTAL STUDENT SURVEY RESULTS OF THE LEARNING STRATEGIES INVENTORY

Subjects. Data are based on the responses of thirty-three experimental students (n=33) in English and earth science classes from Canyon View High School, Iron County School District, Utah.

| | Never | Rarely | Sometimes | Usually | Always |
|--|---------|----------|-----------|----------|----------|
| 1. Before reading, I think about what I already know and want to learn about a topic. (n=30) | 1 0% | 2 10% | 3 60% | 4 30% | 5 0% |
| Average: 3.2 | | | | | |
| 2. Before reading, I know what I am looking for and what I should be taking notes on. (n=30) | 1 0% | 2 1% | 3 33% | 4 63% | 5 3% |
| Average: 3.5 | | | | | |
| 3. I use organizational clues and the author's style (titles, introductory statements and paragraphs, bold print, italicized words, and summary statements) to help me understand the assignment. (n=33) | 1 3% | 2 15% | 3 27% | 4 40% | 5 15% |
| Average: 3.5 | | | | | |

| | |
|--|---|
| <p>4. I use a variety of organizational strategies to help me understand and remember information.</p> <p><i>The data show the number of students indicating they use a particular strategy.</i></p> | <p>Check the strategies you use: Content Frames–1 KWL or KWL Plus–4 Mapping (Power, Free-Form, etc.)–8 Opinion-Proof Notes–10 Power Notes–18 Problem-Solution Notes–7 Selective Underlining–10 Sticky Notes–10 Story Plans–6 Two-Column Notes–25 Venn Diagram–6</p> |
|--|---|

| | Never | Rarely | Sometimes | Usually | Always |
|---|---------|----------|-----------|---------|---------|
| 5. When I do not understand, I know what to do to help me learn. (n=29) | 1 0% | 2 41% | 3 52% | 4 7% | 5 0% |
| Average: 3.6 | | | | | |

Never Rarely Sometimes Usually Always

| | | | | | |
|---|----------|----------|----------|---------|---------|
| 6. I have the opportunity to discuss, in pairs and groups, what I am learning. (n=31) | 1 11% | 2 22% | 3 61% | 4 6% | 5 0% |
| Average: 3.6 | | | | | |
| 7. I write about what and how I am learning in journals and/or learning logs. (n=30) | 1 18% | 2 29% | 3 41% | 4 5% | 5 7% |
| Average: 2.7 | | | | | |

| | | | | | |
|---|--|--|--|--|--|
| 8. I plan before doing any formal writing by putting information into an organizational format. | <p>Check the strategies you use: Mapping (Power, Free-Form, etc.)–13 Opinion-Proof Notes–6 Power Notes–23 Spool Paper Organizer–2 Story Plans–5 Venn Diagram–5 Word Maps–6</p> | | | | |
| <i>The data show the number of students indicating they use a particular strategy .</i> | | | | | |
| 9. To learn new vocabulary, I do more than copying the words and memorizing the definitions. | <p>Check the strategies you use: Draw a picture–7 List synonyms–2 Write the word in sentences–9 Use the word in discussions–7 Make word maps–1 List examples–9 List antonyms–2</p> | | | | |
| <i>The data show the number of students indicating they use a particular strategy .</i> | | | | | |

Never Rarely Sometimes Usually Always

| | | | | | |
|---|---------|----------|----------|----------|----------|
| 10. I learn a variety of learning strategies by watching my teachers demonstrate them. | 1 0% | 2 19% | 3 43% | 4 38% | 5 0% |
| Average: 3.5 | | | | | |
| 11. When assignments and tests are returned, I think about how I studied and how I could improve. | 1 0% | 2 19% | 3 50% | 4 13% | 5 18% |
| Average: 3.3 | | | | | |
| 12. When given a reading assignment, I know how to read, learn, and remember the important information without my teacher's help. | 1 0% | 2 0% | 3 13% | 4 50% | 5 37% |
| Average: 4.6 | | | | | |