EFFECTS OF ACTIVE STUDENT RESPONSE DURING ERROR CORRECTION ON THE ACQUISITION, MAINTENANCE, AND GENERALIZATION OF SCIENCE VOCABULARY BY ELEMENTARY STUDENTS: A SYSTEMATIC REPLICATION

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We compared active student response (ASR) error correction and no-response (NR) error correction while teaching science terms to 5 elementary students. When a student erred on ASR terms, the teacher modeled the definition and the student repeated it. When a student erred on NR terms, the teacher modeled the definition while the student looked at the vocabulary card. ASR error correction was superior on each of the study's seven dependent variables.

DESCRIPTORS: active student response, education, error-correction procedures, elementary students, feedback

This study was conducted in an attempt to replicate and extend the findings of two previous experiments that investigated the effects of active student participation in the correction of errors during academic instruction. Barbetta, Heron, and Heward (1993) found that when students with developmental disabilities repeated the teacher's model of the correct response (active student response, or ASR, error correction) following their errors during sight-word instruction, they performed better during instruction and learned and maintained more words than when they simply attended to the teacher's modeling of the correct response after each error (no-response, or NR, error correction). Similar results were obtained in a replication in which elementary students with learning disabilities were taught geography facts (Barbetta & Heward, 1993). This study addressed two questions: (a) Would ASR error correction be more effective than NR error correction with academic tasks that are more complex than the relatively simple discrimination tasks taught in the two earlier studies? (b) Would the superiority of ASR error correction found with students with disabilities be reproduced with nondisabled students?

METHOD: Five children from three different fourth-grade general education classrooms in an urban, public elementary school participated in the study on recommendation of the school principal. Nick and Leticia, who were enrolled in the school district's program for gifted and talented students, were selected for academic enrichment purposes. Berto, Tom, and Matt were chosen because they were considered to be at risk for academic failure. According to their teachers, Tom and Nick exhibited behavior problems during classroom instruction, and Berto had a severe stutter.

Weekly pretests were administered to generate a new set of 12 unknown science terms for each student (eight terms for Matt). If a student provided a definition during the pretest judged by the experimenter to be "close" to the correct definition, that term was not used. Each term was typewritten on one side of an index card (5 in. by 8 in.), and a 4- to 13-word definition was printed on the back of each card (e.g., *barometer*—an instrument used to measure air pressure in the atmosphere). Each set of vocabulary cards was randomly and equally divided into either the ASR or the NR error-correction condition.

One-to-one instructional sessions were conducted 3 or 4 days per week, with the experimenter and student sitting across from one another at a table. A new set of science terms was used each week. Each 20- to 30-min session consisted of (a) either an initial presentation of all terms and definitions on the first session only for each set, or a next-day test, (b) three rounds of practice trials with ASR or NR error correction, and (c) a same-day test. Procedures for presenting each item, providing error correction, testing, and recording of dependent variables are described in Barbetta et al. (1993).

An alternating treatments design was used to compare the effects of the two error-correction procedures on seven dependent variables: (a) percentage of practice trials in which correct definitions were stated, (b) percentage of just-corrected definitions stated correctly on their next presentation (next-trial corrects, NTCs), (c) number of definitions stated correctly on same-day tests, (d) number of definitions stated correctly on next-day tests, (e) percentage of learned definitions correctly stated on 1-week maintenance tests, (f) percentage of learned definitions written correctly on 1-week paper-and-pencil tests of maintenance and generality, and (g) percentage of learned definitions correctly stated on an end-of-the-study maintenance test. To be scored as correct, a student's definition had to match, word for word (except for articles), the definition printed on the back of the vocabulary card. A student had to begin stating the definition within 3 s after the vocabulary card was presented (a 5-s latency was used with Berto).

A second observer independently recorded each student's performance on approximately one third of all instructional sessions and maintenance tests. Overall, interobserver agreement was 97% or higher for each of the dependent variables except NTC (82%) and paper-and-pencil maintenance tests (89%).

RESULTS AND DISCUSSION: Table 1 summarizes each student's performance on all seven dependent variables. ASR error correction was more effective than NR error correction for all 5 students on both variables measured during instruction and on all five types of postinstruction tests. The data for practice trials and NTCs show that ASR error correction produced approximately 50% more correct responses during instruction. Although the percentage of learned definitions maintained was not always higher for terms taught with ASR error correction (i.e., Nick's, Leticia's, and Tom's 1-week maintenance scores, Berto's paper-and-pencil tests), in every instance the number of definitions maintained was higher with ASR error correction because more terms were initially learned under that condition.

Table 1

Percentage and/or Number of Science Definitions Stated Correctly As a Function of Active Student Response (ASR) and No-Response (NR) Error Correction

Student	Practice trials		Next-trial corrects		Same-day tests ^a		Next-day tests ^a		1-week maintenance		1-week paper and pencil		End-of-study maintenance	
	ASR	NR	ASR	NR	ASR	NR	ASR	NR	ASR	NR	ASR	NR	ASR	NR
Nick (6) ^b	51% (396) ^c	36% (396)	25% (185)	21% (242)	4.4	3.3	4.0	3.3	83% (30)	88% (26)	60% (25)	32% (19)	36% (36)	22% (32)
Leticia (9)	36% (504)	27% (504)	18% (349)	12% (425)	3.4	2.5	3.1	2.2	85% (41)	85% (33)	85% (41)	67% (31)	59% (44)	38% (37)
Berto (9)	45% (576)	30% (576)	23% (313)	14% (392)	3.6	2.9	3.2	2.5	70% (30)	63% (27)	92% (26)	95% (20)	28% (47)	16% (45)
Tom (7)	14% (450)	3% (450)	8% (383)	2% (438)	1.3	0.3	1.4	0.2	79% (14)	100% (4)	0% (6)	0% (2)	71% (17)	40% (5)
Matt (5) ^c	12% (354)	4% (354)	8% (333)	4% (372)	1.4	0.5	0.7	0.3	65% (17)	54% (11)	66% (3)	0% (1)	25% (20)	15% (13)
Group	33% (2,280)	21% (2,280)	15% (1,563)	10% (1,869)	49%	32%	41%	29%	78% (132)	77% (101)	76% (101)	63% (73)	42% (164)	24% (132)

^a Total of six terms in each error-correction condition, except for Matt, who had four terms in each condition.
^b Number of weekly sets of unknown science terms.
^c Numbers in parentheses represent denominators for percentages directly above (i.e., total number of practice trials, total practice trial errors for NTCs, and previously learned definitions for measures of maintenance).

These results add to those of Barbetta et al. (1993) and Barbetta and Heward (1993) in two important ways. First, ASR error correction was found to be more effective than NR error correction with a more complex academic task: definitions of science terms as opposed to the sight word and geography facts used in previous studies. Second, this study produced the same functional relation (i.e., the same pattern of better performance during instruction and on postinstruction tests as a function of ASR error correction) with general education students that was found in previous experiments in which only students in special education programs had participated. The second point may be the most important outcome of the experiment; some teachers may believe that only students with developmental or learning disabilities need to respond actively. Both academically advanced students (Nick and Leticia) and students judged to be at risk academically performed better during instruction and retained more of what they had learned with ASR error correction. The data for Tom and Matt, however, suggest that it may be particularly important for low-performing students to be given an opportunity to emit the correct response following an error. Although the number of terms they learned under either error-correction procedure was not high, both boys correctly defined an average of three to four times as many science terms taught with ASR error correction than they did for terms taught with NR error correction on tests given immediately after instruction. Because the purpose of the experiment was to analyze the effects of active student response during error correction, the procedure was designed to allow numerous errors during instruction. The ASR condition was not intended to be a complete instructional method. When used in conjunction with other empirically demonstrated elements of effective instruction (e.g., interspersing known items, providing antecedent response prompts to facilitate the transfer of stimulus control from the teacher to the printed vocabulary term), ASR error correction may prove to be a significant component of "best practice."

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