HIGH SCHOOL DRIVER EDUCATION USING PEER TUTORS, DIRECT INSTRUCTION, AND PRECISION TEACHING

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The authors investigated the combined effects of direct instruction and precision teaching by peer tutors in a high school driver education curriculum. Learners ($N = 4$) included students with intellectual and learning disabilities and students without disabilities. Peer tutoring was associated with immediate increases in correct responding and a simultaneous and rapid deceleration of errors. Three learners passed the written tests in the driver education classroom, obtained driver's licenses, and produced similar or better driving records than students who did not require assistance. This program is being continued and expanded by school personnel without assistance from the authors.
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Obtaining a driver's license is an important step in gaining community access. According to D'Alonzo and Drower (1984), the ability to drive "creates numerous opportunities for travel, recreation, and employment that might not otherwise be available" (p. 11). However, the National Highway Traffic Safety Administration (1985) estimated that over 100,000 persons with disabilities were unemployed because they lacked transportation. This problem has been associated with social isolation, dependence, poverty, and family disruption (Will, 1984). Transportation, then, should be a primary focus when preparing high school students for independent living (Kerr, Nelson, & Lambert, 1987).

Currently, Texas, New Hampshire, Wisconsin, and Utah require all citizens to pass an approved driver education course before they are allowed to take the state driving exam. Another 20 states restrict the driving privileges of those who have not passed an approved course. Most high schools offer driver education courses that typically include classroom and simulation training (Zider & Gold, 1981) designed to prepare students for the state driving exam.

However, many students fail the driver education courses; some of them do so repeatedly. From 1986 to 1988, between 21% and 25% of the students in a Utah high school driver education course failed to earn sufficient grades and were not allowed to take the state driving exam. In addition, the average class size increased each year from 38 in 1986 to 57 in 1988. As the class sizes increased, so did the failure rate, possibly reflecting the reduced ability of the teachers to assist students who need additional help.

There were two types of requirements in this driver education course: range driving and written maneuvers tests on which the students drew and labeled driving sequences such as turns and parking movements. To pass the course, students were required to write the 18 maneuvers with 100% accuracy. From 1986 to 1988, 94% of those students who failed the driver education course failed the written maneuvers tests.

To assist those students, an intervention was designed that placed minimal demands on teacher time and effort. Several instructional strategies, based on behavioral learning principles, have been effective, including peer tutoring (Cooke, Heron, & Heward, 1983), direct instruction (Becker & Engelmann, 1978; Engelmann & Carnine, 1982), and precision teaching (Lindsley, 1990). Typically, these strategies have been applied to basic skill areas such as reading, math, spelling, and history (Bell, Young,

Blair, & Nelson, 1990; Delquadri, Greenwood, Whorton, Carta, & Hall 1986; Engelmann, Becker, Carnine, & Gersten, 1988; White, 1986). Use of these strategies requires substantial planning and training, which many educators have been unwilling to undertake. Packaging these instructional strategies in a format sufficiently simple to implement by peer tutors in a secondary content area remains a challenge. We investigated the combined application of direct instruction and precision teaching by peer tutors to teach high school students the written maneuvers portion of the driver education curriculum.

METHOD

Subjects and Selection

At the end of the 3rd week of the driver education class, 4 students with the lowest scores on the written tests were selected as learners. Learner 1 was a 16-year-old female with intellectual disabilities (WISC-R full scale I.Q. = 64). Learners 2 and 3 were nondisabled 16-year-old males who had previously failed the driver education class. Learner 4 was a 16-year-old male, identified as learning disabled based on the discrepancy between his expected performance (WISC-R full scale I.Q. = 83) and his actual performance on achievement tests. Each learner's high school grade point average was below 1.6 on a 4.0 scale.

Four students were selected to be peer tutors. Tutor 1 was an 18-year-old male who had tutored in a direct instruction reading group. Tutor 2 was a 17-year-old female who tutored in a version of this intervention during a pilot study. Tutors 3 and 4 were 17- and 18-year-old males who had no previous experience in peer tutoring, direct instruction, or precision teaching. Each tutor was paired with the same learner for the entire study.

Setting

This study was conducted in a high school of approximately 1,300 students from communities located 5 to 35 miles from most employment opportunities in the area. These communities were not served by public transportation. Each day, the

learners and tutors met in a regular education classroom for the last 10 min of driver education. The tutors, learners, and the investigator were the only persons in the room during the training sessions.

Experimental Design and Conditions

A multiple baseline design (Kazdin, 1982) across three maneuvers was applied to each learner, beginning with "backing right" and proceeding sequentially to "turning left" and "passing" as the learner met criterion on the previous maneuver.

The experimental conditions consisted of baseline, peer tutoring, and maintenance.

Baseline. The learners were removed from the driver education classroom for approximately 5 min each day and were asked to write as much of each maneuver as they could during 1-min timings. The learners participated in the regular driver education class for the remainder of the class period, where instruction continued to be provided by the teacher.

Peer tutoring. Peer tutoring was delivered in 10-min daily sessions, beginning when the learner sat down at a desk facing the tutor. Using a checklist, the tutors were trained in a 40-min session to use the direct instruction format of model, test, retest; to acknowledge correct responses; to use the correction procedure of interrupt, model, test; and to begin the timings with the student in the writing position and end the timings in 1 min.

The maneuvers included both narrative and diagram sections. Figure 1 includes a teaching master and corresponding student response sheet for the maneuver "turning left" with response counts indicated in the left column. Because rate was used as a unit measurement, the tasks were divided into discrete responses requiring approximately equal amounts of time. In the narrative section, each number, letter, or punctuation mark counted as one response. For example, the first step in the narrative section was "1. Proper lane ½ block," which required 20 responses. In the diagram section, where the learners used symbols to simulate the tasks and the sequence of actions necessary to complete the maneuver while driving, responses were defined as markings that required a relocation of the writing instrument. For example, brake lights

were represented by an X and required two responses because the student had to relocate the writing instrument after each line in the X.

Because verbal responses provided more opportunities to respond than written responses did, the learners were taught to say the complete narrative section of the maneuver before writing it. For example, "The first step is proper lane ½ block" (model). "What is the first step?" (test). The learner should say, "Proper lane ½ block." Correct responses were followed by a verbal acknowledgment such as "right," "good," or "yes." Incorrect responses or failure to respond were corrected as follows. "Stop" (interruption). "The first step is proper lane ½ block" (model). "What is the first step?" (test). Finally, the response was retested after the presentation of additional steps (retest), and the learner wrote the section.

Using the teaching master as a model, the drawing section of the maneuver was taught by asking the learner to draw one car at a time in the sequence that a car would follow in actual driving. Next, the learner was asked to connect the cars and add the lines. Finally, the teaching masters were removed and the learner was asked to draw the section. Errors or failure to respond were corrected by stopping the learner (interruption), demonstrating the response (model), and asking for a response (test). When the learner was able to reproduce the entire maneuver accurately, timings were introduced.

To provide practice and encourage fluent or automatic responding, the learners were timed for 1 min, during which they wrote as much of each maneuver as they could. Beyond accurate responding, fluent responding has been related to the maintenance and generalization of skills (Liberty, Haring, White, & Billingsley, 1988; West, Young, & Spooner, 1990). Timings were conducted using the blank student response sheets. Each timing began with the learner in the writing position and the direction, "Begin." If an error was made during the timing, the tutor stopped the timing, gave corrective feedback, and began another timing. Timings were continued until the learner could write the maneuver at 112 correct responses per

Figure 1. A teaching master and student response sheet for the maneuver "turning left" with the response counts indicated in the left column.

minute with no errors, a criterion established by timing and averaging the scores of 3 students who were identified by the teacher as high performers. The learners were required to describe the maneuver in writing exactly as in Figure 1. Other abbreviations, alternative markings, or omissions were not acceptable to the driver education teachers and were counted as errors. At the conclusion of each session, regardless of the level to which the learner had advanced in the teaching sequence, a timing was conducted to assess each learner's daily performance. The score obtained from the timing was entered as each learner's daily score.

Maintenance. Daily 1-min maintenance timings were conducted for those maneuvers on which the learner had previously reached criterion. The timings were administered immediately before or after the daily 10-min teaching sessions.

Dependent Variables

Training responses. The dependent variables were the numbers of correct and incorrect responses per minute. The learners responded by writing on the student response sheets and thereby created a permanent product that was later compared for congruence with the teaching masters to score responses.
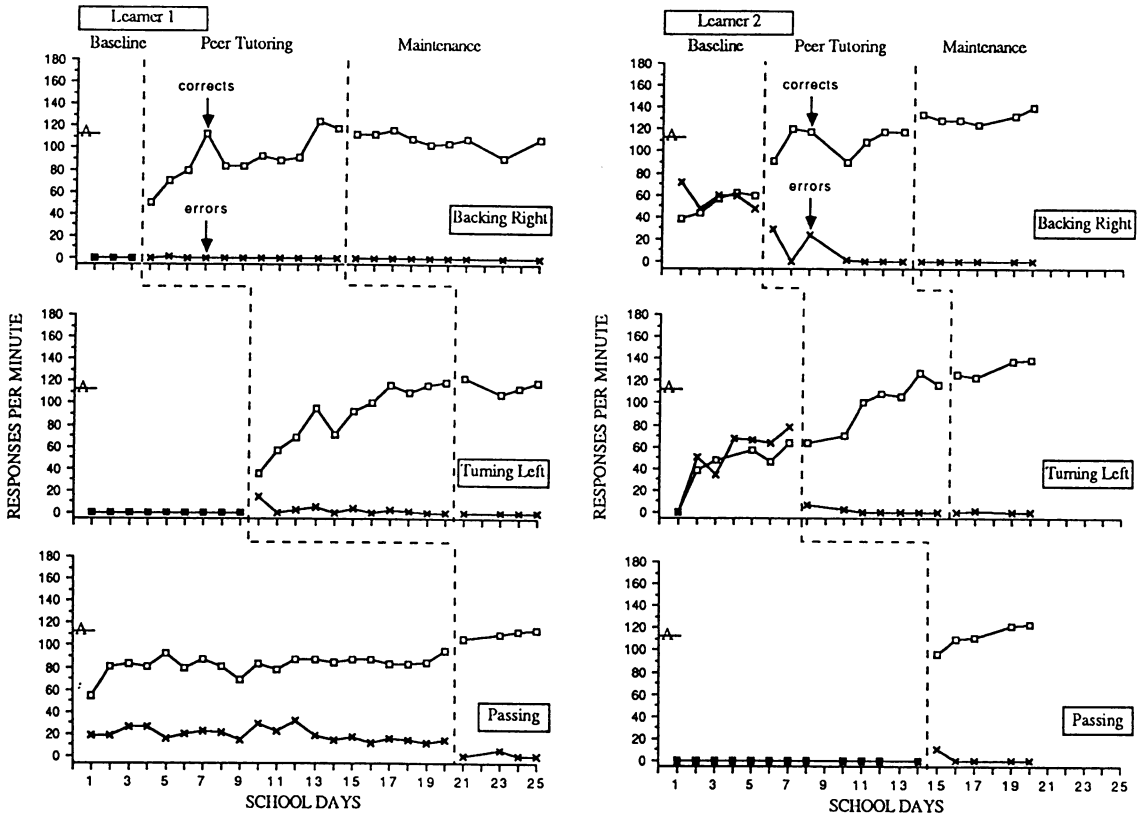
Figure 2.   Responses per minute on "backing right," "turning left," and "passing" for Learners 1 and 2. The criterion of 112 correct responses is indicated with the symbol A.

Classroom performance. The learners' performance on the maneuvers tests taken in the driver education classroom were also collected. For these tests, the driver education teacher required each student to write eight maneuvers, including "backing right," "turning left," and "passing," with 100% accuracy and assigned either a "pass" for each correct maneuver or a "fail" if there were any errors.

Interobserver Agreement

Each response sheet was compared to the teaching masters and scored independently by a tutor and the first author. Initial agreement was obtained on the number of corrects and errors on 202 of 228 (89%) response sheets. Each test taken in the regular classroom was scored as pass or fail by the driver education teacher and a peer tutor. Initial agreement was 96% on these tests. When scorers disagreed, the sheets were recounted by both scorers

point by point, and the corrected scores were entered as session data; thus 100% agreement was achieved on all scores.

Treatment Verification Data

Using the training checklist, we collected treatment verification data on 24 occasions, at least once per condition. Tutors 1 through 4 were scored as following the program components on 98%, 100%, 92%, and 94% of their opportunities, respectively.

RESULTS

Figures 2 and 3 display the effects of peer tutoring on "backing right," "turning left," and "passing" maneuvers for all learners. During baseline, when the learners received instruction only in the driver education classroom, the learners responded inaccurately or at near-zero rates. For all learners, peer tutoring was associated with imme-
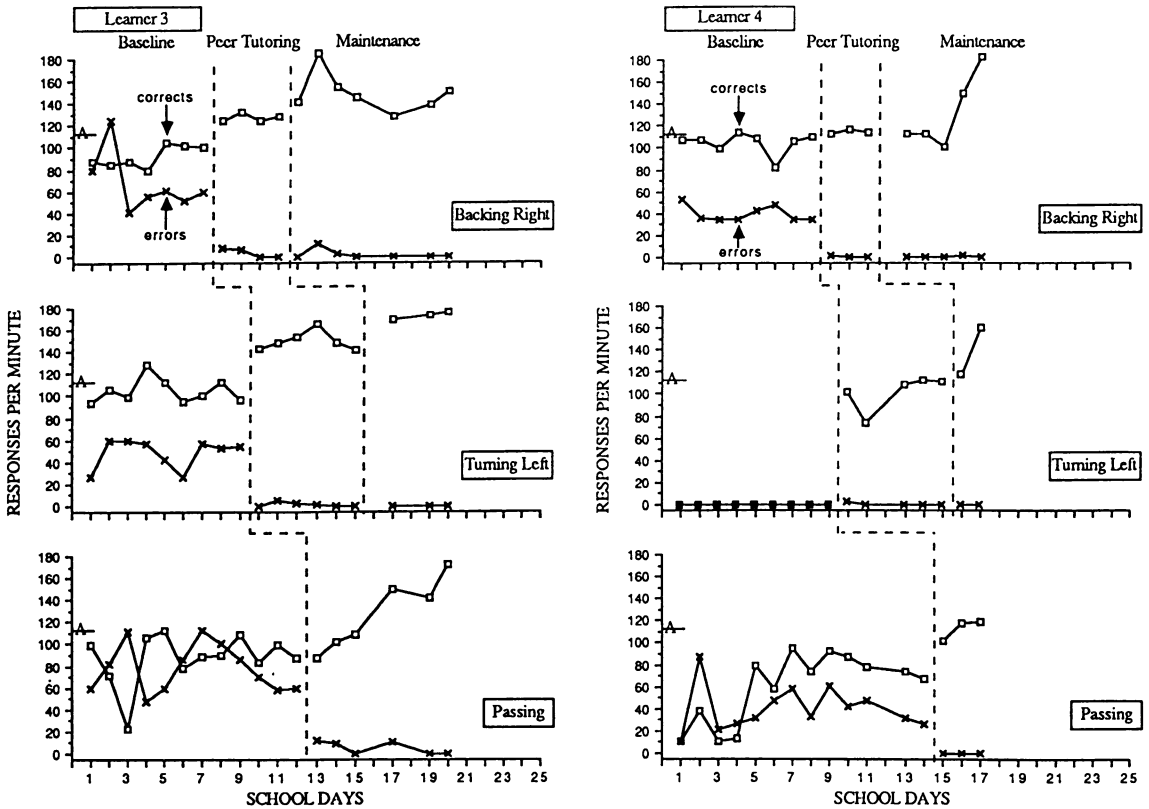
Figure 3. Responses per min on "backing right," "turning left," and "passing" for Learners 3 and 4. The criterion of 112 correct responses is indicated with the symbol A.

diate increases in correct responding or minor increases in correct responding with a simultaneous and rapid deceleration of errors, resulting in both accurate and fluent responding by the 4 learners. A high rate of correct responses and a zero or near-zero rate of errors continued during the maintenance conditions for all learners.

Further positive changes become evident in examining each individual learner's data. Learner 1 (Figure 2) had zero correct responses on "backing right" and "turning left" during baseline and improved to 50 and 36 correct responses, respectively, on the first day of peer tutoring. Learner 2 (Figure 2) responded inaccurately with high rates of correct responses and errors during baseline on "backing right" and "turning left" and with zero responses on "passing." Within 13 10-min sessions, this learner met criterion on all maneuvers.

Learner 3 (Figure 3) had high rates of both correct responses and errors during the last session of baseline conditions on "backing right," "turning

left," and "passing," even though the correct responses accounted for only 62%, 64%, and 59% of the responses, respectively. However, during the first session of peer tutoring the percentage of correct responding changed to 94%, 100%, and 88%. Learner 4 reached criterion on "backing right" and "passing" in only three sessions and on "turning left" in five sessions. Errors were remediated in one session, with the exception of a single error during maintenance conditions.

Each learner's performance on "backing right," "turning left," and "passing" tests taken in the regular driver education classroom and the average scores for the class are represented in Table 1. Weekly test scores in the regular classroom increased as the learners reached criterion in their peer tutoring sessions, with the exception of Learner 2 on "turning left." Three of the 4 learners and 76% of the class received grades of C— or better, which enabled them to take the state driving exam. Learners 2, 3, and 4 passed the state exam and received

Table 1

Maneuvers Tests Taken in the Driver Education Classroom

		Tests[a]								Final class grade	Obtained license	Moving violations (8 months)
		1	2	3	4	5	6	7	8			
Learner 1	Backing right	f	f	f	f	P	P	P	P	D−	No	—
	Turning left	f	f	f	f	f	F	P	P			
	Passing	f	f	f	f	f	f	P	P			
	Score (10 pts. each)	0	0	0	0	10	10	30	30			
Learner 2	Backing right	f	f	f	f	F[b]	P	P	P	C−	Yes	No
	Turning left	f	f	f	f	F[b]	P	P	P			
	Passing	f	f	f	f	F[b]	P	P	P			
	Score	0	0	0	0	0	30	30	30			
Learner 3	Backing right	f	f	f	f	F[b]	P	P	P	C	Yes	No
	Turning left	f	f	f	f	f	P	P	P			
	Passing	f	f	f	f	f	P	P	P			
	Score	0	0	0	0	0	30	30	30			
Learner 4	Backing right	f	f	f	f	F[b]	P	P	P	C	Yes	No
	Turning left	f	f	f	f	f	P	P	P			
	Passing	f	f	f	f	f	P	P	P			
	Score	0	0	0	0	0	0	30	30			
Class average (N = 54)	Score	26	27	24	24	22	26	25	25			

[a] F = fail; P = pass. Lower-case letters indicate baseline; upper-case letters indicate peer tutoring.

[b] Peer tutoring in effect but learner had not reached criterion.

driver's licenses. None of these learners reported receiving a traffic citation or being involved in a motor vehicle accident during approximately 8 months of driving. However, of the 36 classmates that passed the state exam, 11 received one or more moving violations and one was involved in a single-car accident.

Consumer Satisfaction

At the conclusion of the intervention, the learners and tutors expressed their agreement to statements using a 5-point Likert-type scale. All of the tutors and learners indicated that they had learned, that the school should continue this program, and that they would recommend it to others. Additional classes are using this intervention without the assistance of the authors.

DISCUSSION

The authors investigated the application of direct instruction and precision teaching by peer tutors to teach the written maneuvers portion of a driver education class. During baseline, the learners responded inaccurately and at low rates. However, with peer tutoring, all learners met criterion on the maneuvers in the training sessions and passed the tests in the driver education classroom. The fact that these changes occurred only during peer tutoring provides evidence that the training was responsible for the mastery of the maneuvers tests. These effects, demonstrated in a functional curriculum and performed in a regular classroom, attest to the applied significance of these findings.

Further, these results extend the application of peer tutoring using precision teaching and direct instruction to secondary content areas with learners and tutors that have different entry-level skills. The learners included students with and without disabilities, each with a history of failure during over 25 hr of traditional instruction. Peer tutoring produced criterion responding on maneuvers tests taken in the driver education classroom in 17 to 25 sessions, representing less than 3 to 4 hr of instructional

time. All of the tutors delivered this intervention accurately.

Learner 1 required 1 hr longer than the fastest learner to complete the intervention and pass the tests in the regular classroom. However, tutoring began too late in the course for her to master all of the material and pass the class. At the time of this writing, she was enrolled in another program using this intervention package.

Learners 2, 3, and 4 and 66% of their classmates passed the course and the state driving exam, and obtained driver's licenses. According to the results of a telephone survey, the learners' driving records were similar to or better than the other drivers from this class, providing evidence that these disabled and low-performing students can drive as safely in the community as other students their age. Each of the 3 learners reported driving their vehicles over 25 miles each week to work.

Many states and driver education programs require written driving exams. This requirement may discriminate against persons with disabilities that impair performance on written tests but who may otherwise be safe drivers. The inability to obtain a driver's license severely restricts lifestyle, especially in communities that lack public transportation. For that reason, we should scrutinize the testing procedures in our states and lobby against those lacking validity. Finally, because driver education classes generally require both range driving and written competency, materials of the sort presented in this article (Bell & Hofmeister, 1990; copies of the manual are available for $4.50 prepaid from Outreach Division, Developmental Center for Handicapped Persons, Utah State University, Logan, UT 84322-6845, 801-750-1991), in addition to the range driving task analysis of Zider and Gold (1981), may provide a comprehensive program to help low-achieving and disabled persons obtain driver's licenses, access to the community, and opportunities for employment.

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