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EDITORIAL POLICY

The **Journal of Precision Teaching** is a multidisciplinary journal dedicated to a science of human behavior which includes direct, continuous and standard measurement. This measurement includes standard units of behavior, **frequency, latency, and duration**, a standard scale on which successive units are displayed, the **Standard Celeration Chart**, a standard measure of behavior change between two units, **frequency multiplier**, and a standard, straight-line measure of behavior change across seven or more units, **celeration**. Frequencies, latencies, durations, frequency multipliers, and celerations displayed on the Standard Celeration Chart form the basis for Chart-based decision-making and for evaluating the effects of independent variables.

The purpose of the **Journal of Precision Teaching** is to accelerate the sharing of scientific and practical information among its readers. To this end, both formal manuscripts and informal, Chart-sharing articles are considered for publication. Charts produced by behavers are exact reproductions.

Materials submitted for publication should meet the following criteria: (1) be written in plain English, (2) contain a narrative that is brief, to the point and easy to read, (3) use the **Journal of Precision Teaching Standard Glossary and Charting Conventions**, (4) contain data displayed on the Standard Celeration Chart that justify conclusions made, (5) be submitted in quadruplicate to the editor, and (6) include one set of original charts or hand-drawn copies. Each formal manuscript will be reviewed by one consulting editor and two reviewers, two of whom must approve it prior to publication.

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LESS THAN 4 HOURS TO FLUENT LIBRARY LOCATIONAL BEHAVIOR *

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Abstract: The effects of precision teaching (direct, daily measurement) on the library locational skills of secondary learning disabled students was investigated. Timed locational activities were charted on the Standard Celeration Chart over a period of ten days to determine speed of learning for each of six students. In addition, student frequencies were compared to an exemplary (skilled) group of teachers and library aides. Results indicated a x1.4 (40%) rate of growth or higher, per week, for five of the six students, significant differences in beginning and ending frequencies ($p=.038$), and no significant differences between student and exemplar groups ($p=.158$) at the conclusion of the study. It was concluded that precision teaching was an effective tool for creating fluent locational behavior in secondary learning disabled students, and that "harder to do" activities may actually be "easier to learn" when growth factors are taken into consideration.

Teaching learning disabled (LD) students to locate materials in the card catalog and on the shelves in libraries is a neglected component of the curriculum in secondary public education. For the LD adolescent confronted with reference assignments, knowledgeable and fluent use of the library is requisite to survival in school settings. Alley and Deshler (1979) have noted that LD adolescents who have not acquired strategies necessary to use reference materials are at an educational disadvantage. A method for producing rapid acquisition and fluency of locational skills is essential if LD adolescents are to successfully complete library assignments.

* The procedures described in the following article are intended to encourage precision teachers to look at their students' needs outside the immediate classroom setting. Media Centers and libraries are full of activities which can be adapted to a PT model, as are art, music, computer, and vocational areas. Further, even the simple activity of locating books in the library can be conducted as a study and shared with other precision teachers and researchers. We have to go a little further than "see/say add facts"; let's grow past the basics and mere practice sheet teaching.

Although the amount of data-based information available on teaching locational skills is limited, other instructional publications have provided suggestions that may benefit teachers. Dallman (1958) recommended that students browse the card catalog for titles being used in their own classroom. In addition, she suggested book placement diagrams and simulated card catalogs for use in the classroom. A comprehensive, semester or year long training program was suggested by Jones (1966) and Peterson (1974) as the ideal method for producing students competent in library use. Components of those comprehensive programs included: teaching alphabetizing skills, location and use of reference materials, demonstration and instruction in card catalog use, explanation of Dewey decimal and Library of Congress classification systems, limited practice of locational exercises, and oral book reports. Although these programs would seem to have value initially, it should be noted that they have not been empirically validated, nor do they suggest techniques for teaching basic locational skills in a minimum amount of time.

The present study reports the effects of precision teaching (direct, daily measurement and practice) on the library locational skills of high school level LD students. This method of teaching uses frequency of response as its basic datum with growth measured on a proportional scale rather than an additive one. Precise and timely curriculum decisions preclude wasted instructional time and decrease the number of lessons necessary for students to reach fluency (an automatic level of responding). Efficacy of these procedures has been demonstrated and documented numerous times by various projects, teachers, and researchers. Albrecht (1982) used frequency-based procedures to encourage creative writing in middle school students. Data indicated a significant increase in ideas and words produced per unit of time. Miller and Calkin (1980) monitored learning among high school science students in the areas of science equipment, microscope, skeleton, and science facts. Immediate and significant improvement (correct responses accelerated, incorrect responses decelerated) was observed in 75 of 92 total phases. A validation study conducted by the Great Falls Precision Teaching Project (1981) in the areas of math operations, English vocabulary, and parts of speech resulted in significant improvement for high school students using frequency-based practice sheets.

In the present study, precision teaching was used to teach locational skills to LD adolescents. The primary concerns were the time required to learn the skills, and the production of accurate, fluent, locational behavior. Due to the data-based decision component of precision teaching, independent variables were not ascertained prior to baseline, but were contingent upon students' rate of learning. The criterion variable, frequency of response per minute, was used to measure the number of books located in the card catalog and on the shelves.

Method

Subjects

Six male students in the study had been previously identified as learning disabled and exhibited a significant discrepancy between ability and performance according to state criteria. Each student was receiving instruction in English and math in a special education resource room model. All students were below the fourth-grade level in reading as measured by the Woodcock-Johnson Psycho-Educational Battery (achievement section) and were below sixth-grade level in math according to the same battery. Four of the students were fifteen-year old ninth graders, one student was a seventeen year-old tenth grader, and one was a seventeen year-old eleventh grader. Each student had been recommended for instruction in library utilization by regular classroom teachers, and by the librarian on the basis of performance on a teacher (librarian) made library skills assessment test.

Setting

All activities took place in the library of a large public high school. The library was 20 x 40 meters with the card catalog located centrally, and the shelves situated around the perimeter. Books on the shelves were arranged sequentially according to the Dewey decimal system. Media equipment and periodical materials were located in a room adjacent to the main room and did not obstruct students during periods of timed activity.

Equipment and Materials

Five instruments were used for the study: a stopwatch, card catalog, cue cards, the Standard Celeration Chart, and a celeration finder. The stopwatch was a Casio F-81 wristwatch/chronograph. The card catalog was a two section 10-drawer by 6-drawer unit. The sections stood seven feet apart and could

accommodate several students simultaneously. Cue cards were ordinary 5 x 8 file cards. Five randomly selected references from the card catalog were listed on the cue cards. References were printed clearly on the cards in the following format: author last name, author first name, title, and date. A margin was provided at the left of each reference to allow students to write the call number on the cue card when the reference had been located.

Student progress was charted daily on the Standard Celeration Chart (Lindsley, 1968). The vertical axis of the chart is logarithmically scaled and represents frequencies ranging from one per day to one thousand per minute. The horizontal axis is an equal interval scale and represents days of the week. When frequencies are plotted on the chart they become time-series points through which a celeration line (line of best fit) can be drawn. The standardization of the chart enables celeration lines of equal slope to maintain equal value regardless of placement on the chart. The chart then, provides a picture of student progress showing absolute number correct and incorrect, percent correct and incorrect, and overall rate of growth. The most important dimension, growth, can not be determined from an equal interval chart, but may be easily found on the Standard Celeration Chart by using a celeration finder. This instrument is a protractor calibrated to the logarithmic scale of the chart and is used to assign a numeric value to a rate of growth by determining the slope of a celeration line. Accelerations are assigned a "times" (multiply) value, e.g., x1.5, x3.1. Decelerations are assigned a "divide by" value, e.g., /2.6, /1.9. A flat celeration is given a value of x1.0. Celerations assigned these values may be then converted to percent improvement or decay per week or day, and may be used to compare growth rates among students.

Procedure

Establishing performance standards. Prior to implementing the practice sessions, an exemplary performance standard was established. This was accomplished by requesting that several teachers and experienced library aides perform the locational exercises that would be required of the students. These exemplars performed the exercises twice to assure their understanding of the task, and the best performance (least number of minutes taken to locate all books) of the two trials was recorded and charted. The median of these

performances then became the practical standard for students to achieve, and provided them with a goal.

Student training. In order to begin the sessions, the following information was given to students: location of card catalog and shelves, alphabetical nature of cards in the catalog, numerical sequence of the books on the shelves, location of author, title and call number on catalog cards, location of call number on books, and format of cue cards. Students were then instructed to locate, in the card catalog, each book listed on the cue card, and to write the call number for each book in the space provided on the cue card. This was referred to as the card catalog task (CC). When this task was completed, they were to proceed to the shelves and locate each book. This was referred to as the on-shelf task (OS). Further instructions were to locate cards and books as quickly as possible, and to minimize extraneous activity.

The first day was baseline, and students were given no help before, during, or after the session. As students began the session the stopwatch was started, and the instructor watched closely as the tasks were performed. Individual difficulties observed at this time would be used to develop intervention procedures. When each student had located his last book, the stopwatch was stopped, the time noted, and the number of books located per minute was charted. The charting procedure was performed by the students and confirmed by the instructor.

After the initial day of activity, it was determined that each student needed basic alphabetizing skills to aid in locating books in the card catalog. A simple ten word list (e.g. check, chip, chat, chin, car, etc.) was prepared each day for the next four days, and given to each student prior to the timed activity in the library. A ten minute period of time was set aside for the students to place the words in alphabetical order and receive feedback and instruction from the instructor. After four days, the alphabetizing intervention was discontinued on the basis of performance data, and a modeling session was scheduled to provide students with an example of exemplary locational performance. The session took place on the sixth day, and was performed by the instructor. In this way, each student was able to observe fluent locational skills that could be applied to their own performance. After the modeling session, the timed locational activities continued for

four more days, before termination on the tenth day.

Results

Charted data from the study were analyzed to provide a descriptive summary of individual student performance and learning. In addition, group figures were calculated and compared with the exemplar (standard) group.

Individual Student Results

As an example, charted data are presented for one student in Chart 1. This chart shows total task (TT) frequencies (both tasks combined), card catalog (CC) frequencies, and on-shelf (OS) frequencies. Celerations for each task can be visually analyzed to determine rate of growth, and to compare growth among tasks. Celerations for each student are summarized in Table 1. An examination of these celerations revealed that 5 of the 6 students had greater acceleration on the card catalog task than the on-shelf task. The same 5 students had total task celerations of x1.4 per week or greater. To compare the on-shelf with the card catalog celerations, the larger celeration was divided by the smaller. This resulted in an "easier to learn" factor (degree by which learning on one task was greater than on another) which showed that 5 students found the card catalog task easier to learn than the on-shelf task (see Table 1).

Table 1

Student Celerations and Learning Factors

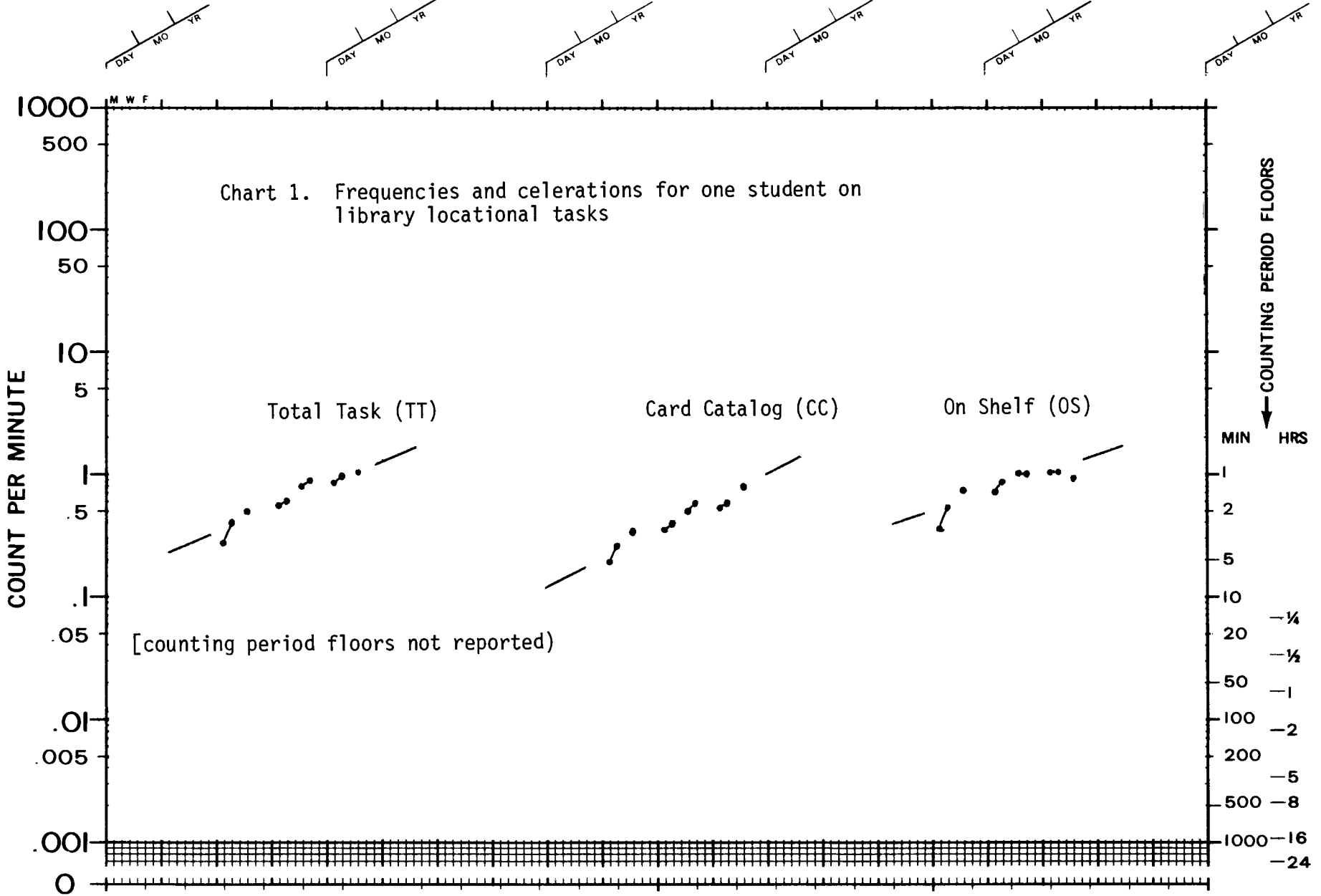
| Student | Celerations | | | "Easier to Learn" Factors | |
|---------|-------------|------|------|---------------------------|------|
| | TT | CC | OS | CC | OS |
| Vince | x1.1 | /1.4 | x1.8 | -- | x2.5 |
| Steve | x1.6 | x1.6 | x1.1 | x1.5 | -- |
| Chris | x1.4 | x1.3 | x1.2 | x1.1 | -- |
| Clay | x1.4 | x1.4 | x1.2 | x1.2 | -- |
| Bobby | x1.6 | x1.7 | x1.4 | x1.2 | -- |
| John | x1.4 | x1.2 | x1.0 | x1.2 | -- |

Table 2 presents the beginning and ending durations (number of minutes to complete the task) for each student on total, card catalog, and on-shelf tasks. To compare card catalog and on-shelf tasks, the larger duration was divided by the smaller duration. This resulted in a "harder to do" (HTD) factor for beginning and ending task

CALENDAR WEEKS



DAILY BEHAVIOR CHART (DCM-9EN)
 6 CYCLE - 140 DAYS (20 WKS)
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| | | | | | | | | | | | | | | |
|------------------------|--|--|-----------------|--|--|---------|--|--|----------|--|--|---------------|--|--|
| SUPERVISOR | | | ADVISER | | | MANAGER | | | Bobby | | | locates books | | |
| Center School District | | | Kansas City, MO | | | | | | BEHAVIOR | | | AGE | | |
| AGENCY | | | TIMER | | | COUNTER | | | CHARTER | | | COUNTED | | |
| | | | | | | Gayler | | | | | | | | |

performance. These factors are presented in Table 3. The card catalog task was harder to do than the on-shelf task for five of the six students at the beginning of the study, and for four of the six at its conclusion. Improvement factors (largest duration /smallest duration for each task) revealed improvement of x1.6 per week or greater for each student on the total task (see Table 3).

Table 2
Student Durations (minutes)

| Student | Beginning | | | Ending | | |
|---------|-----------|----|----|--------|----|----|
| | TT | CC | OS | TT | CC | OS |
| Vince | 16 | 8 | 8 | 9 | 7 | 2 |
| Steve | 39 | 30 | 9 | 16 | 8 | 8 |
| Chris | 35 | 24 | 11 | 16 | 11 | 5 |
| Clay | 33 | 24 | 9 | 19 | 12 | 7 |
| Bobby | 38 | 24 | 13 | 11 | 6 | 5 |
| John | 23 | 13 | 10 | 14 | 7 | 7 |

Table 3
Performance and Improvement Factors

| Student | "Harder to Do" Factors | | Improvement Factors | | |
|---------|------------------------|--------|---------------------|------|------|
| | Beginning | Ending | TT | CC | OS |
| Vince | x1.0 | x3.5 | x1.8 | x1.1 | x4.0 |
| Steve | x3.3 | x1.0 | x2.4 | x3.8 | x1.1 |
| Chris | x2.2 | x2.2 | x2.2 | x2.2 | x2.2 |
| Clay | x2.7 | x1.7 | x1.7 | x2.0 | x1.3 |
| Bobby | x1.7 | x1.2 | x3.5 | x4.0 | x2.8 |
| John | x1.3 | x1.0 | x1.6 | x1.9 | x1.4 |

Group Results

Celeration value distributions were constructed to show the dispersion of celerations for the group. Chart 2 presents the distributions as plotted on the Standard Celeration Chart. The total task celeration distribution showed a median of x1.4 and a range of x1.5. This distribution showed the least dispersion among the three distributions. The card catalog distribution showed the greatest dispersion of celerations having a range of x2.4, but the x1.35 median revealed that the group experienced faster growth on the card catalog task than on the on-shelf task (median of x1.2). By dividing

the larger celeration (x1.35) by the smaller (x1.2), a figure of x1.13 was derived which showed that the magnitude of growth was greater by 13% on the card catalog task.

Chart 2 also presents the beginning and ending duration distributions for the card catalog and on-shelf performances. Visual inspection shows, again, that the group experienced greater performance gains on the card catalog task. The magnitude of the gain was x3.2 as compared to x1.6 for the on-shelf gain. The comparative gain was x2.0 (x3.2/x1.6). Using the Median Test and Fisher's Exact Probability, a significant difference was found ($p = .038$).

Chart 2 also shows the total task beginning and ending durations, and the durations for the exemplar group. The total task distributions revealed a significant group gain of x2.3. The Median Test and Fisher's Exact Probability yielded a significant difference ($p = .038$). Furthermore, the dispersion (range) of durations, which divided by 1.14 or 14% (x2.4/x2.1), showed that the ending durations clustered more closely around the median than did the beginning durations.

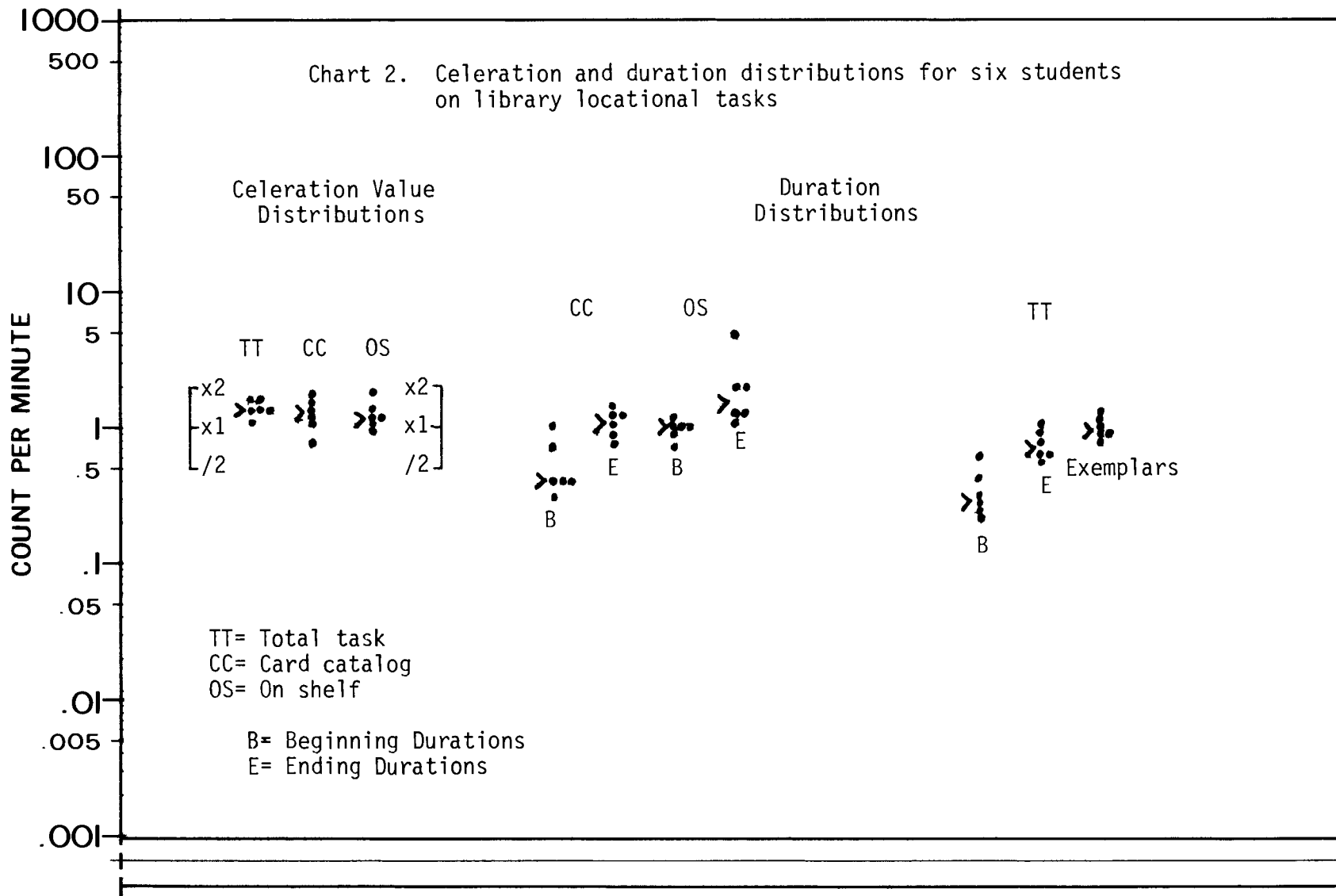
A comparison of the medians of the ending student distribution and the distribution of the exemplar group yielded a difference of x1.3. This difference was not found to be significant (Fisher's $p = .158$).

Discussion

The application of precision teaching to the locational skills of secondary level LD students was found to be an effective, efficient way of producing fluent locational behavior. Each student showed immediate improvement and, with the exception of one student, accelerated their learning by at least x1.4 (40%) per week. The student showing the least amount of growth (10% per week) was already quite proficient in locational skills as shown by his beginning duration of 16 minutes for the total task (see Vince, Table 2).

The card catalog task was generally more difficult to perform than the on-shelf task, and provided the students with a greater opportunity to improve their skills. In addition, celerations were greater for most students on the card catalog task.

One of the most important and useful comparisons of the study revealed the relationship between "hard to do" and "easy to learn", previously reported by McGreevy



6 students

locate books

(1980). In this aspect of the study, the card catalog task was consistently harder to do (both beginning and ending frequencies) than the on-shelf task. Traditional pedagogical opinion would hold that a task which is hard to do should also be hard to learn. In many cases the task would be modified to make it easier for the student to do, thus "enhancing learning(?)". In this study, no modifications were made, and students were instructed to perform the task regardless of difficulty. As the study progressed, it became clear that the card catalog task, although harder to do at first, became easier to learn. This factor was shown by the relatively steep celerations produced by the task, as compared to the on-shelf task. The steeper celerations indicated that faster growth and easier learning occurred even though task performance was comparatively more difficult. This "harder to do but easier to learn" phenomenon was further substantiated by the fact that the on-shelf task, which was easier to do for most students, resulted in less growth, thereby being harder to learn. This suggests that teachers should examine the difficulty level of their tasks in relation to growth, and quantify the "harder to do, easier to learn" relationship prior to subjectively modifying tasks on the basis of performance difficulty only.

As a group the students showed significant improvement in performance on both tasks. The first duration distribution in Chart 2 indicates the magnitude of improvement. Furthermore, a comparison of the ending durations for the total task with the total task durations of the exemplar group revealed that the two groups of durations could have come from the same population. Simply, the students became as proficient as the exemplar group after only 10 days (less than 4 hours per student) of direct practice and daily measurement of their own locational behavior. This suggests two practical implications for teachers. First, a group of students monitoring their own behavior daily can be expected to reach fluency, at their particular task, in a very short period of time. Second, when providing an aim for students to strive for, an exemplary (best ever) performance should be obtained to serve as that goal (Lindsley, 1983). In addition, the exemplar should come from a skilled, normal population rather than one characterized by handicapping conditions.

This study was limited by two factors, both relating to the public school setting in which it was carried out. First, there was little chance for reliability measures to be

carried out because the availability of other teachers as timers and observers was limited. Second, the exemplar group was measured on only one performance of the task. A one or two week daily measure of growth for this group would have provided further information about the effectiveness of direct daily measurement and practice.

Areas for further research might include: traditional single subject research designs (e.g. multiple baseline) to replicate the locational behavior at different points in time; comparisons between experimental groups and exemplar groups on celeration factors; and expansion of the scope of locational behavior to include a periodicals index, microfilm catalog, and reference material.

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**RETENTION AMONG COLLEGE STUDENTS:
A COMPARISON OF TRADITIONAL
VERSUS PRECISION TEACHING**

**C.P. Olander, D.L. Collins,
B.L. McArthur, R.O. Watts,
and C.E. McDade**

Center for Individualized Instruction

The speed and accuracy of decision-making in a clinical situation is vital for the professional nurse. Except for the pioneering work of Dean (1973), nursing education has not emphasized fluency of correct responses. At the Lurleen B. Wallace School of Nursing of Jacksonville State University, retention of precision Pathophysiology was evaluated.

Retention of material is of concern to practically everyone in higher education. Methods of improving retention should be especially welcome by educators who are concerned when their students do not possess the knowledge and skills they were thought to have mastered. Retention of learned material is affected by the kind of feedback from evaluation (Sassenrath & Garverick, 1965), the type and frequency of evaluation (Spangler & Hankins, 1975), and the timing of feedback from evaluation (Olander, McDade, Grimsley, Yaracs, & Merbitz, 1981a). Spangler and Hawkins (1975) demonstrated that immediate retention (i.e., a week interval) of psychology students was significantly enhanced by precision teaching. The present study was designed to compare the long-term (eight months) retention of nursing students following a course in Pathophysiology taught using precision teaching and traditional methods.

Method

This study was conducted with a total of eighteen students in Biology 360: Pathophysiology. Nine students were taught using precision teaching and nine using traditional methods. The latter group attended two one and one-half hour lectures per week. Student performance was measured with an essay exam after every two chapters and a comprehensive final exam.

Students taught using precision teaching proceeded at their own pace without lectures (Olander, McDade, Ulrich, & Merbitz, 1981b). Testing consisted of students responding verbally to ten randomly selected questions on flash cards. Prior to the actual evaluation, students were allowed to examine the questions and assemble the cards in any order with unlimited time to contemplate their answers. Students were required to answer eight correct responses per minute at 80 percent mastery in order to proceed to new material. Students charted their daily progress on Standard Celeration Charts, plotting frequency correct, frequency incorrect, and record floor (Pennypacker, Koenig, & Lindsley, 1972). Comprehensive verbal review tests of ten questions from each chapter were given after every two chapters.

Both groups were taught by the same instructor using the textbook, **Basic Pathophysiology** (Groer & Shelton, 1979). Both groups received three semester-hour credits for the course and covered the same number of chapters. Students taught using precision teaching earned an average course grade of 3.00/3.00, while the students taught using traditional methods earned a mean course grade of 1.78/3.00.

The dependent variable, eight month retention, was measured by an evaluation tool prepared for this study. Part I of the evaluation measured retention for definition and explanation of the physiologic significance of thirty-six terms. Part II measured retention of six physiologic concepts in essay form, one from each chapter.

Each group was tested by an unannounced retention exam. The instructions on the evaluation were read aloud, and participants were informed that they had been selected for research in nursing education, with names remaining anonymous. After both groups were tested, the anonymous evaluations were double-blind graded by two instructors.

Results

The evaluations for both groups were compared by the Mann-Whitney U Test. The results were statistically significant with the calculated probability of wrongfully rejecting the null hypothesis $<.05$. As shown in Chart 1 the students taught using precision teaching were 1.8x more accurate and 1.8x more fluent than their traditionally taught counterparts eight months after their pathophysiology course. Surprisingly, these students, who never had

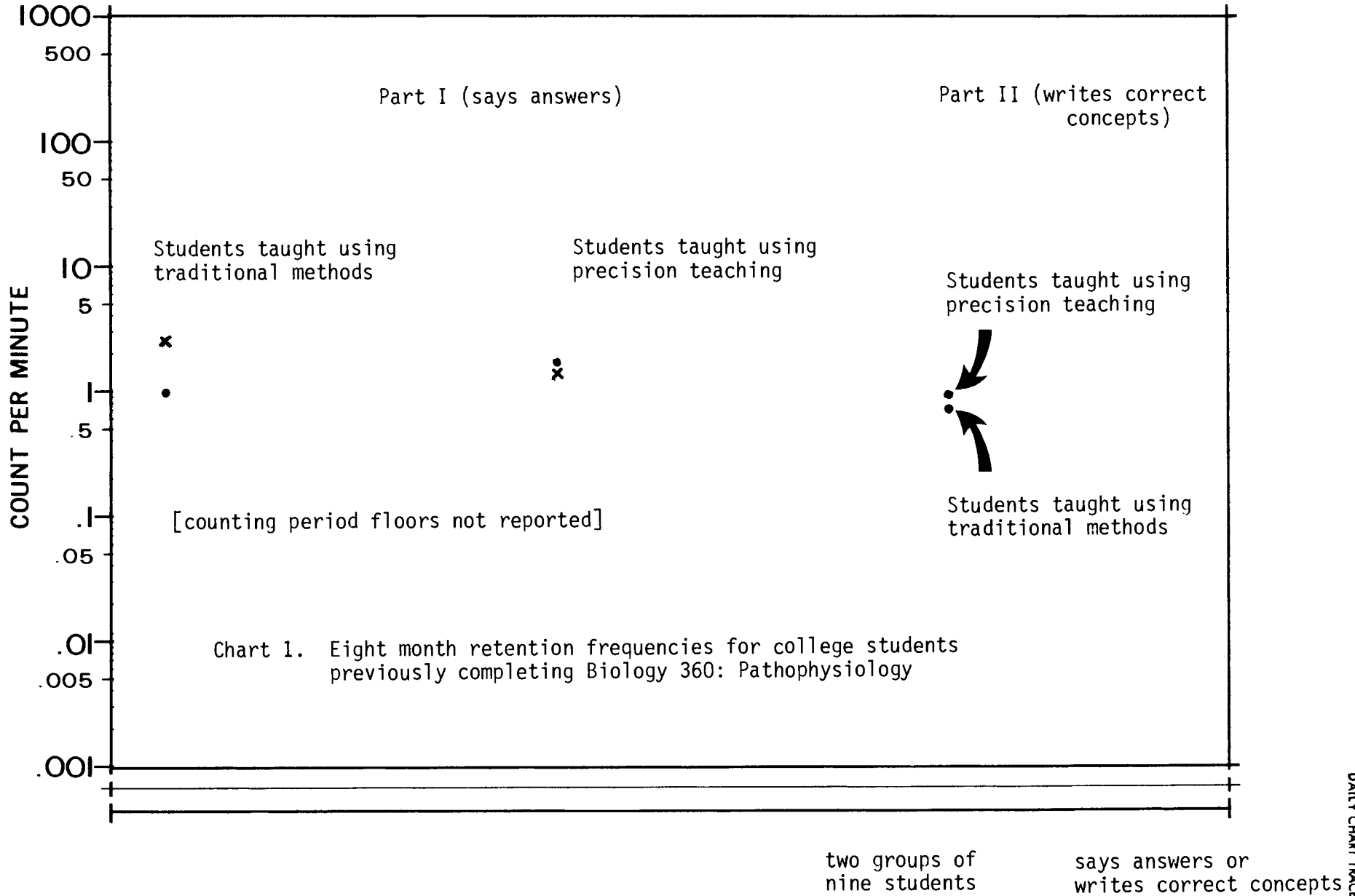


Chart 1. Eight month retention frequencies for college students previously completing Biology 360: Pathophysiology

two groups of
 nine students

says answers or
 writes correct concepts

(mean frequencies)

written an essay exam in pathophysiology performed 1.4x better than the traditionally taught students whose performance was always measured in this manner.

Discussion

Precision teaching has been shown to enhance the short term retention of college students (Spangler & Hawkins, 1975). Also, frequency testing of key concepts in a discipline until proficiency is reached has been found to generalize to applications of these concepts in the less structured situation of essay exams (McDade, Rubenstein, & Olander, 1982; Olander, et al., 1981b). The data generated in the present study support the conclusion that precision teaching enhanced generalization of this type as well as long term (eight month) retention.

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Abstracts

The following are abstracts of recently published articles or completed research. Figure 2 from the first article is included to demonstrate how the data was displayed in standard format for a traditional journal.

Merbitz, C. T., King, R. B., Bleiberg, J., & Grip, J. C. (1985). Wheelchair push-ups: Measuring pressure relief frequency. **Archives of Physical Medicine and Rehabilitation**, 66, 433-439.

Abstract: Ischial pressure sores (PS) are a long-recognized complication of wheelchair confinement, yet teaching spinal-cord patients to establish lift-off behavior habitually and permanently remains a challenge. A new device was developed to record automatically and continuously the wheelchair lift-off behavior of spinal-cord injured patients. Data from seven patients who used the device for between 768 and 1800 hours each are reported. The device was used to monitor longitudinally the behavioral compliance of each individual with prescribed lift-off intervals using standard teaching procedures. Wide variability between patients and within patients over time was found. Experimental interventions including the use of an electronic timer and written and oral feedback of the previous day's data also varied in their effectiveness. Data from one patient who developed a pressure sore while being monitored suggest that there is no simple relationship between lift-off intervals and PS formation.

Reprint requests:

Charles Merbitz, Ph.D.
Learning Research
Rehabilitation Institute of Chicago
345 East Superior Street
Chicago, IL 60611

Ferrucci, B. J. (1985). **The relationship of precision teaching to the speed, computational skill development, and concept development of working with rational numbers.** Unpublished manuscript, Mendon-Upton School District, Mendon, MA.

Abstract: This study investigated the relationship of precision teaching as an evaluative procedure to the achievement of rational numbers in a grade five regular education mathematics class. The areas of speed, computational skill development, and concept development of working with rational numbers were studied.

Worksheets, known as rated assessment sheets, which focus on direct and daily measurements were designed for this study and were used in conjunction with other precision teaching tools, such as IS plans, Standard Celeration Charts, and data decisions and instructional changes.

A non-equivalent control group design was used. Student performance was measured with three different tests. The computational skill test was used as a pre-treatment and post-treatment achievement test and consisted of twenty-five multiple choice questions. Speed in working with rational numbers was evaluated by a timed-test of twenty-five computational problems. The area of concept development was a testing process which consisted of two parts. The first part was to identify instances of a rational number as belonging or not belonging to a set of rational numbers. The second part was giving the name of the concept.

The sample consisted of grade five students from two different school districts with similar socioeconomic backgrounds. One entire school district was selected as the experimental group with five classes. Another district was chosen as the control group with seven classes.

All 310 students were administered the pretest, posttest, and speed test. Twenty percent of the subjects from each district were selected to participate in the concept test.

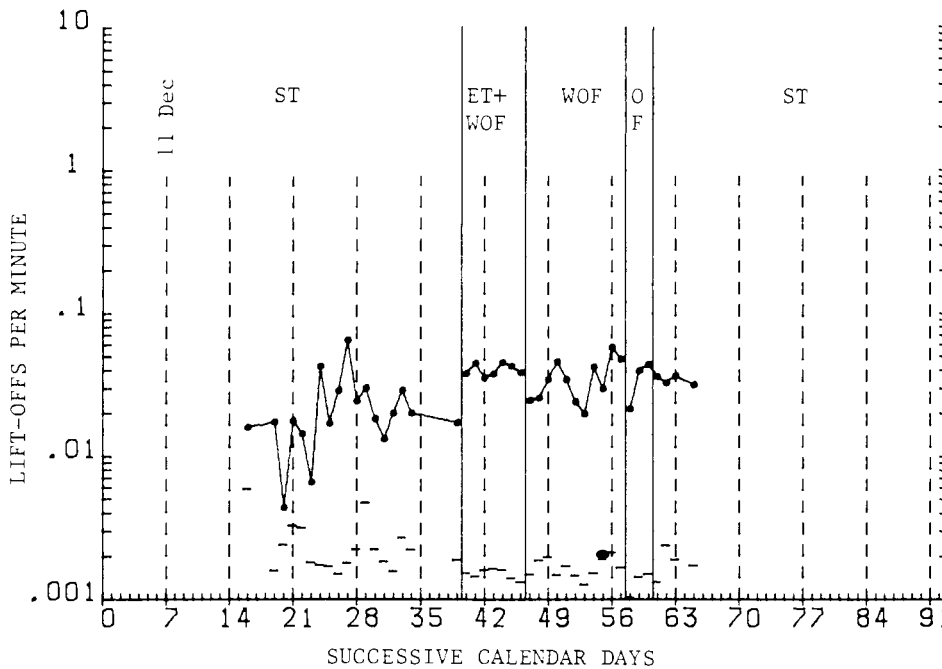


Fig 2—Lift-off frequencies, patient A. Dots are daily lift-off frequencies. Dashes are reciprocal of total minutes spent in the wheelchair. Numbered, vertical dashed lines are Sundays. Day 0 is the Sunday before hospital admission. Intervention codes as in fig 1. Temporarily discharged on days 17-18 and 35-38. No data collected on day 64.

Prior to the study, the teachers involved with the experimental group attended three workshop sessions which introduced the philosophy and components of precision teaching. The participants had no previous knowledge or experience with precision teaching techniques.

The statistical analyses focused on a multiple analysis of variance test (MANOVA) with nested designs and a Scheffe test of multiple comparisons. Analyses of the data revealed that the experimental and control groups differed significantly at the .05 level of significance in their mean scores on the tests of speed, computational skill development, and concept development in favor of the experimental group. The Scheffe test showed that some of the lower achieving classes of the control group differed significantly from some of the higher achieving classes of the experimental group.

In summary, this research shows that a group using precision teaching techniques achieved better than a comparable control group. A group that used brief systematic practice during the unit of rational numbers had higher performance on all three researcher-constructed evaluations. Moreover, when such intensive practice was accompanied with classroom activities and explanations, greater scores on speed, computational skill development, and concept development of rational numbers was found.

Reprint requests:

Beverly J. Ferrucci, Ph.D.
Computer/Math Coordinator
Mendon-Upton School District
Mendon, MA, 01756.

stories, nice art work, accurate math, and a few papers that just showed completion. In one sense or another each displayed a "well done performance".

One of my submissions was the learning record of a 6 year old first grade girl before and after help by her 12 year old brother. The learning chart and its story were each mounted on light blue construction paper to highlight the chart lines (first grade teachers quickly learn about such detail), and a large gold star was placed on the presentation. The principal wrote praise to both children and signed her name. After a weeks' display, the chart, story, star, and praise were sent home for the parent to see. The story and the chart are displayed in Chart 1; the children's names were changed, though they really deserve full recognition.

Most schools do an adequate job publishing pupil performances in some manner. Reminders and new ideas are usually welcome. Publishing pupil performances on the Principal's Pride Wall is a grand idea. Since performance and learning are different school products, precision learning/precision teaching teachers need two walls--The Principal's Pride Performance Wall for rewarding pupil frequency and The Principal's Pride Learning Wall for rewarding pupil learning.

Reference

LaFray, Barbara. (1984). **Principal's pride wall.** Panther Lake Elementary School, Federal Way, WA.

Malcolm Neely is a teacher at Panther Lake Elementary School and resides at 29811 6th Ave. South, Federal Way, WA, 98003.

Chart-sharing

PRINCIPAL PRIDE WALLS

Malcolm D. Neely
Federal Way School District

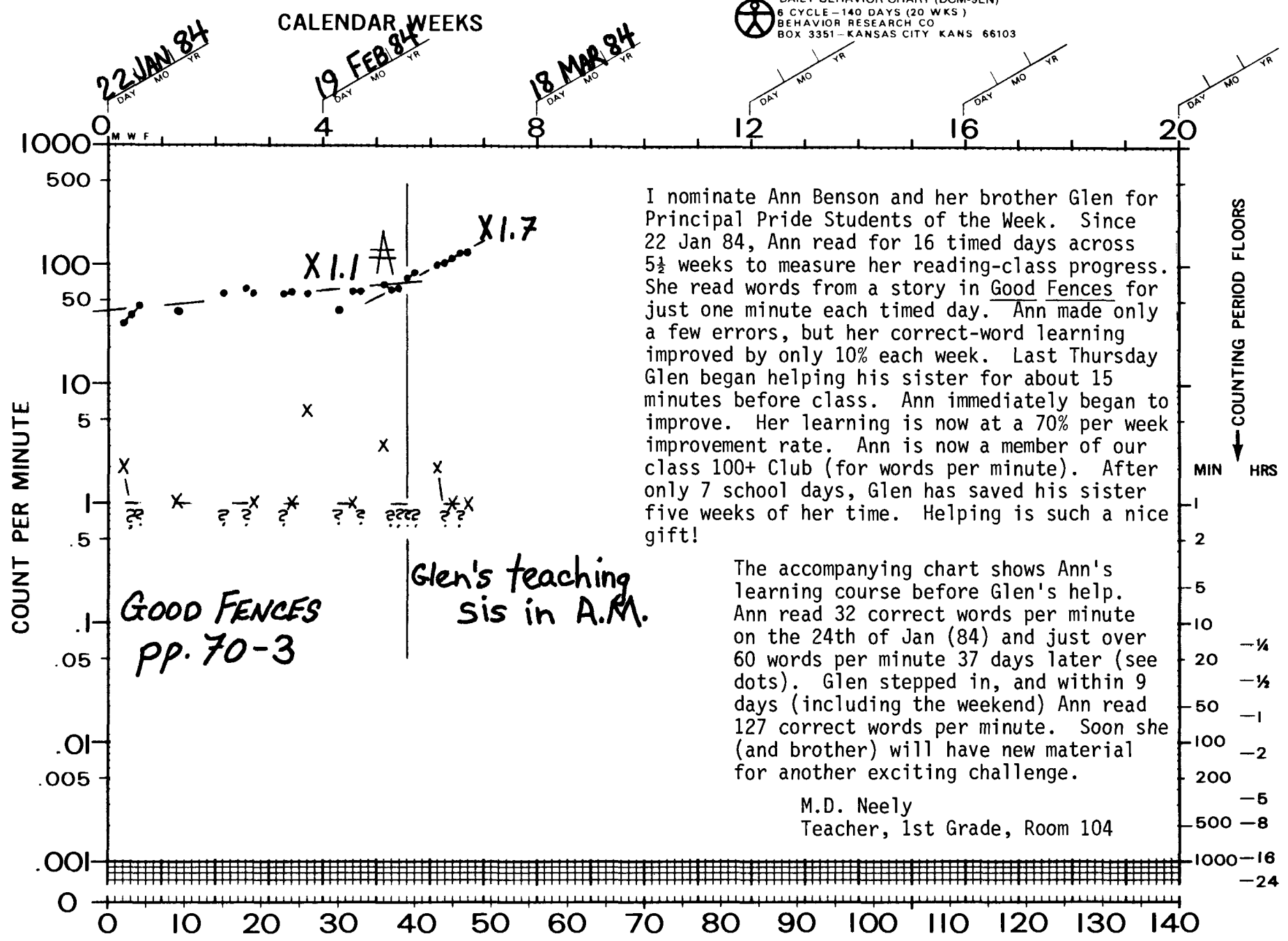
In the spring of 1984 our building principal, Barbara LaFray, requested samples of pupil work that we teachers thought deserved recognition on her new Principal's Pride Wall (LaFray, 1984). From each classroom came good penmanship, clever poems, impressive

CLEARING THE SMOKE

John R. Caimi
Southeast Missouri State University

In order to gain experience collecting and plotting data on a Standard Celeration Chart, our class (taught by Dr. Larry Lowrance) was given the assignment to select a few behaviors (our own or those of others) which we would be able to keep track of and possibly affect. I chose to try a structured reduction of the number of cigarettes I smoked each day. In the past, I had found that I could easily quit cold turkey for a day or two, but would soon revert to my original level of consumption.

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I nominate Ann Benson and her brother Glen for Principal Pride Students of the Week. Since 22 Jan 84, Ann read for 16 timed days across 5½ weeks to measure her reading-class progress. She read words from a story in Good Fences for just one minute each timed day. Ann made only a few errors, but her correct-word learning improved by only 10% each week. Last Thursday Glen began helping his sister for about 15 minutes before class. Ann immediately began to improve. Her learning is now at a 70% per week improvement rate. Ann is now a member of our class 100+ Club (for words per minute). After only 7 school days, Glen has saved his sister five weeks of her time. Helping is such a nice gift!

The accompanying chart shows Ann's learning course before Glen's help. Ann read 32 correct words per minute on the 24th of Jan (84) and just over 60 words per minute 37 days later (see dots). Glen stepped in, and within 9 days (including the weekend) Ann read 127 correct words per minute. Soon she (and brother) will have new material for another exciting challenge.

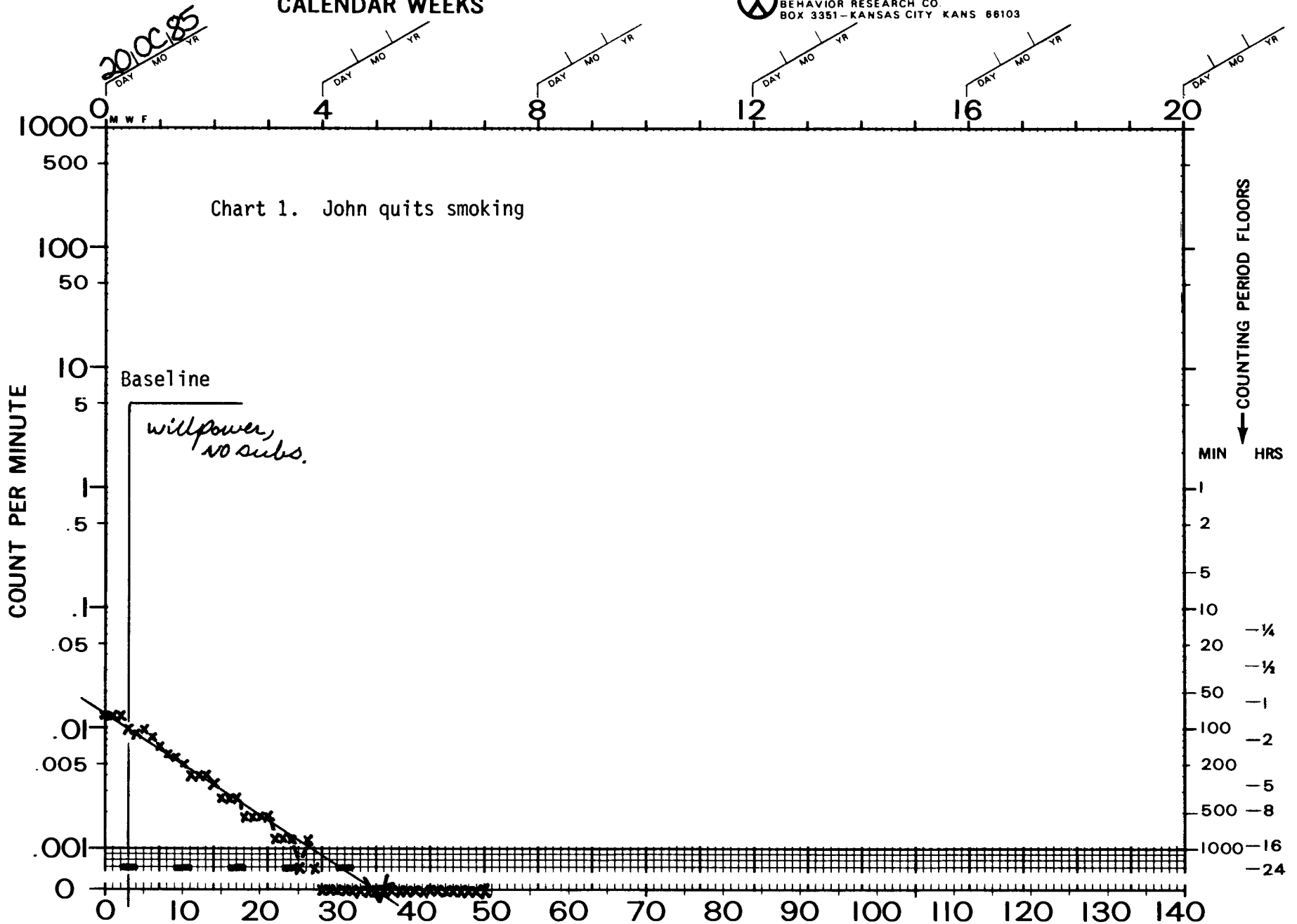
M.D. Neely
 Teacher, 1st Grade, Room 104

| | | | | | | |
|-------------------------|----------------------------|--------------------------|--|-----------|-----|---------------|
| M. Neely | | SUCCESSIVE CALENDAR DAYS | | Ann | 6½ | see-say words |
| SUPERVISOR | ADVISER | MANAGER | | BEHAVIOR | AGE | COUNTED |
| Panther Lake Elementary | Federal Way Public Schools | Federal Way, WA | | Room Moms | | |
| AGENCY | | | | CHARTER | | |



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CALENDAR WEEKS



| | | | | | | | | | | | | | |
|------------|-----------------|---------|-----------------|---------|--|--------------------------|--------------|----------|--------------|-----|----------------|-------|----------------------|
| SUPERVISOR | <u>Lowrance</u> | ADVISER | <u>J. Caimi</u> | MANAGER | | SUCCESSIVE CALENDAR DAYS | <u>02</u> | BEHAVIOR | <u>27</u> | AGE | <u>Student</u> | LABEL | smokes cigarettes |
| DEPOSITOR | | AGENCY | | TIMER | | COUNTER | <u>Caimi</u> | CHARTER | <u>Caimi</u> | | | | COUNTED |

Baseline was a pack a day (20 cigarettes). I chose a minimum cessation line (MCL) of 1/2, which meant I would be reducing my consumption by one-half each week (White & Haring, 1980). This decision was firmly accepted only after calculating where I would actually have to be on the chart in one, two, and three weeks. On reflection, my success was the direct result of a realistic goal.

My first (and only) intervention was sheer willpower with the stipulation of no substitutions-- oral or nicotinic in nature. I found the act of actually plotting the data each day to be reinforcing--when it was under my MCL. I also had a friend asking about my progress periodically.

The gradual reduction of cigarettes allowed my system to slowly cleanse itself and become acclimated to the lower-level intakes of nicotine. I had no uncontrollable attacks, nor did I experience cravings for more than one or two cigarettes over quota on a given day. If the temptation to yield to one of these cravings became too strong, I could go over and still stay with my program as long as this did not happen more than two days in a row (in keeping with the three-day rule for intervention change) (White & Haring, 1980).

There were a few tricks I pulled in manipulation or self-assistance. For example, I found myself looking in advance to note how many days I could have three, or two cigarettes before I was reduced again. Twice I waited until after midnight so I could use one of the following day's cigarettes and still stay under the MCL. This practice cost me on the following day, of course.

I met my aim rate a week early and have maintained my abstinence for three weeks as of this writing.

Reference

White, O. R., & Haring, N. G. (1980). **Exceptional Teaching** (2nd ed.). Columbus, OH: Charles E. Merrill.

John Caimi is a graduate student at Southeast Missouri State University, pursuing a Master's degree in Special Education. He resides at 1822 Old Cape Road, Jackson, MO, 63755.

IMPROVING RESPONSES TO PARENTAL REQUESTS

Janis L. Martin
University of West Florida

My daughter, Amy, is a ten-year-old with a mind of her own. My husband and I had tried for years to have her respond to our requests immediately when asked to (or not to) do something. We had tried both positive and negative reinforcements with virtually no success. Amy would usually do what we asked, but took her time getting to it.

I decided to try a precision teaching technique to hopefully modify this behavior. The results were gratifying. Rather than having her dad and I responsible for her responding to our requests, I wanted her to be responsible for her own behavior. I collected a week of baseline data on her responses to requests which appeared to show Amy's rate of non-compliance. On Sunday, September 8, 1985, I began an intervention which consisted of a contract between Amy, her dad, and I. Amy agreed that for every response to a parental request begun within five seconds she would receive one point; she would not be penalized if she responded after the time limit. Amy made a list of items and privileges she wished to work toward earning to which I assigned points. Amy selected a privilege "costing" 100 points. The data in Phase 2 show an increase in "responses within five seconds" and appear to show an increase in "responses taking longer than five seconds to begin". Amy was pleased with herself, but I wanted to decrease the responses taking longer than five seconds to begin.

A second intervention, begun on Tuesday, September 24, 1985, allowed Amy one week from that date in which to "earn" the remaining points toward the 100-point item. If the remaining points were not accumulated, Amy would be asked to "spend" the earned points for items on the list "costing" less and begin earning points toward the 100-point item after the allotted time. The data in Phase 3 show a greater increase in the number of responses begun within five seconds and an apparent decrease in responses begun after five seconds. The data suggest that control of the time factor in Phase 3 caused more positive results than were observed in Phase 2.

The results of this charting were pleasing to both Amy and me. Her dad and I were amazed that she would respond so quickly, and we

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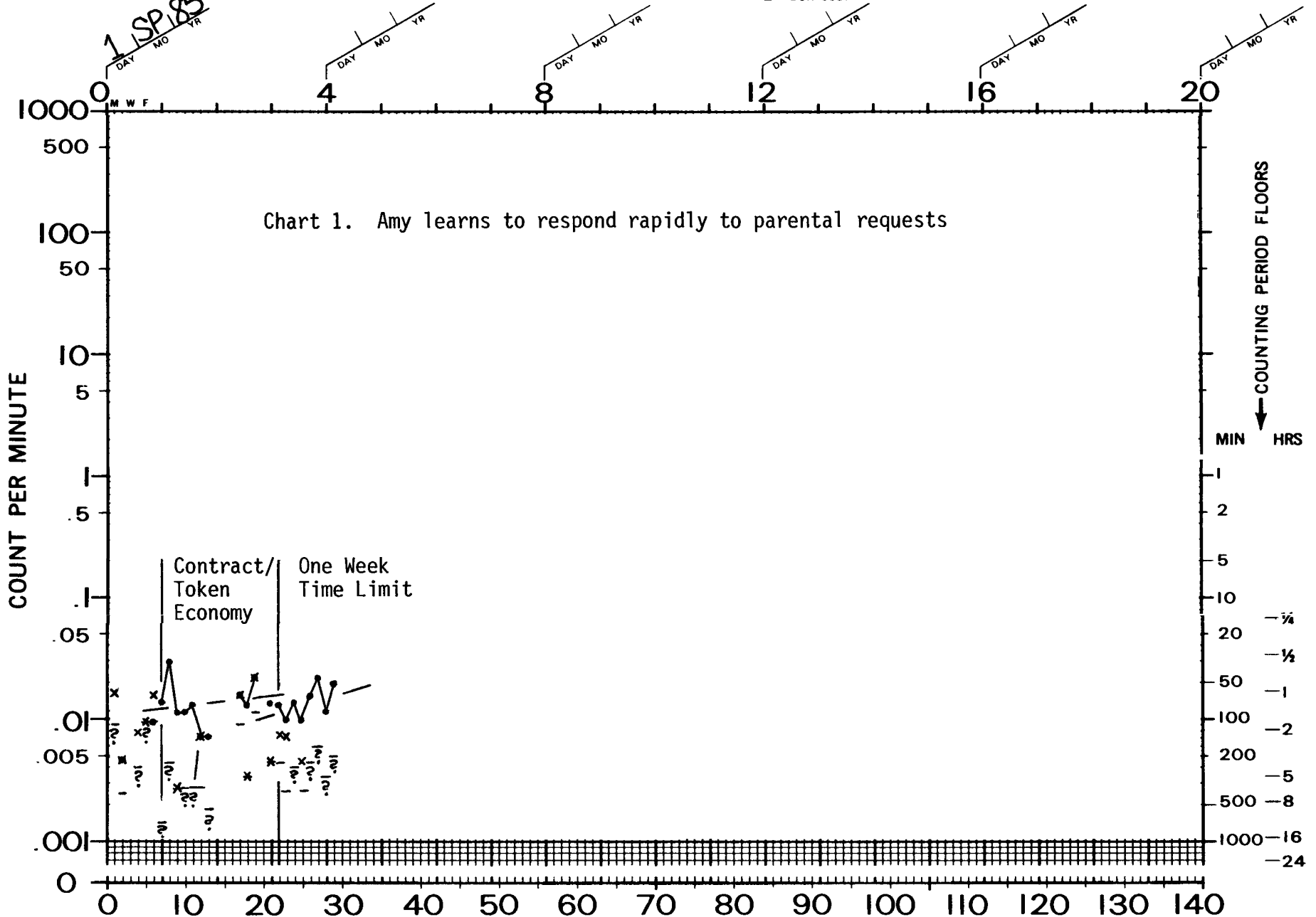


Chart 1. Amy learns to respond rapidly to parental requests

SUCCESSIVE CALENDAR DAYS

responds to parental requests within 5 sec.

| | | | | | | |
|------------|---------|---------|------------|---------------------|-------|---------|
| SUPERVISOR | ADVISER | MANAGER | <u>Amy</u> | <u>10</u> | | |
| | | | BEHAVIOR | AGE | LABEL | COUNTED |
| DEPOSITOR | AGENCY | TIMER | COUNTER | <u>JANIS MARTIN</u> | | |
| | | | | CHARTER | | |

found her easier to like. Amy felt an immense sense of accomplishment, pride, and happiness; she asked if we could continue this system. We have continued it, and it continues to work for us!

Janis Martin is the mother of Amy Martin and a student at the University of West Florida. She, Amy, and her husband reside at 7129 Belgium Circle, Pensacola, FL, 32506.

SLEEPING THROUGH THE NIGHT

Ghislaine Durr
University of West Florida

What can one do when a 2 or 3 year old child refuses to sleep alone through the night? This is a problem many parents experience at one time or another. This was my situation with my 2 year old son. He would sleep for an average of 4 consecutive hours before getting out of his bed. I used the Standard Celeration Chart to determine the intervention that would increase consecutive sleeping time to 8 hours.

Lower points on the Chart represent increased durations of sleeping times. The average number of consecutive hours slept in the week of October 13th was 7 hours. This occurred during the 6th week of "sleeping next to parents' bed" intervention. The celeration was $x1.5$.

The average number of hours slept for the week of October 27th was 8 hours. The celeration was $x1$. The average hours slept during the week of November 10th was 8 hours 30 minutes, with a celeration of $x1.3$. During this week the setting changed so that he was sleeping in his room alone.

The first two interventions were not well received by my son. The third one was a compromise that we both agreed to. The first 4 weeks of this intervention were characterized by a great deal of variability in the data. It does not look like progress was being made. The 5th 6th weeks show consistently longer sleeping periods. This would suggest that my son now feels comfortable with this intervention. The charted week of October 27th shows that this desired behavior was maintained. The next step was to extend this new behavior to a new setting- "sleeping in his own room."

The week of November 10th shows that the behavior was successfully transferred to the new setting. The fact that he agreed to the intervention of "sleeping next to parents'

bed" might have some bearing on the final result of his sleeping for 8 or more consecutive hours a night.

Ghislaine Durr is a mother and student at the University of West Florida, Special Education, Pensacola, FL, 32503.

ABOUT PT

NOTES FROM THE EDITOR

Patrick McGreevy

If you have not received your copy of Volume VI, Number 3, it should be in your mailbox within a few days. The last two issues of this volume were delayed and were mailed at approximately the same time (see Notes from the Editor, Volume VI, Number 3).

The Journal is in need of additional funds, in other words, subscribers. These funds would be used to increase the size of each issue, enhance its appearance, and pay for much needed clerical help. At the present time, most of the latter is performed by Mary Arthur, my graduate assistant. I would like to thank Mary for her valuable assistance. I would also like to thank Dr. Bill Pinar, the chair of Curriculum and Instruction at LSU, for providing the assistantship and for assigning Mary to myself and JPT.

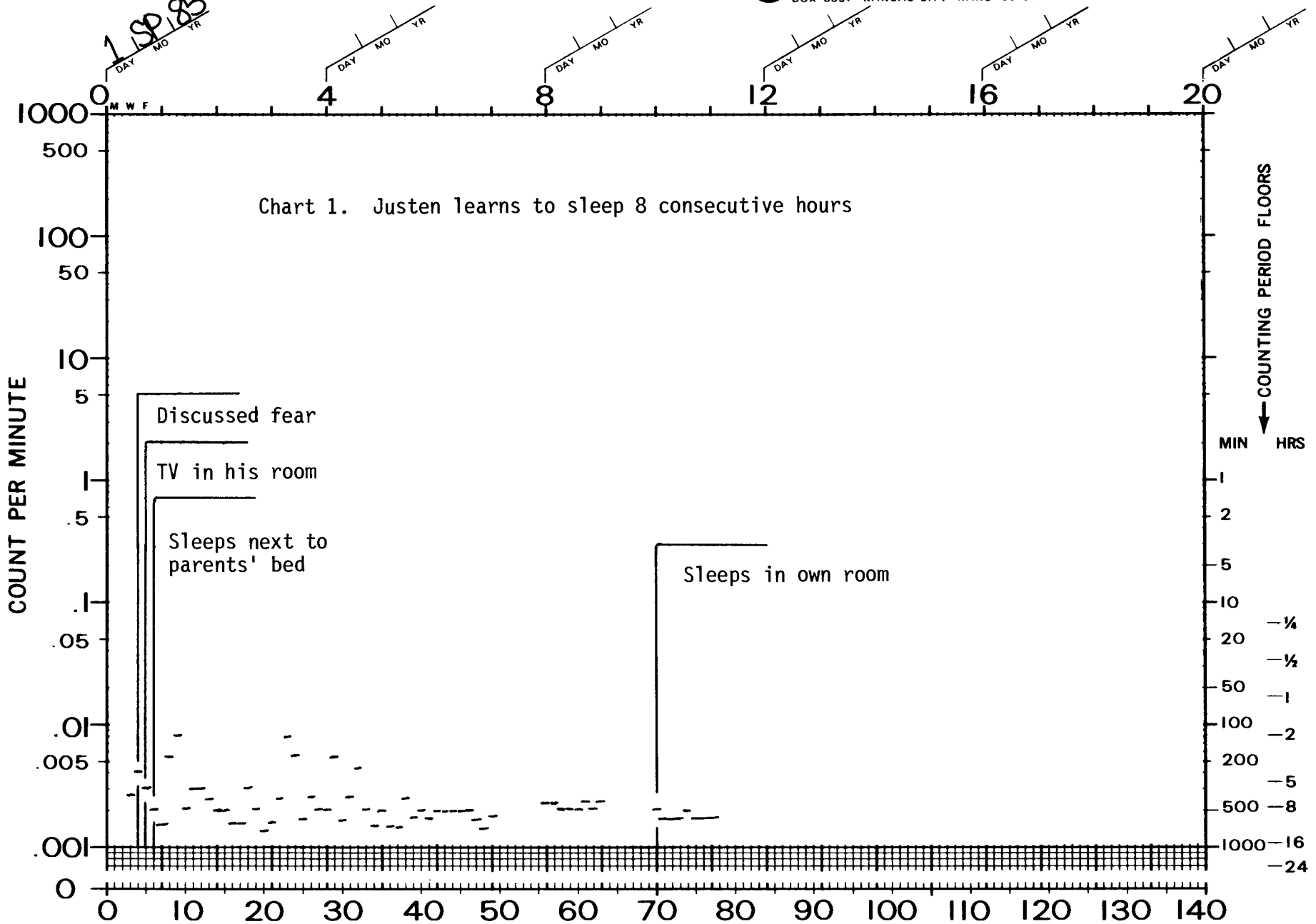
This issue contains a precision teacher's guide to the Association for Behavior Analysis (ABA) Twelfth Annual Convention in May, as well as, information on a special tribute to Eric Haughton at this conference. I would like to congratulate Ogden Lindsley on a very successful year as president of ABA and to extend my best wishes to Henry Pennypacker, who will serve in this capacity for the coming year. I would like to encourage those of you who have not previously participated in this organization and its convention to do so. For information, call or write to ABA, Department of Psychology, Western Michigan University, Kalamazoo, MI, 49008, 616-383-1629.

I would like to form an ABA special interest group-- Standard Behavior Measurement. Anyone interested in assisting with this project, please contact me prior to the ABA



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CALENDAR WEEKS



SUCCESSIVE CALENDAR DAYS

JUSTEN DURR 47mos sleeps consecutive hrs

SUPERVISOR _____ ADVISER _____ MANAGER _____

BEHAVIOR _____ AGE _____ COUNTED _____

DEPOSITOR _____ AGENCY _____ TIMER _____ COUNTER _____

Gigi Durr
CHARTER

conference: Department of Curriculum and Instruction (EDCI), Louisiana State University, Peabody Hall, Baton Rouge, LA, 70803, 504-388-6878.

The new column by Chris Mason, which first appeared Volume VI, Number 3, should provoke some reaction from readers. If so, let's hear from you and we'll publish your response. I have talked to many people who have experienced cutbacks in travel funds. Let's use **JPT** to share information that these cutbacks will not permit us to share at conferences. I received a letter from George Williams of Burlington County College in Pemberton, NJ, asking that **JPT** announce the 15th Annual Conference of ISII-- A Society for Exploring Teaching Alternatives. This conference will be held 9-11 October 1986 in Atlanta. For information, write Jean E. Wold, Graduate School, California State University, Chico, CA, 95928. Please feel free to send any information that you would like to pass along to our readers. Beginning with Volume VII, Number 1, we will inaugurate a new section of **JPT**, entitled simply "Sharing". **JPT** was built on a foundation of informal sharing; let's keep it going. Function, rather than form-- just send whatever you have to share on a scrap of paper.

I would like to draw your attention to two books I recently "discovered": (1) **The Mad Minute-- A Race to Master the Number Facts** (1981) by Paul Joseph Shoecraft and Terry James Clukey is a workbook with addition, subtraction, multiplication, division, fractions, decimals, and percents drill sheets appropriate for one-minute timings; each sheet is perforated and can be used to make a ditto master; the book is available from Addison-Wesley, Menlo Park, CA; (2) **Behavioral Assessment in Behavioral Medicine** (1985), edited by Warren W. Tryon, is a series of papers describing the use of standard measurement in behavioral medicine using mechanical instruments, such as the actometer; repeated reference is made to **Strategies and Tactics of Human Behavioral Research** (1980) by James Johnston and Henry Pennypacker.

Beginning with this issue, we will publish abstracts of articles published in other journals that include standard celeration charting or that are of interest to precision teachers. Send us your abstracts.

COMING UP IN VOLUME VII

The following articles will appear in Volume VII: **Where have all the classrooms gone, Precision teaching with the physically impaired: They can chart too, and Precision teaching/standard celeration charting: Where do we go from here.** There's still plenty of room for "your article or chart-share"; send it along!

A PRECISION TEACHER/STANDARD CELERATION CHARTER'S GUIDE TO THE 1986 ABA CONVENTION

At the 1986 ABA Convention, there will be a special tribute to Eric Haughton. This tribute has been organized by Bea Barrett, Kent Johnson, Carl Binder, Harold Kunzelmann, and Jim Pollard, with assistance from Ogden Lindsley and Henry Pennypacker. This tribute is in the form of a symposium entitled, "Frequency as a Fundamental Dimension of Skilled Performance: A Tribute to the Contributions of Eric C. Haughton", which will be conducted from 4:00 to 5:50 pm on Thursday, 22 May 86. The following pages have been reprinted from the convention program. This and other presentations that will likely contain information on precision teaching or standard celeration charting have been circled.

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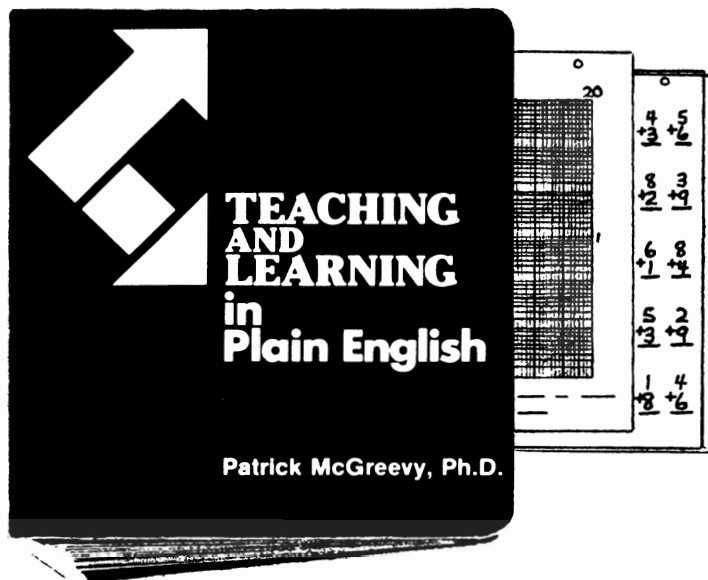
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