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FOUR VALIDATED INSTRUCTIONAL STRATEGIES

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ABSTRACT: This is a summary of specific teaching strategies found useful. Each strategy has been field tested and validated to demonstrate effectiveness. The strategies can be used across a range of subject matters.

Response cards: Cards, signs or items that are used by students to indicate their response to a question or problem presented by the teacher. Response cards allow a teacher to provide practice for all students simultaneously instead of just calling on one or two students. Evaluation indicated that with response cards well over ten times as many student responses were obtained, with higher test scores, than without response cards.

Guided Notes: Teacher prepared handouts that guide a student through a lecture with standard cues and specific spaces in which to write key facts, concepts, and relationships. Data support higher test scores when guided notes are used, and that student notes are more accurate after using guided notes.

Error Correction: The use of multiple opportunities for students to practice (respond) to materials during the acquisition phase of learning, while providing immediate feedback and error correction that ensures that students don't practice errors. Error correction has been shown to improve student learning in a range of studies.

Time Trials: Following the acquisition phase of learning, used to help students build fluency, i.e., the ability to respond quickly and accurately within a given time limit and to retain learning over time. Studies have shown that time trials improve student accuracy and that students like time trials.

Following is a description of four instructional strategies-response cards, guided notes, effective and efficient error correction, and time trials-that have demonstrated and validated benefits in improving the educational performance of both general and special education students. Each of these "low-tech" procedures is easy to implement using inexpensive, readily available materials. Additionally, each of the four strategies for improving student performance can be integrated across the curriculum areas and subject matter.

Response Cards

Program Description

Response cards are cards, signs, or other items that are simultaneously held up by all students to display their responses to a question or problem presented by the

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teacher. There are two basic types of response cards: *preprinted* and *write-on.* With preprinted cards, the student selects a card showing her chosen answer from her personal set of cards. Preprinted responses on cards may include "Yes/True" or "No/False," numbers, colors, traffic signs, molecular structures, or parts of speech, depending upon the nature of the lesson. Preprinted cards may also include those with multiple responses allowing students to indicate their chosen response. With write-on response cards, each student marks or writes an answer to each instructional item on blank cards or boards that are erased between learning trials. Heward, Gardner, Cavanaugh, Courson, Grossi, and Barbetta (1996) illustrate and describe numerous responses cards for various curriculum areas and provide suggestions for their effective use.

Evaluation

Response cards have been evaluated in studies conducted in regular and special education classrooms at the elementary, middle, and secondary levels (Heward, 1994). For example, Gardner, Heward, and Grossi (1994) reported three basic findings from whole-class science lessons in an inner-city fifth-grade classroom. First, students responded to teacher-posed questions an average of 21.8 times per 30-minute lesson when response cards were used, compared to and average of only 1.5 responses per lesson when students raised their hands and were called upon individually by the teacher to respond orally.

Second, all 22 students scored higher on next-day quizzes and 2-week review tests that followed lessons with response cards than they did on quizzes and tests that followed lessons in which hand raising and individual responding had been used. Third, all but one student preferred response cards over raising their hands and waiting to be called on by the teacher.

Guided Notes

Program Description

The lecture is widely used in middle and high school classrooms to present academic content to students. The teacher talks, and students are held responsible for obtaining, remembering, and using the information at a later time. Most successful students take notes during teacher lectures that they study later. Students who take good notes and study them later consistently receive higher test scores than students who only listen to the lecture and read the text (Baker & Lombardi, 1985; Carrier, 1983). Although various strategies and formats for effective notetaking have been identified, they are seldom taught to students (Saski, Swicegood, & Carter, 1983). The listening, language, and, in some cases, motor skill deficits of many students with learning disabilities make it extremely difficult for them to identify what is important and write it down correctly and quickly enough during a lecture. While trying to choose and write one concept in his notebook, the learning disabled student

might miss the next two points. When teachers develop guided notes to accompany their presentations, both mainstreamed students with disabilities and their regular classroom peers benefit.

Guided notes are teacher-prepared handouts that "guide" a student through a lecture or demonstration with standard cues and spaces in which to write key facts, concepts, and relationships. Guided notes take advantage of one of the most consistent and important findings in recent educational research: Students who make frequent, relevant responses during a lesson learn more than students who are passive observers. Guided notes have applicability both in the regular classroom and in the education of children with learning disabilities, as well as in other instructional settings. The listening, language, and motor-skill deficits of many children with learning disabilities sometimes makes it difficult for them to take notes with fluency, that is, to identify what is important and write it down correctly and quickly enough during a lecture. Examples of guided notes and suggestions for constructing and using them in the classroom can be found in Heward (1996).

Evaluation

Yang (1988) found that, compared to students taking their own notes, use of guided notes resulted in higher scores on next-day oceanography quizzes for all five mainstreamed children with learning disabilities and 17 of 18 nondisabled students in a middle school science class.

Pados (1989) found that for US History taught in a fifth-grade classroom, the two mainstreamed students with learning disabilities, all 1I general education students, and 6 of 7 gifted students obtained higher next-day quiz scores with guided notes. Pados also found that guided notes markedly improved the accuracy of students' notes for the students with learning disabilities (18% own notes vs. 89% guided notes), general education students (34% vs. 97%) and gifted students (38% vs. 97%). Extent of benefits from use of guided notes in comparison to student-taken notes appears to be similar whether used in a short format or a more extensive format (Courson, 1989). Lazarus (1993) extended findings by Pados (1989) that, for students with mild disabilities, supervised review of guided notes in the resource room resulted in superior quiz scores compared to when their own notes were reviewed in the resource room. White (1991) found that use of guided notes for some lessons and student-taken notes for others, over time, led to improved accuracy in student-taken notes over time (17% initially vs. 84% on follow-up). Beckley, AI-Attrash, and Heward (1997) found that guided notes resulted in higher next-day quiz scores and much more accurate lecture notes for all 18 students in an eighth-grade social studies class. This study included 3 mainstreamed students with learning disabilities who reviewed their notes with a resource room teacher.

Effective and Efficient Error Correction

Program Description

Students learn by doing, but when students are allowed to repeat errors, they may learn to perform skills incorrectly. Most errors are made during the acquisition phase of learning, when the student is learning how to perform a new skill or to remember and use correctly new knowledge. Feedback during this initial phase of learning feedback should focus on the accuracy of the student's response, follow each practice trial, and be provided before the student is required to practice or use the new skill or knowledge again. The biggest problem with delayed feedback during the acquisition phase of learning is that it allows students to practice errors. Strategies for ensuring students receive systematic feedback and error correction during the acquisition stage include:

- providing frequent opportunities for all students to actively respond with techniques such as choral responding and response cards,
- using peer tutoring or small-group activities in which peers provide feedback and error correction to one another following each response,
- using computer-based instructional procedures that provide feedback on each response before proceeding to the next item,
- having students self-score and self-correct their work before proceeding to the next item, and
- avoiding homework or seatwork activities that do not contain self-scoring and self-correcting components until students can perform the targeted skills with some accuracy.

Evaluation

Studies were done in various subject matter areas (see references) but they have not been replicated across all subject matters.

Research suggests that learning is enhanced when error correction has the following qualities:

- Errors are corrected before going on to the next item or problem. Comparison of "right now" and "end-of-the-Iesson" error correction during sight word lessons with primary students with mental retardation and science vocabulary lessons with upper elementary-age students with learning disabilities, have found that the benefits of "right now" error correction are superior (Barbetta, Heward, Bradley, & Miller, 1994; Kleinman, Heckaman, Kimball, Possi, Grossi, & Heward, 1994).
- Several studies have shown that the effectiveness of error correction is improved when students are provided with complete information or a direct model of the missed item (Barbetta, Heward, & Bradley, 1993; Espin & Deno, 1989). Instead of offering incomplete or indirect feedback, the

teacher should tell, show, and/or guide the student through the correct response.

- Correcting an error in 3 to 4 seconds is better than discussing the student's mistake for a minute or longer. Although a detailed explanation is sometimes necessary, students often get confused or lose interest, and the time lost to hashing over the previous error is better used to conduct several more complete learning trials (Heron, Heward, Cooke, & Hill, 1983).
- Results from several studies show that feedback is more effective when the student who erred is given an opportunity to repeat immediately the corrected response (Barbetta & Heward, 1993; Dalrymple & Feldman, 1992; Drevno, Kimball, Possi, Heward, Gardner, & Barbetta, 1994).
- In a study with six primary students with mild mental retardation during sight word lessons, Barbetta, Heron, and Heward (1993) compared the effectiveness of error correction in which the teacher, but not the student, gave the correct response, to an error correction procedure in which the student repeated the teacher's model. Student repetition of the teacher's model was more effective for all six of the children on five measures of performance: number and percent of correct responses during instruction, same-day tests, next-day tests, tests 2 weeks after instruction, and words read in sentences.

Time Trials for Fluency Building

Program Description

Providing students with practice to build fluency-performing a skill with both speed and accuracy-is an important part of teaching. To be functional, many skills (e.g., reading, math facts) must be performed at a criterion rate of speed. After the initial acquisition stage of learning, when a student learns how to perform the skill correctly, the students should progress to the practice stage of learning in which the focus shifts to building fluency with their newly-learned skills. Daily time trials, or the opportunity to perform a skill as many times as one can in a brief period, is one excellent tactic for fluency building. Miller and Heward (1992) have offered guidelines for conducting time trials:

- keep the time for each trial short; 1 minute is sufficient for most academic skills,
- timed trials every day, perhaps in series of two or three 1-minute trials,
- make the trials fun; they should be presented as a learning activity similar to a game rather than as a test,
- use timed trials only during the practice stage of learning (i.e., after students have learned how to perform the skill correctly),
- follow timed trials with a more relaxed activity,
- during feedback, emphasize proficiency (number correct), not accuracy (percent correct),

- instruct students to try to best their own best scores,
- have students graph their own progress.

Evaluation

Studies have shown that not only do both general and special education students benefit from time trials, but that students also like to be timed. For example, 11 students with mental retardation took part in a study of the effects of 1-minute time trials on the rate and accuracy of answering single-digit math facts (Miller, Hall, & Heward, 1995). During the first two weeks when the students were instructed to "answer as many problems as you can" during daily 10-minute work periods, they correctly answered an average of 8.4 problems per minute. During the next phase, which involved a daily series of seven 1-minute time trials, the students' average correct rate increased to 13.2 per minute. During a final phase, when immediate feedback and self-correction were incorporated immediately following time trials, fluency improved to 16 problems per minute. Working faster did not harm the students' accuracy; during the 10-minute untimed phase they answered 85% of problems attempted, and when time trials were used their accuracy was 89%. When asked at the end of the study, 10 of the 11 students said they liked time trials better than the untimed work period. These results are consistent with the findings of other research on use of time trials with regular and special education students (McCuin & Cooper, 1994; Stump, Lovitt, Fister, Kemp, Moore, & Schroeder, 1992; Van Houten, 1980; Weinstein & Cooke, 1992).

For Further Information

Each of these individuals shown below can provide additional research information and/or technical assistance to schools and educators who want to learn more about the four strategies described. Areas of particular interest and expertise are identified for each person.

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