

Using Precision Teaching Techniques: Translating Research

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Researchers and others have for some time complained about the dissemination gap—the time elapsed between discovery of an instructional technique and its implementation in classrooms (e.g., Goodlad, 1983). Depending on the research, its marketing, the locale, and many other factors, this gap could be from 1 to 10 years or longer. The obvious reason for lamenting this lag is that if researchers have come up with a more effective, more efficient way to teach something and teachers are not making use of that approach, then scores of youngsters are not being served as well as they might be.

The following are among the reasons advanced to account for this gap: (a) the topics that were investigated were not of particular interest to teachers; (b) the research was published in journals that neither teachers nor teacher educators commonly read; and (c) the steps for carrying out the new procedures were not adequately explained so that teachers could arrange them in their settings.

The intent of the project described in this article was to translate research of interest to teachers into practice for them. A related purpose was to encourage teachers to validate that research in their classrooms by carrying out experiments of their own and to provide a clear explanation of the procedures in a journal that would be read by a large number of special education teachers. In the research reported here, three strategies were presented to special education teachers and to classroom teachers who had students with mild handicaps in their classes. The three strategies were keywords, study guides, and graphic organizers.

Another intent of the project was to rely on principles of Precision Teaching (PT) to translate and further validate the selected

research. Following are seven principles of PT as expressed by Lindsley (1972):

1. Teachers learn best by studying the behaviors of their students.
2. Rate of response is the universal measure of behaviors.
3. Student performances are charted on a Standard Celeration Chart.
4. Direct and continuous monitoring is emphasized.
5. Behaviors and processes are described and functionally defined.
6. Building, rather than eliminating, behaviors is emphasized.
7. Impact of environmental influences on behaviors is analyzed.

Participants

Members of the Utah Learning Resource Center (ULRC) staff in Salt Lake City provided inservice training for the teachers in this project. The staff members are experienced special education teachers. Providing instruction to teachers of adolescents with mild handicaps in this project is only a part of their responsibilities. They offer staff development on numerous topics to teachers in 44 school districts and state-operated programs.

The teachers who received inservice instruction in this research were from eight Utah school districts. Of the 110 teachers who participated, 75 carried out research in their classrooms and returned data on 1,431 students to the ULRC. For keywords, 38 teachers returned data from 729 students; for graphic organizers, 25 teachers returned data on 477 students; and for study guides, data were returned from 12 teachers on 225 pupils.

Strategy Instruction

Strategy instruction was defined to include both teaching strategies and learning strategies. Teaching strategies are controlled and managed by teachers regarding decisions as to what information is presented to students and when and how it is presented. In this research, graphic organizers and study guides were considered teaching strategies for adapting materials.

Learning strategies are controlled and managed by students. They are intended to facilitate problem solving and independent learning. Use of keywords was the learning strategy involved in this investigation.

The teachers who participated in the project were given a six-step procedure for instructing students in the use of these strategies. Following are the steps as adapted from CEC's Academy for Effective Instruction (Archer, et al., 1986): (1) gain attention; (2) review; (3) communicate objective and provide rationale; (4) model the steps in the strategy; (5) prompt students to use the strategy; and (6) check students in performing the strategy. This procedure was selected in order to provide a consistent and effective instructional method across teachers and content areas.

Following are descriptions of the three strategies used, including explanations of how PT procedures were integrated with each as a measurement technique.

Keywords

Keywords are significant words in a statement or phrase that provide indexes to the content. Many keywords are nouns or verbs, but that depends on the context of the phrase. Keywords are often words that are italicized, set in bold print, or underlined. In the following sentence, the keywords from a passage in a history textbook are italicized: "*Woodrow Wilson*, from *New Jersey*, was president of the United States before and during the *First World War*." From a sentence in a science textbook, the keywords are italicized: "Humans and many other species are *vertebrates* of the class *Mammalia*."

The procedure used to teach students to identify keywords is RIMS, a mnemonic that prompts them to do the following: Read the statement; Identify important words using clues (e.g., important persons, places, things, words that are underlined, capitalized, boldfaced, italicized, or in quotes); Mark the important words; and Self-check by asking whether or not the words that were marked conveyed the important information. (For additional information on RIMS, contact personnel at ULRC, 801/2723431.)

This study investigated students' ability to identify keywords while taking PT timings and the effect on their performance in a number of content areas. It was postulated that if students could identify keywords in test items more efficiently, their test scores would improve. (For more information about keywords see Link, 1979.)

To evaluate the effects of the keyword strategy, a three-phase study was arranged: baseline, intervention, and retention. Throughout a 5-day baseline period, teachers either lectured the students or required them to read passages from their textbooks. Students were not instructed in the RIMS strategy at this time. Following the baseline, a 5-day intervention phase was scheduled. Throughout this period, teachers used the six steps from the Academy for Effective Instruction and students were instructed in the RIMS strategy. Several days after the intervention phase, a retention phase was scheduled, during which time data were gathered once a week for 4 weeks. In this phase, students were not instructed on the keyword strategy.

Following the lecture or reading in all sessions across phases, students were given a 20-item, 1-minute timing over the material (see and mark [S/M] keywords, see and write [S/W] answers). During this timing, the students' first task was to circle all the keywords in the question and then answer the question. Students were instructed to move on to the next question if they were unable to answer the question after circling the keywords. At the end of the timing, students put a slash where they finished. They were then instructed to finish the exercise untimed.

Data were obtained on the number of correct and incorrect answers to keywords circled and answers written during the timed period. Data were also obtained on the number of correct and incorrect answers marked during the untimed portion of the exercise. Data from the three phases were charted on the Standard Celeration Chart.

Graphic Organizers

Graphic organizers are spatial displays of information that are connected in a meaningful way. This study investigated the effectiveness of presenting lecture information through a graphic organizer, as measured by student performance on a PT timing (S/W answers). It was assumed that if teachers presented information using a graphic organizer as a visual aid, students would improve their performance on timings.

Graphic organizers were categorized into four formats: (1) top down/bottom up (to organize information that has a main idea followed by supporting details); (2) compare/contrast (to compare key attributes of various items or situations); (3) sequence (to depict a progression of events); and (4) diagram (to display information in the form of sketches, maps, and pictures).

Teachers who participated in the project were given the following four-step procedure for developing graphic organizers to accompany the material presented to their students:

Step 1. Select an appropriate scope of content material. A graphic organizer could cover enough information for 1 or 2 class periods.

Step 2. Determine the most important facts and concepts from the selected material.

Step 3. Arrange the facts and concepts on paper in a logical manner. Boxes, circles, lines, arrows, and other symbols could be used to display relationships among pieces of information. It is important to consider the teaching objective carefully and select an appropriate and efficient format.

Step 4. Prepare three different copies of the graphic organizer for students: completely blank and partially blank copies to use for lectures or quizzes and a completed organizer for review activities. (For more detail on

developing and implementing graphic organizers, see Horton & Lovitt, 1989.)

To evaluate the effects of graphic organizers, a two-phase study was arranged: baseline and intervention. Throughout a 5-day baseline, teachers either lectured or required students to read passages from their textbooks. During the 5-day intervention phase, teachers explained the use of graphic organizers and provided students with a rationale for their use. The new material was then presented using the six steps from the Academy for Effective Instruction and the four-step graphic organizer procedure. Following all sessions throughout the study, students were given a 50-item, 3 minute timing over the material that was presented. Data were entered on a Standard Celeration Chart.

Study Guides

Study guides are outlines, abstracts, or questions that emphasize important information in textbooks or lectures. They have taken a variety of forms, from straightforward listing of sentences to more involved outlines. This study examined the use of study guides as a teaching strategy for presenting information and a means of improving student performance on timings related to content materials.

The following four-step procedure was provided to teachers to help them develop study guides:

Step 1. Select an appropriate scope of content material. A study guide could cover enough material for 1 or 2 days of assignments.

Step 2. Determine the most important facts and concepts from the selected material.

Step 3. Arrange the facts and concepts logically and sequentially.

Step 4. Prepare copies of the guides for students. Write them at a level appropriate for students and consider the amount of information they are to complete. (For more information on developing and implementing study guides, see Lovitt & Horton, 1987.)

To evaluate the effects of study guides, baseline and intervention periods were scheduled. During a 5-day baseline phase,

teachers either lectured or required students to read passages from their textbooks. During the 5-day intervention phase, teachers provided a rationale for using study guides and used the six steps from the Academy for Effective Instruction and the four-step study guide procedure.

Following all sessions, students were given a 50-item, 3-minute timing (S/W answers) over the material that was presented. At the end of 3 minutes, the students made a mark and continued responding until they were finished with the exercise. Thus, two scores were calculated for the pupils: one for the timed and one for the untimed period. Data were plotted on the Standard Celeration Chart.

Workshops and Follow-Up

Each workshop was conducted by two members of the ULRC staff and ran for about 6 hours. For the first 3 hours the staff presented an overview of the strategy and explained procedures for implementing and integrating it with PT techniques. The presenters also offered a rationale for scheduling the strategy and summarized supporting research. Sample lessons were modeled to demonstrate the use of the strategy and how to collect and record data. Throughout the afternoon, teachers were assisted by ULRC trainers to develop the materials, including PT timing sheets, required to carry out the strategies in their classrooms. To facilitate this process, teachers brought their textbooks, class notes, and other instructional materials to the workshops.

After the teachers completed their research on one of the strategies, they responded to a follow-up survey. They were asked whether they thought the strategy assisted students, particularly low-achieving students; whether they would continue using the strategy; whether they received support from principals as they carried out the strategy, and whether they informed other teachers about the new approach. Students who participated in the research were also surveyed. They were asked whether they thought the strategies helped them learn more and whether they would continue using them.

Evaluation

The data from this project were analyzed in several ways. First, the overall data from each of the strategies were examined. For this, data were pooled from all districts, teachers, and students. For keywords and study guides there were two measures: one for circling keywords or completing study guides during timed periods and one for circling keywords or completing study guides and answering questions during untimed periods. For graphic organizers, data were from timed periods only.

The data, in Figure 1, indicated that the mean correct rates increased from baseline to intervention phases for all three strategies. Mean incorrect rates decreased from baseline to intervention phases for study guides and graphic organizers, and from baseline to retention phases for keywords.

In addition, net gains were calculated for all the districts and teachers for the three strategies. Those data, for the timed periods, showed that for keywords, graphic organizers, and study guides, all districts improved.

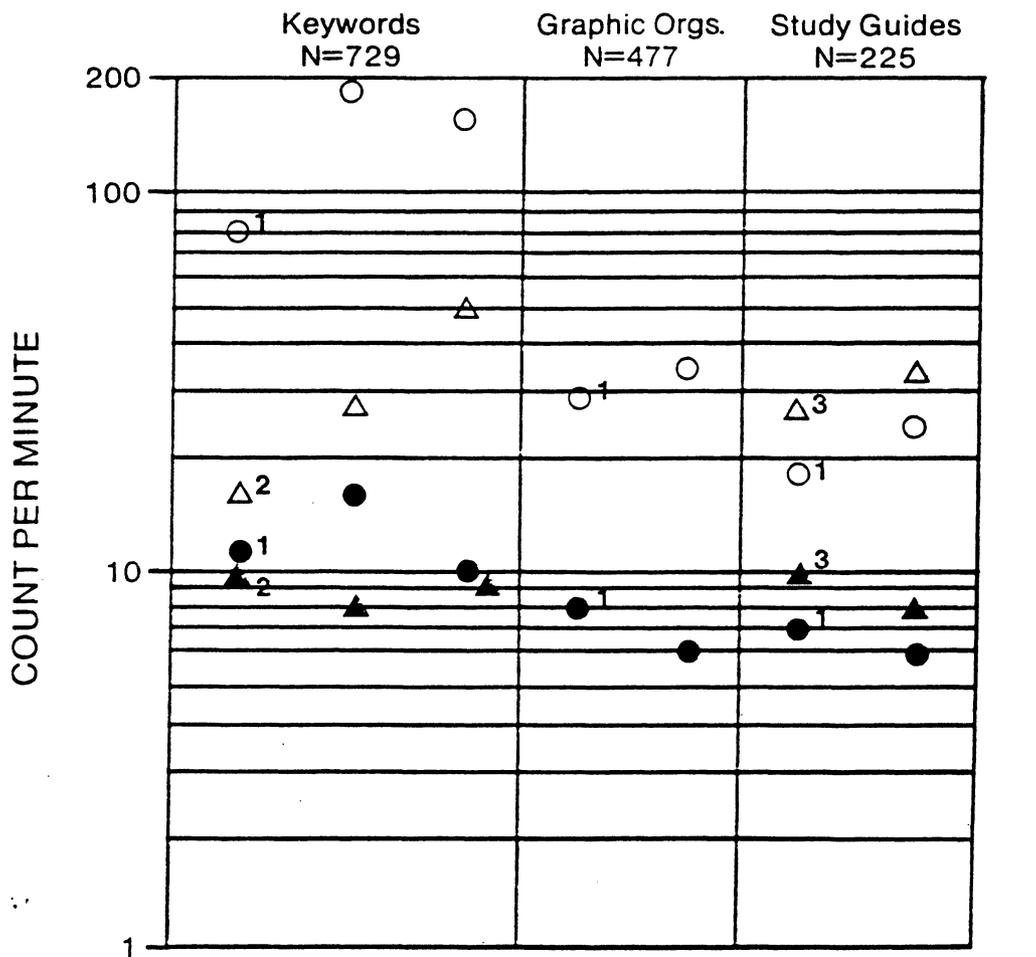
With respect to the net gains for teachers for the timed periods, data showed that for keywords, 30 of 38 teachers improved from baseline to intervention and 17 of 23 from baseline to retention. For graphic organizers, 21 of 25 teachers improved from baseline to intervention. and for study guides, 11 of 12 teachers showed improvement across those phases.

Data from the teachers' follow-up surveys showed that most of them thought the strategies helped low-achieving students and increased student achievement in general. The majority also indicated that they planned to incorporate the strategies and timing sheets into their teaching after the study, that many of their fellow teachers were interested in learning more about the strategies, and that building principals supported their efforts to try out the procedures.

Survey results from the students indicated that most of them believed that their grades would improve as a result of using graphic organizers

Figure 1

OVERALL RATES FOR THREE STRATEGIES



	B	I	R	B	I	B	I
○ Correct	81	183	158	28	34	18	24
● Incorrect	11	16	10	8	6	7	6
△ Correct	16	27	49	—	—	26	33
▲ Incorrect	10	8	9	—	—	10	8

- 1 Correct and incorrect rates during timed tests for keywords, graphic organizers, and study guides.
- 2 Correct and incorrect rates during untimed test for keywords.
- 3 Correct and incorrect rates during untimed test for study guides.

B=Baseline
I=Intervention
R=Retention

and study guides and that they planned to continue using them. They were not convinced that knowing about keywords would raise their grades, and they were not certain that they would continue using them.

Conclusion

This research yielded two recommendations for teachers. One is that teachers, particularly those at the secondary level, should make use of the teaching and learning strategies discussed here. Sufficient evidence exists to show that these strategies help youngsters gain more from lectures and textbooks.

The second recommendation deals with evaluation. We strongly support the use of PT techniques for assessing educational programs and procedures. The data from this project, gathered with PT techniques, were highly sensitive to various teachers' abilities to carry out programs and to various pupils' performances in their classes.

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