PROGRAM ABSTRACT
1993

The goal of Project CRISS® (Reading, Writing, and Studying Strategies for Literature and Content*) is to provide students (grades 4-12) with reading and study skills strategies that will help them better organize, understand, and retain information. Project CRISS® students learn from their content teachers how to use and apply a variety of strategies to their course material. These include: identifying the author's craft and design, organizing information through notetaking, concept mapping, and charting, writing reports and essay tests as well as applying memory techniques, incorporating vocabulary and discussion strategies and using writing as a learning and response tool.

Student participants in Project CRISS® demonstrate significantly greater gains ($p<.001$) in retention of course content than comparable nontreatment students when assessed by a free-recall technique. Whereas students in regular classrooms did not significantly improve their ability to retain content information during the testing period (one semester), CRISS® students tripled the amount of information they retained.

*NOTE: In 1996, the Project CRISS® name was changed to:

CReating
Independence through
Student-owned
Strategies

BASIC INFORMATION

A. **Project Title**   Project CRISS®: Reading, Writing, and Studying Strategies for Literature and Content Strategies

        Location   40 Second Street East, Ste. 249
Kalispell, MT 59901

        Contact   Lynn Havens, Project Director
(406) 758-6440

B. **Original Developer & Applicant Agency**

The program was developed and implemented in the Kalispell School District. Carol Santa, Ph.D., Language Arts Curriculum Director, coordinated both the development and implementation of the program. More recently, Dr. Santa organized the expansion (to middle grades) and updating of ideas and materials.

C. **Years of Project**

1979 -1982	Original development and evaluation.
1980 - present	Operated in Kalispell School District.
1981	Evaluated & selected as state demonstration site.
1982 -1983	Disseminated as state demonstration site.
1985	Evaluated by JDRP, grades 10-12.
1985 -1993	Disseminated through NDN, grades 10-12.
1988 -1992	Development of elementary and middle school strategies and materials.
1991-1992	Collection of evaluation data for PEP, grades 4-12.

D. **Sources and Levels of Development and Dissemination Funding**

YEAR	FUNDING SOURCE	AMOUNT
1979-1980	Title IV-C	$35,228.90
1980-1981	Title IV-C	48,140.00
1981-1982	Title IV-C	17,191.00
1985-1986	National Diffusion Network	52,784.00
1986-1987	National Diffusion Network	50,000.00
1987-1988	National Diffusion Network	60,000.00
1988-1989	National Diffusion Network	64,000.00
1989-1990	National Diffusion Network	66,000.00
1990-1991	National Diffusion Network	68,000.00
1991-1992	National Diffusion Network	73,000.00
1992-1993	National Diffusion Network	76,000.00

DESCRIPTION OF THE PROGRAM

A.   Goals

The goal of Project CRlSS is to provide students with the reading and study skills to help them organize, understand, and retain course information. In short, students receiving Project CRISS instruction "learn how to learn."

B.   Purpose(s) and Needs Addressed

Project CRISS is redesigned to fill a striking need in our educational system. If America is to achieve the goal of 90 percent graduation and be first in content subjects such as science and math by the year 2000, students must learn how to learn. Content learning instruction should begin in the middle elementary grades and continue throughout middle school and high school.

Many teachers assume that students can learn from their reading assignments without any instruction. However, students often fail because they are not taught how to organize and process the information. Project CRISS provides teachers with a variety of motivating and easy to use learning strategies that address various student learning styles and content tasks. By integrating learning strategies, students as much as double their retention of course information.

C.   Intended Audience

Project CRISS has been proven effective with intermediate, middle school and high school students (grades 4-12). While the evidence presented in this submittal is drawn from students enrolled in science and social science classes, Project CRISS skills are not limited to these areas and are effectively employed in any subject area.

D.   Background

Project CRISS (Content Reading Including Study Systems) was originally developed because the high school students in School District No.5 were not able to effectively read and remember information presented through their text books. Program components focused primarily on identifying main ideas, notetaking, summarizing and vocabulary development. The project received JDRP validation in 1985 for grades10-12 and was subsequently adopted by over 11,000 teachers in 43 states.

The current project, (Reading, Writing, and Studying Strategies for Literature and Content) represents far more than a project revision. About half of the instructional strategies incorporated in the original project have been dropped or changed to reflect new research in learning and reading. With input from many teachers across the country, the program has been expanded to include multiple ways for students to organize and use writing for processing and assessing student learning. Methods for memory development and discussion have been added. The staff development training now emphasizes using the Project CRISS strategies with all learning experiences, lectures, video presentations, field trips, science and math labs, and reading.

The new Project CRlSS is adapted for a greater range of student levels (for grades 4-12 rather than just for grades 10-12). Its revised form is particularly popular for middle schools and for districts that are moving toward integrated curricula. The present project also represents a shift in student evaluation. Included as part of the workshop and in the Project CRlSS manual is a new section on student evaluation which incorporates strategy knowledge as part of portfolio assessments. The Project CRISS workshop has been changed and the Project CRISS manual has been completely

rewritten to reflect the expanded grade levels, and changes in instructional strategies and assessments.

While our acronym (CRISS) no longer fits our title, we are planning to keep the CRISS name as part of our dissemination strategy. [NOTE: In 1996, the Project CRISS® name was changed to: **CR***eating* **I***ndependence through* **S***tudent-owned* **S***trategies*.]

Foundation and Theoretical Framework

In order to enhance the content reading, long-term comprehension and retention skills of its students, Project CRISS employs five concepts, drawn from cognitive psychology (Barr, Kamil, Mosenthal, & Pearson, 1990).

- Students must be able to integrate newly learned information with prior background knowledge.
- Students must become actively involved in their own learning.
- Students must be able to organize information from their reading.
- Students must be able to monitor their own learning in order to identify which among their repertoire of learning and studying strategies are the most effective for a given set of learning tasks.
- Students must know how to process content material through writing and discussion.

The project holds that these concepts **can** and **should** be taught and that they are key to maximizing the acquisition of information.

E. How the Program Operates

Scope

Project CRISS strategies are readily incorporated into existing curricula and can be used with any content area from elementary school through high school. Teachers have no difficulty including CRISS strategies as part of regular classroom instruction. Districts do not need to change their curriculum or teaching materials. CRISS is compatible with traditional approaches to instruction as well as such approaches as cooperative learning, literature-based instruction and process writing. The project has been used effectively in such programs as English as a Second Language (ESL), Chapter I, Gifted and Talented, Adult Basic Education, Special Education (mainstreaming projects) and at risk programs. In many schools Project CRISS has replaced separate study skills classes.

Curriculum and Instructional Approach and Learner Activities

The instructional content of Project CRISS includes the following strategies:
- **Identifying the Author's Craft and Design:** Students begin by learning how the organization of narrative and expository text influences its comprehensibility. They learn how to quickly familiarize themselves with the author's style of main idea development and are taught procedures (summarizing, underlining and note taking) for extracting the main ideas from expository text and the elements of fiction (characters, setting, plot, resolution) from literature.
- **Organizing Information:** Students learn to organize material in ways that will help them better retain key information. They are taught how to organize both verbal and written information into main idea-detail notes, problem-solution notes, and argumentative notes. Students learn notetaking procedures for problem solving in mathematics, for analyzing the steps in the scientific method, and for evaluating the components of fiction. They learn how

to summarize short stories and novels by organizing their ideas around the elements of fiction. Students practice structuring information into two and three column formats and practice representing ideas through various concept map and charting procedures.

- **Memory Development:** Students learn categorization and clustering techniques which reduce the number of key items they have to remember. They also learn how to use writing, discussion, and self-testing as preparation for tests.
- **Reports and Essay Tests:** Project CRISS provides students with step by step procedures for writing reports and for taking essay examinations.
- **Writing Strategies:** Students engage in a variety of writing strategies used as tools for critical analysis. These include writing responses in journals and procedures for developing persuasive and problem-solution papers.
- **Vocabulary Development:** Students learn how to expand their vocabulary through concept mapping, writing activities, and analysis of the author's context.
- **Discussion Strategies:** Students learn how to lead their own discussions by writing their own questions and conducting their own discussions as part of cooperative teams or as a whole class.
- **Student Evaluation:** Project CRISS also provides teachers and students with a variety of ways to incorporate authentic assessments as part of instruction and evaluation. These include procedures for incorporating learning strategies as part of portfolio assessments.

During Project CRISS training, teachers are given the opportunity to apply each of the CRISS strategies to their own curriculum materials. Project trainers model strategies so that teachers will know how to teach the strategies to their own students. Project trainers also provide follow-up assistance for teachers through on-site visits, demonstration lessons, newsletters, and a computer network.

Project CRISS Instruction

Project CRISS strategies are introduced to students through teacher explanation and modeling, followed by guided practice and independent application. Teachers show, explain and demonstrate strategies with their students before students begin to use them on their own. For example, rather than telling students to take notes, Project CRISS teachers take students step-by-step through the processes of taking notes with content that students are learning in their course. Teaching about how to learn content occurs at the same time that the teacher is teaching the content.

- **Learning Materials:** Teacher classroom materials and texts remain unchanged. However, Project CRISS provides some text assessment tools which might result in different materials being adopted in the future--materials which are more "considerate" for student learning. Project CRISS provides a teacher manual covering the topics identified earlier in this Section, plus numerous student and teacher examples.
- **Staff Development and Management Activities:** Teachers in all curriculum areas and administrators should be inserviced with Project CRISS strategies and philosophy. The project recommends the selection of a district local facilitator who would manage the program by setting up the original training, communicating with project staff, organizing follow-up sessions and eventually becoming a certified trainer who could train new staff.
- **Monitoring and Evaluation Procedures:** Project CRISS staff have developed an administrators guide which provides a step-by-step procedure for acquiring a successful adoption. The procedure was developed by surveying successful adoptions. Project CRISS staff provide guidance in evaluating the program's success. Evaluation materials are available on request, and project staff provide the scoring and assessment.

F.   **Significance of Program Design as Compared to Similar Programs**

Project CRISS has many features which make it unique. First, the program is for all students. Learning strategy instruction, if taught at all, was relegated to special studies skills classes or a reading laboratory. Moreover, past programs have also taught study strategies in isolation from the rest of the curriculum, which leaves students the problem of transferring strategy knowledge to real learning situations. By contrast, Project CRISS strategies are designed to be used as part of course instruction where students have a need to learn content.

Second, in the elementary schools most students learn how to read, but few have opportunities to learn how to use reading as a learning tool. Too often teachers assume that students can figure out how to learn on their own without any instruction. Yet, research tells us that this is not the case (Barr, et al. 1990). Students need to be taught how to learn. Project CRISS offers students this opportunity.

Third, many school districts are moving toward integrated curricula and new systems of student evaluation. During this time of transition, teachers are grappling for ways to insure that students learn important skills. Project CRISS provides teachers with tools for teaching reading, writing and study strategies with any material. It also helps teachers move from traditional ways of student evaluation to performance-based assessments using portfolios and student products.

Fourth, Project CRISS helps provide instructional unity across the disciplines and grade levels. It provides teachers and students with a common "vocabulary" of strategies. For example, problem-solution notes in language arts will look quite different from problem-solution notes in social studies, but the strategy knowledge is the same. When students learn how to apply the same strategy across the content areas and grade levels, they begin to internalize these procedures and to use them on their own. Project CRISS provides a core of teaching knowledge that helps teachers work together in teams and coordinate instruction.

Fifth, many districts are struggling with ways to integrate special needs students into the regular classroom. Project CRISS strategies provide resource teachers and regular education teachers with ways to collaborate and work together to support children with a range of abilities.

Finally, Project CRISS advocates a strong component of follow-up. All district or school adoptions must have a local facilitator and/or certified trainer to organize follow-up sessions, produce a newsletter of shared successes, distribute the CRISS newsletter and to communicate problems and questions to the project staff. Several Project CRISS adopters have selected peer coaching and classroom demonstrations as methods of follow-up and reinforcement. Project CRISS staff also provides on-site, regional and state-wide follow-up sessions. The project has established a computer network system via Internet. This provides one more mode for teachers, districts, and certified trainers to communicate with and gather information from project staff and from other adoption sites.

POTENTIAL FOR REPLICATION

A.   **Setting and Participants**

Project CRISS was developed in Kalispell (MT) Public Schools and evaluated in the Kalispell, MT, Putnam County, FL and Stafford, VA school systems.

Kalispell School District, Montana, draws primarily from the town of Kalispell, a community of 12,000 [in 1993] people located in a rural, mountainous area of northwestern Montana. Kalispell

is primarily a lower to middle class, white community with an economic base of small business, tourism, and lumber.

Putnam County School District, Florida, is located in Central Florida. The district draws from a working, middle-class community and has a student population which is 77% white, 20% black, and 3% Hispanic.

Stafford School District, Virginia, is in the Washington D.C., metropolitan area. The population is almost totally white, middle/upper-middle and mostly professional.

The evaluation data presented in this document were gathered from students who are representative of these populations. All classes were heterogeneously grouped except the 11th grade groups from Stafford, VA who were advanced placement students (supportive evidence).

B. Replicable Components and Documentation

All necessary instructional materials are provided in a 200 page manual. The manual details the project's theoretical foundation and presents the various strategies through explanations and examples. In addition, an adopter's guide, for school administrators outlines Project CRISS implementation procedures and includes a plan for incorporating the project throughout a district's curriculum. No additional curriculum materials are required either by teachers or students.

C. User Requirements

First, districts are asked to select a local facilitator to coordinate the program. The facilitator sets up the 12-hour training which can be presented in two consecutive days or divided into shorter segments spread over several weeks or months. Teachers at various grade levels (beginning with grade 4) and in all content areas need to be included in the inservice. Each participant must have a training manual.

Next, the local facilitator works with project staff to set up a follow-up session three to six months after the completion of the final training session. Frequent meetings for teachers to share Project CRISS ideas after or before school or during duty-free periods helps insure a successful adoption.

Finally, project staff assist with an evaluation of the project's success. This can be designed to meet the district's needs, from informal surveys of teachers and students to pre and post assessment tests.

D. Cost of Adoption

The following estimates of implementation costs are based on an adoption of the program in a site with 30 participating teachers. Staff release time must be included if training is conducted in school time. There is a one-time cost for materials. Please go to our Web site for cost information. <http://projectcriss.com/projectcriss/pages/training/costs.html>

A.   Claim

Student (grades 4-11) participants in Project CRISS will demonstrate significantly greater gains (p<.001) in the retention of subject specific information than comparable nontreatment students when assessed by a free-recall technique.

B.   Methodology

Design

The evaluation of Project CRISS was comprised of eight (8) pre/post comparison group studies conducted at the developmental site and two replication sites using intact groups of students at grades 4, 6, 8, and 11. Treatment group students received Project CRISS strategies as part of their regular program instruction. No Project CRISS strategies were given to comparison group students.

Sample

All groups from which data were collected were intact classes of students who had been pre-assigned or pre-registered during the 1991-92 school year. Teachers, rather than classes were randomly assigned to treatment and comparison conditions. In this way, 16 classes were randomly assigned to treatment/comparison condition in pairs. Treatment group teachers received CRISS training; comparison group teachers did not.

Instruments

Information retention was assessed through a standardized free-recall approach that used several pages of relevant information at a reading level appropriate to the sample. The selected prose was then dissected into "idea units" or underlying propositions to form a "grid" of recallable information and to provide a consistent basis for scoring.

Care was taken to choose readings that had a strong content base and that contained similar issues to those that the students would address as part of their respective courses. The actual topics, however, would not have normally been covered in those courses. Because of this, the results presented solely reflect changes in recall ability and are not affected by such variables as study time or quality of teaching. The readings selected were different for each grade level as follows:

Grade 4 Assessment: *The Western Movement* (770 words, 2 single spaced pages)

An historic piece focusing on the different groups of people who moved west: fur traders, cattlemen and farmers. The article describes why they moved west and the impact they had.

Grade 6 Assessment: *The Mystery of Thirst* (920 words, 3 single spaced pages)

A scientific article describing the conditions that can lead to fatalities. The piece describes why man is poorly adapted for living in desert conditions.

Grade 8 Assessment: *Extinction is Forever* (1580 words, 4 single spaced pages)

A scientific article describing the factors leading to the extinction of species: overhunting, habitat destruction (insecticides, pollution), etc.

Grade 11 Assessment: *The Restless Decade* (1600 words, 4 single spaced pages)

The article describes the economic, social, scientific and political conditions prevalent in the 1920's.

The reliability of each data collection tool was estimated using an inter-rater technique in which two trained raters each scored 30 sample student papers. Pearson coefficients were extremely high and very consistent ranging from .93 to .95.

This strategy is considered to be highly sensitive to the effects of Project CRISS because students are given no external memory cues to aid recall and therefore must rely on the organizations and structures that they themselves have imposed on the prose material.

Data Collection and Scoring

Data were collected on a pre and post-test basis immediately prior to and at the conclusion of a semester long course allowing for approximately 18 weeks of intervention.

Each data collection process had two phases. Students first studied the prose (40 minutes) and then, after a period of delay (24 hours), recalled as much information as they could. The 24 hour delay between reading and recall makes the free recall format a sensitive measure of longer term or lasting retention. Research has shown that "forgetting" follows an exponential curve with the large majority of information being "lost" in the first 24 hours.

All data collection procedures were designed to mirror, as closely as possible, actual classroom learning and testing situations. Several precautions were taken in order to ensure reliability of data collection:
- All data were collected on site by trained project staff.
- Identical test directions for all assessments were read by the teachers to each group.
- Time allocations for the reading and recall/ testing portions of the tests were standardized.
- In order to eliminate the possibility of scorer bias, all tests were scored blind (unaware of time of test or experimental condition) by two well trained and practiced scorers.

Scoring was based on the number of idea units an individual was able to remember. One point was given for each idea unit the student was able to recall.

Data Analysis

All data were analyzed by an external evaluator using parametric techniques: pre and post scores for Project CRISS students were contrasted using a correlated t-Test; an independent t-Test across pretest score was used to investigate differences that may have existed between the treatment and comparison samples; and a two-way ANOVA with repeated measures was used to explore differential effects of the treatment across pre- and post-tests.

C.   **Results**

STUDY ONE (Kalispell, MT)

Study one was conducted in Kalispell, MT and included students at grades 4,6, and 11. The results of a correlated t-Test, revealed that significant gains (p<.0010), averaging over a full standard deviation, were made by each of the Project CRISS groups (Table 1).

Table 1: Pre and Post Means, Standard Deviations and Mean Gains for Treatment Group (CRISS) Students by Grade for the Kalispell, MT Study

GRADE	T/C	n	PRE $\overline{x}$	s	POST $\overline{x}$	s	$\overline{x}$ gain	t	p
4	T	23	4.73	2.33	10.35	2.67	5.62	11.94	0.0000
4	C	18	6.00	3.21	6.11	2.84	0.11	0.15	NS
6	T	19	5.21	3.53	10.52	4.47	5.31	6.02	0.0000
6	C	18	8.16	2.70	9.44	3.14	1.28	1.96	NS
11	T	23	5.52	3.28	11.61	3.93	6.09	7.88	.0000
11	C	21	6.52	4.20	8.19	3.82	1.67	2.82	0.05

The data were next examined through a two way Analysis of Variance (ANOVA) with repeated measures. The observed differential performances by the two groups were evident in significant ($p<.000l$) interaction (Groups x Tests) ratios as summarized in Table 2.

Table 2: Summary of Two-way Analysis of Variance (ANOVA) Tables (Groups x Tests) for the Kalispell, MT Study

GRADE	df	Fint	PROB
4	39	42.92	0.0000
6	35	13.39	0.0000
11	42	19.99	0.0000

STUDY TWO (Putnam County, FL)

Study two was conducted in Putnam County , FL and included students at grades 4,6, and 8. Using a correlated t-Test, it was established that significant gains (p<.0000), averaging over a full standard deviation, were made by each of the Project CRISS groups (Table 3). As may be expected in any two-trial study, significant growth (p<.05) was also made by comparison groups at grades 4 and 8. This gain, however, averaged less than one quarter of that made by Project CRISS students.

Table 3: Pre and Post Means, Standard Deviations and Mean Gains for Treatment Group (CRISS) Students by Grade for the Putnam County, FL Study

| | | | PRE | | POST | | | | |
GRADE	T/C	n	$\overline{x}$	s	$\overline{x}$	s	$\overline{x}$ gain	t	p
4	T	17	3.41	2.12	7.82	3.09	4.41	6.02	.0000
4	C	18	3.27	2.02	4.83	2.91	1.56	2.86	0.05
6	T	18	6.05	3.71	11.11	5.95	5.06	4.65	.0000
6	C	19	5.84	3.87	5.68	3.72	-0.16	-0.31	NS
8	T	20	5.40	2.04	11.05	3.10	5.65	11.20	0.0000
8	C	19	6.95	3.51	8.21	2.92	1.26	3.02	0.01

The data were next examined through a two-way Analysis of Variance (ANOVA) with repeated measures. The observed differential performances by the two groups were evident in significant (p<.0000) interaction (Groups x Tests) ratios as summarized in Table 4.

Table 4: Summary of Two-way Analysis of Variance (ANOVA) Tables (Groups x Tests) for the Putnam County, FL Study

GRADE	df	Fint	PROB
4	33	9.94	0.003
6	35	19.74	0.0000
8	37	44.41	0.0000

STUDY THREE (Stafford, VA)

Study three was conducted in Stafford, VA and included students at grades 4 and 6. A correlated t-Test revealed that significant gains (p<.0000), averaging over a full standard deviation, were made by each of the Project CRISS groups (Table 5). As in study 2, while gains were also made by Stafford comparison group students, they paled by comparison to those made by students receiving Project CRISS strategies.

Table 5: Pre and Post Means, Standard Deviations and Mean Gains for Treatment Group (CRISS) Students by Grade for the Stafford, VA Study

GRADE	T/C	n	PRE $\bar{x}$	s	POST $\bar{x}$	s	$\bar{x}$ gain	t	p
4	T	22	4.73	2.89	8.68	3.91	3.96	6.06	0.0000
4	C	20	3.65	1.79	5.05	2.44	1.40	2.38	0.05
6	T	21	7.33	3.81	13.66	5.26	5.67	6.40	0.0000
6	C	18	6.66	3.58	8.83	4.38	2.17	3.04	0.0000

The data were next examined through a two-way Analysis of Variance (ANOVA) with repeated measures. The observed differential performances by the two groups were evident in significant (p<.0000) interaction (Groups x Tests) ratios as summarized in Table 6.

Table 6: Summary of Two-way Analysis of Variance (ANOVA) Tables (Groups x Tests) for the Stafford, VA Study

GRADE	df	Fint	PROB
4	40	8.34	0.006
6	37	12.89	0.0000

Summary by Grade Level

For summary purposes, the data from Studies One, Two, and Three were collapsed and reanalyzed by grade level. Once again, the data provide strong testimony to the impact of Project CRISS.

Significant gains (p<.0000) were recorded by each of the four Project CRISS grade level groups (Table 7). Gains ranged from approximately .75 sd to 1.25 sd. Stated another way, students, on average, were able to recall twice as much information using Project CRISS strategies than they could without them.

Table 7: Pre and Post Means, Standard Deviations and Mean Gains for Treatment Group (CRISS) Students by Grade

GRADE	T/C	n	PRE $\overline{x}$	s	POST $\overline{x}$	s	$\overline{x}$ gain	t	p
4	T	62	4.37	2.53	9.06	3.38	4.69	13.07	0.0000
4	C	56	4.28	2.64	5.32	2.73	10.03	2.83	0.01
6	T	58	6.24	3.73	11.84	5.35	5.60	9.91	0.0000
6	C	55	6.94	3.50	7.93	4.07	0.99	2.79	0.01
8	T	20	5.40	2.03	11.05	3.10	5.65	11.21	0.0000
8	C	19	6.94	3.51	8.21	2.91	1.26	3.02	0.0000
11	T	56	8.69	4.13	16.28	6.40	7.58	11.67	0.0000
11	C	43	5.79	4.09	6.84	4.04	1.04	2.52	0.0000

As in any two-trial measurement process, gains were also expected of and made by comparison students (testing effect). The average gain for comparison students ($\overline{x}$=1.05), however, was less than one-fifth of that ($\overline{x}$=5.79) made by Project CRISS students.

From the data presented (Table 8), it is evident that no pretest differences existed at any of the grade levels tested.

Table 8: Independent t-Tests Across the Mean Pretest Scores of Treatment and Comparison Groups

GRADE	T/C	n	$\overline{x}$	s	t	p
4	T	62	4.37	2.53		
4	C	56	4.28	2.65	0.17	NS
6	T	58	6.24	3.73		
6	C	55	6.95	3.50	1.03	NS
8	T	20	5.40	2.03		
8	C	19	6.94	3.51	1.69	NS
11	T	23	5.52	3.29		
11	C	21	6.52	4.20	0.88	NS

Whereas no significant differences existed at pre-test, Project CRISS students significantly outperformed their comparison counterparts following the treatment period. In a two-way ANOVA with repeated measures, these interaction effects (Groups x Tests) were significant at the $p<.0000$ level.

Interaction Effect:
4th GRADE DATA

F = 50.90; p<.0000
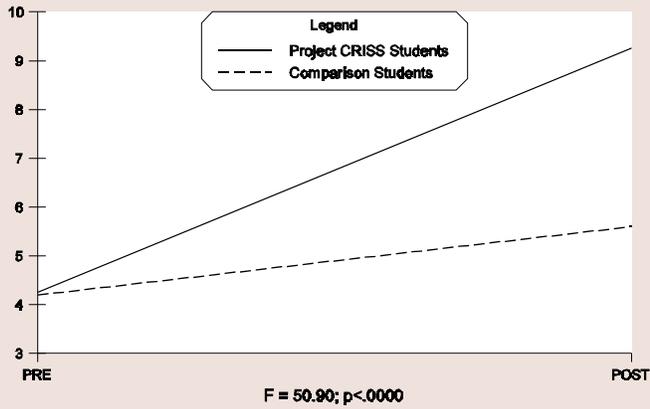
Interaction Effect:
6th GRADE DATA

F = 46.25; p<.0000
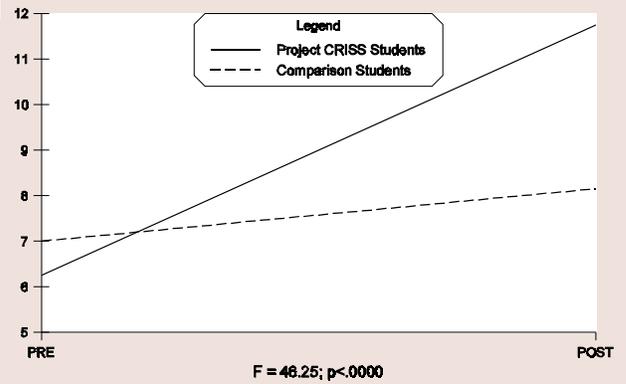
Interaction Effect:
8th GRADE DATA

F = 44.41; p<.0000
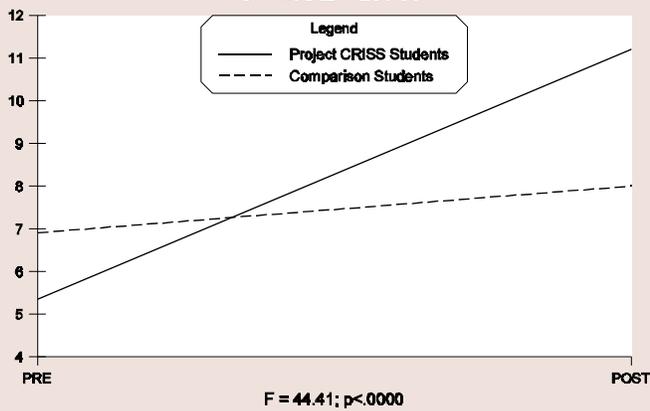
Interaction Effect:
11th GRADE DATA

F = 19.99; p<.0000
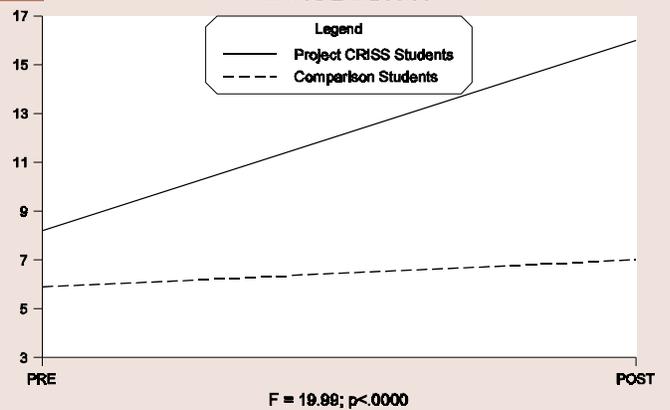
## D.	Supplementary Evidence

Advanced Placement History

Project CRISS strategies were effectively used by an eleventh grade advanced placement group at the Stafford, VA site during the 1991-92 school year. Using the same testing process as that for the three project studies, this group with pre- and post-test means of 10.90 (sd=3.10) and 19.54 (sd=5.76) respectively, registered gains in the area of two full standard deviations. Unfortunately, due to the composition of the group, no comparison was available.

Teacher Observation

Project CRISS social studies teachers reported better classroom performance on the part of their students than did comparison teachers. In addition, semester grades in history were considerably higher in the treatment classes with 30% more "A" and "B" grades.

Student Comments about Strategies

After post-testing, students from both treatment and comparison classes were asked to write a paragraph explaining what they did to read and learn the information in the articles. The comments showed a definite pattern. The control students had little strategy knowledge. In fact, their most common response was that they studied by re-reading or memorizing. By contrast, experimental students used a rich assortment of learning strategies, and often used multiple strategies such as taking notes, writing summaries and self-questioning. The following table gives the responses listed most frequently, the number of times students listed these strategies, and the number of students who reported using more than one strategy.

| | PROJECT CRISS | | | | COMPARISON | | | |
| | (grades) | | | | (grades) | | | |
Strategies	4	6	8	11	4	6	8	11
Specific								
Rereading (only)	6	3	1	4	12	20	7	8
Memorizing	0	0	0	0	6	3	2	0
Concept Mapping	12	7	2	3	0	0	0	0
Summarizing	5	6	5	9	0	0	0	0
Self-testing	6	6	7	14	0	3	0	1
Categorizing Ideas	23	20	18	25	0	1	0	0
Mental Pictures	4	2	3	5	0	0	1	0
Notes & Charts	13	28	16	22	0	0	0	2
Multiple	8	26	21	33	1	8	3	2

Implementation

Six months after participating in the CRISS inservice, teachers respond to an implementation survey. The following summary represents responses from surveys collected during the 1991-1992 school year. These results are based on 120 teachers from grades 4-12. The results clearly indicate that teachers incorporate CRISS instruction into their teaching.

		ALWAYS	USUALLY	SELDOM
1.	I bring out the students background knowledge about a topic before I start teaching it.	82%	18%	0%
2.	I model or show students how to write or take notes or underline, etc. before they actually do an activity using that strategy.	68%	26%	5%
3.	I help my students become aware of the learning strategies that work for them.	63%	32%	5%
4.	I help students develop a purpose for reading with each assignment I give.	80%	17%	3%
5.	I teach my students how to differentiate between main ideas and details.	65%	30%	5%
6.	I have taught my students how to write their own questions and lead their own discussions.	15%	79%	6%
7.	Check which CRISS note-taking procedures you have taught your students to use: a) Two column notes–89% b) Mapping–83% c) Problem/solution–46% d) Opinion/proof–48% e) Power notes–64% f) Journal (learning logs)–82% g) Three or more column notes–30%			
8.	Check the CRISS writing strategies your students use in class: a) Spool paper–75% b) RAFT–64% c) Framed paragraph–30% d) Paragraph or page summary–83% e) One sentence summary–56% f) Journals–48% g) Opinion/proof notes and persuasive papers–46%			

E.   Interpretation and Discussion of Results

The results obtained provide strong testimony to the effectiveness of Project CRISS. Gains made by Project CRISS students, relative to their comparison counterparts are statistically significant, consistent, and educationally meaningful. Moreover, given the strength of the evaluation design and the consistency of the results, there is little doubt that the such gains are indeed a function of Project CRISS:

- The pre/post, treatment/comparison group design effectively controls for history, maturation and testing-- regression and mortality are not at issue;
- Sound testing and scoring procedures nullify instrumentation effects and potential scoring bias; and
- The consistency of the results across eight trials makes it unlikely that the occurrences were due to chance.

F.   Educational Significance of the Results

Project CRISS deals with the subject matter of the greatest importance, particularly as schools implement curriculum changes in response to an ever expanding body of knowledge. Learning how to learn from reading is a fundamental skill vital to the success of students in all areas of endeavor.

The magnitude of the change caused by this program is clearly evident. Project student gains consistently exceeded a full standard deviation. In real terms, after removing the effects of testing and maturation (estimated by comparison group data), Project CRISS students almost tripled the amount of information they were able to retain. This level of increased retention, if extrapolated across all the subject matter encountered by a student during the course of his/her school career, would result in phenomenal impact!

Barr, R., M. Kamil, P. Mosenthal & D. Pearson (1990). *Handbook of reading research: Volume II.* Newark: International Reading Association.