

# **Promoting Active Reading Strategies to Improve Students' Understanding of Science Findings (Year 1: October 2000 to June 2001)**

## **READING STRATEGY TRAINING**

The following section describes the methodology for the Pilot and Baseline studies conducted this year, and the *lessons learned* during the process of completing these studies. The results from these studies will be available in August 2001.

### **Pilot Study**

#### Method

The pilot study was conducted as a preliminary examination of the differences and effectiveness of the three training programs (see Experiment 2 in the proposal). The study included 341 students from two high schools with 9 Earth Science classrooms from Site A, and 7 Earth Science classrooms from Site B. There were 186 males and 155 females, of whom 53% were Caucasian and 40% were African-American.

There was a primary experiment, and two sub-experiments. The primary experiment was designed to compare the three training programs (Insert, Previewing, SERT) to a control condition. Three teachers from each site taught two regular (non-honors) Earth Science classes. Hence, one of each teacher's classes was randomly assigned to an experimental condition (Insert, Previewing, SERT), the other was randomly assigned to participate as a Control condition such that there were a total of 6 experimental and 6 control classrooms.

At Site A, the three teachers also each taught an Earth Science Honors class, hence using the same condition assignment as in the primary experiment, each Honors class participated in one of the three experimental conditions (this secondary experiment lacks a control condition). At Site B, one of the three teachers taught a third Earth Science course which was assigned to the SERT condition to allow a sub-comparison with one teacher between Insert, SERT, and the Control condition.

For the primary experiment and the two sub-experiments, the methodology was the same. The experiment included 6-7 class sessions including a pretest; training (1-2 sessions); a 1-week delay post-test; 2 mid-semester reminders; and a final post-test at the end of the year. The pretest session occurred the second week of classes. We administered the Gates-MacGinitie (Form K), a Science Prior-Knowledge test, a multiple-choice reading strategy test, a reading strategies checklist, and a demographics questionnaire. The following week, participating students were provided with reading strategy training. The SERT and Previewing conditions required two class periods (about 2 hours), whereas the Insert and the Control conditions required 1 class period. The control condition consisted of reading the same texts as those read in the training conditions and discussing topic questions. At the end of the training session, the students read a science text (a chapter about Glaciers) and answered comprehension questions. Students in the experimental conditions were instructed to use the strategy they had learned during training. One week following training (post-test), the students read a science text (a chapter about Air Masses), answered comprehension questions, and completed a reading strategies checklist to indicate

reading strategies used when reading the text. Students in the experimental conditions were instructed to use the strategy they had learned during training. After a 4-week and 10-week interval, students in the experimental conditions were provided with a brief reminder for the reading strategy they had learned, and all participating students were given a questionnaire to assess reading frequency and strategy use. During a final post-test session (at the end of the semester), students completed the Gates-MacGinitie (Form L), the multiple-choice reading strategies test, the reading strategies checklist, and a demographics questionnaire. They also read two science texts and answered questions about the texts.

## Results

We are currently scoring and entering the data from this study. We expect to be able to report results from this study by August.

## **Baseline Study**

### Method

The purpose of the Baseline study was two-fold (see Experiment 1 in the proposal). First, it is a correlational study to examine the relationships between reading skill, reading strategy knowledge, science knowledge, science text comprehension, and science course performance. Second, it provides baseline measures for the four sites to be included in our study next year (i.e., Experiment 3 in the proposal). We conducted the Baseline study at the four school sites (Norfolk, VA; Williamsburg, VA; Prestonburg, KY; and Americus, GA) with a total of 88 classrooms including 1,890 students, of whom approximately 57% were Caucasian and 35% were African-American. The students were in the following courses: Physical Science (n=14 classrooms), Earth Science (n=21); Chemistry (n=11); Biology (n=36); Physical Science/Biology (n=6). We administered the Gates-MacGinitie (Form L), a brief Science Prior-Knowledge test, a multiple-choice reading strategy test, a reading strategies checklist, and a demographics questionnaire. They also read a text about Air Masses and answered comprehension questions concerning the text. The session required 90 minutes. For the two schools with 90-minute class sessions, testing required one session. For the two schools with 50-minute class sessions, testing was administered across two sessions.

### Results

We are currently scoring and entering the data from this study. We expect to be able to report results from this study by August.

## **Lessons Learned**

Although our quantitative data is not yet ready to present, our pilot study was also geared toward refining our testing and training procedures. In that respect, it was time well spent – our lessons learned during the past year will serve us well in the upcoming year. The following is a list of our most important ‘lessons learned’.

1. Previewing was much more difficult for the students to learn than we expected. We need to simplify our training protocol and include more scaffolding.
2. If possible, we need to reduce the number of tests administered during the pretest (a grueling session).

3. Training was disruptive to the teachers' schedule because we covered different topics during training than what the teacher was covering at that time. We need to use texts during training such that we are covering the topics that they are covering in class. This approach sacrifices the experimental rigor of using the same text for all training conditions, but will allow a more natural application of the reading strategies for the students.
4. Refresher training needs to be provided using classroom texts and maintaining teachers' curriculum plans.
5. Communication with teachers (and administrators) is problematic. We have now adopted a three-pronged approach including phone calls, faxes, and letters.
6. Collecting the students' grades at the end of the year has been difficult. Although the schools agreed to provide them to us at the beginning of the study, a couple of schools (in both the Pilot and Baseline studies) refused when it came time to do so (they have since complied, but with reluctance). In future studies, we will obtain a written agreement with each school and request, in advance, a volunteer teacher to collect the data. This individual will be reimbursed for time spent in this endeavor.

## AUTOMATED TUTOR DEVELOPMENT

### Development of the Instructional Component

The development of the instructional component involved a series of decision-making tasks regarding the automated trainer's requirements and specifications. The activities, resulting conclusions, and implementations were presented in the *Activities* section.

### Development of the Latent Semantic Analysis Component

The development of the LSA practice component has involved a combination of computer programming tasks and empirical studies. The programming activities, conclusions, and implementations were presented in the *Activities* section. The results from the empirical investigations will be available in October 2001.