While these data are nearly "ancient history" they have not been replicated to my knowledge. Seven years ago when Marilyn Chappell produced these data, we spoke of having a "new standard" by which to measure classroom effectiveness. It seems that this standard has been either out of reach or not aimed for since. I recall Eric Haughton (1979) speaking of encouraging students to make learning opportunities as a way of increasing their "curricular courage". Eric meant the courage of students to try things they did not already know how to do. From the data reported in the Journal of Precision Teaching, it seems that it is not students, but teachers who need to develop a bit of curricular courage. They might start by reporting some results of increasing the learning of entire classrooms of children.

References

Bower, R., & Orgel, R. (1981). To err is divine. **Journal of Precision Teaching, 2**(1), 3-12.

Haughton, E. (1979). Personal Communication.

McGreevy, P. (1980). Hard to do becomes easy to learn. **Journal of Precision Teaching, 1**(1), 27-29.

McGreevy, P., Thomas, T.G., Lacy, L., Krantz, S., & Salisbury, C. (1982). Can learning or variability be predicted from low initial performance: Implications for precision teachers and equal-interval charters? **Journal of Precision Teaching, 3,** 63-68.

PRECISION TEACHING WITH THE PHYSICALLY IMPAIRED: THEY CAN CHART TOO!

Eleanor Crawford
Orange County Public Schools

Judy Olson
University of Central Florida

Abstract: This study examined the adaptation of Precision Teaching techniques in the teaching of addition facts to the physically impaired. The students in the experimental group participated in the correction and charting of their progress while the students in the control group completed worksheets from their class text. A comparison of post test gain scores revealed more progress for those students in the Precision Teaching group. An examination of individual charts showed positive learning pictures for all students in the experimental group. The authors suggest the use of Precision Teaching as a viable means of accountability for teachers of the physically impaired.

Perhaps, there is no other area of education where proof of a student's progress is so essential as in the area of exceptional education. Propelled by the passage of Public Law 94-142, an Individual Education Plan (IEP) must be written for each special student. Among other requirements, the IEP must contain goals and objectives plus documentation for determining when objectives have been reached. One technique that may be used to document the student's progress towards achievement of these goals and objectives is Precision Teaching (Lovitt, 1977b). Precision Teaching was first introduced as a useful measurement strategy by Ogden Lindsley in 1965 (Lindsley, 1971).

Employing frequent and direct measurement, a teacher, in using Precision Teaching, may chart either a child's academic or social progress. Behavioral change is measured in terms of movement over time or frequency. In changing an academic skill, the teacher first selects the behavior to change and the goal, designs a probe or practice sheet, records a baseline of that behavior, begins teaching, and charts the daily behavioral changes on the probe assessment until the goal is reached, all the time evaluating the student's progress and the teaching strategy. The charting provides a pictorial picture and documentation of a student's progress.

Research with the visually impaired (Mangold, 1978), hearing impaired (Isaacs, 1976), learning disabled (Bower & Meier, 1981; Johnson, 1971), and educable mentally handicapped (Cohen & Martin, 1971) shows that Precision Teaching produces positive changes in both social and academic behaviors. Yet, there are no studies where Precision Teaching was used with the physically handicapped. This may be due, in part, to the hesitancy of some to using a time-based measure of behavioral change with children who have motor limitations and who may be more handicapped by a technique which requires rapid responding.

However, if Precision Teaching is as effective with the physically impaired as it has been with other exceptional populations, teachers of the physically impaired will have a valuable technique for producing and documenting behavioral changes. The purpose of this study was to examine the effectiveness of Precision Teaching techniques when used to teach addition facts to physically impaired children.

Method

Subjects

The subjects of this study were six physically impaired students who attended a self-contained classroom in a public school in Florida. All six were staffed into the classroom based on physician's recommendations and all had physical impairments which substantially limited one or more of their major life activities. The subjects ranged in age from 12-13 and in IQ score from 64-76. Four were diagnosed with cerebral palsy and one with Spina Bifida. Four were female, two had no speech and communicated using Bliss symbols, two had very little use of their hands, and three were confined to a wheelchair. The six were matched using these factors and randomly assigned to control and experimental groups.

Materials

Worksheets from the third chapter of Heath Mathematics, Level 1, pages 63-90 were used with the control group. These pages contained only problems of basic addition facts, sums 0-10. The Standard Celeration Chart, the A-3 probe, and a stopwatch were used with the experimental group. The A-3 probe is a worksheet of 90 basic addition facts, sums 0-10 produced by the Orange County Public Schools Precision Teaching Project. Three games adapted from Mathematics Their Way were used with both groups.

Instrumentation

Subtest, Addition, C-1 from the Brigance Diagnostic Inventory of Basic Skills was administered as the pre and post test. The 24 problems on this subtest were basic addition facts, sums 0-10. The Brigance was selected as this was the assessment tool required to evaluate change according to county guidelines. The researchers tried to duplicate the regular classroom

procedures as much as possible, thereby, in some cases, limiting the experimental manipulations.

Procedure

The classroom teacher administered the addition subtest individually to each student. Since the children were motorically involved, the teacher presented the problems one at a time, visually and aurally. Then each student gave the answer by pointing to a number line. If the student corrected a mistake before the next problem was administered, the problem was counted as correct. There was no time limit on the test. The time of completion, however, was recorded for each student.

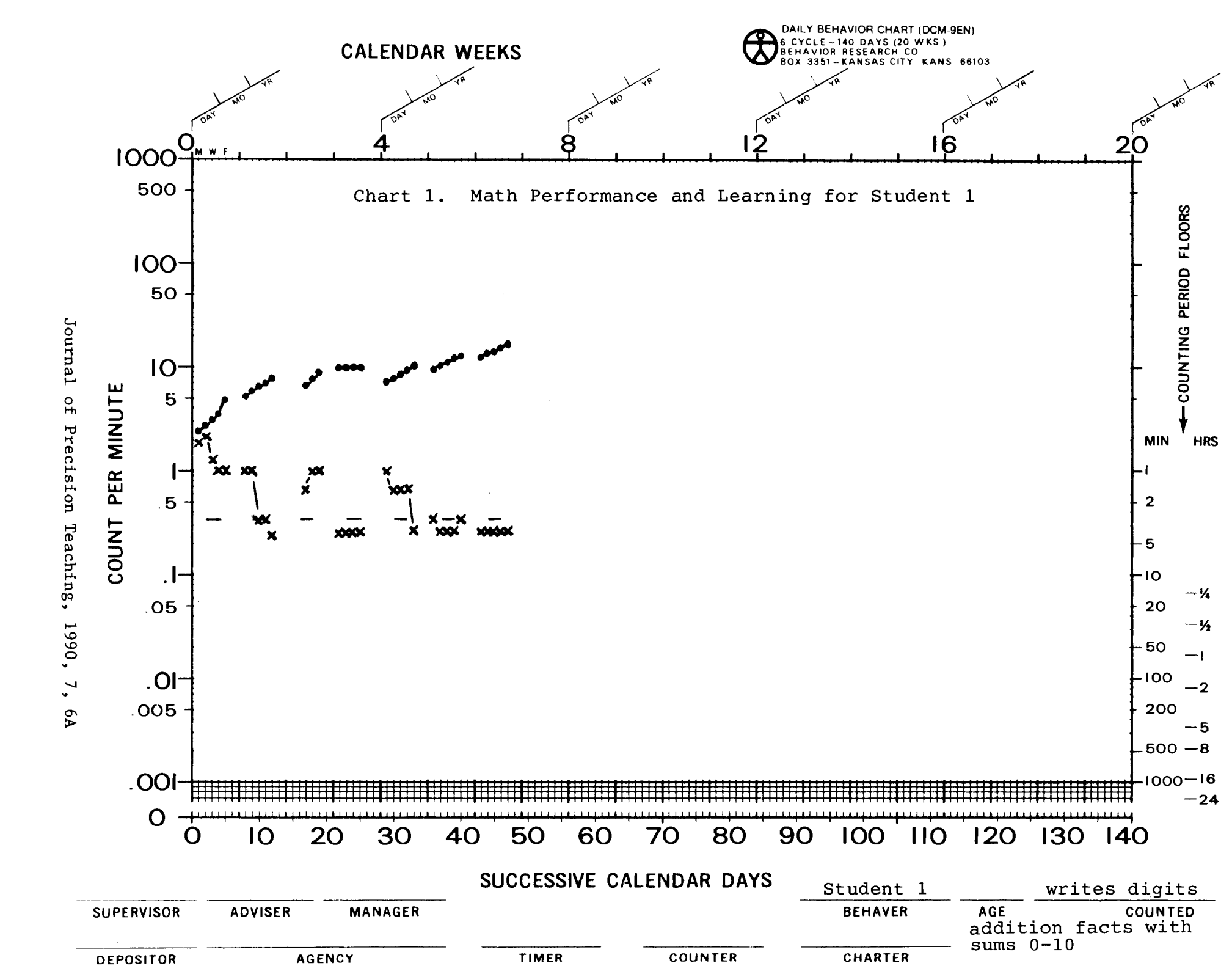
During the daily math class, both the experimental and control groups spent the first 10 minutes of the period participating in direct teacher instruction using the various board games. After the games, the control group was given addition fact worksheets from Heath Mathematics. The worksheets were completed using the number line with assistance and were scored immediately with student feedback. The completion of the worksheet, scoring, and feedback took approximately five minutes per student.

After the games, the experimental group participated in Precision Teaching techniques. Each student was given a three-minute timing using the A-3 probe and the number line. After the three minutes, each student was assisted in checking the problems and charting the number correct and number wrong. The timing, checking, and charting took approximately five minutes per student.

The teacher and trained teacher-aide alternated working with the control and experimental groups. The teacher had taken a semester course in Precision Teaching and the teacher-aide had participated in various workshops offered by the Orange County Precision Teaching Project. At the end of seven weeks, the Addition subtest was again administered by the teacher.

Results

Frequency correct was calculated for both the pre and post test scores by dividing the number of correct digits by time taken to complete the test. Then the gain score was computed by subtracting the pretest from the posttest frequency. The pretest, posttest, and gain score frequencies are reported in Table 1. The group exposed to the Precision Teaching techniques performed substantially better than the control group.



Journal of Precision Teaching, 1990, 7, 6A

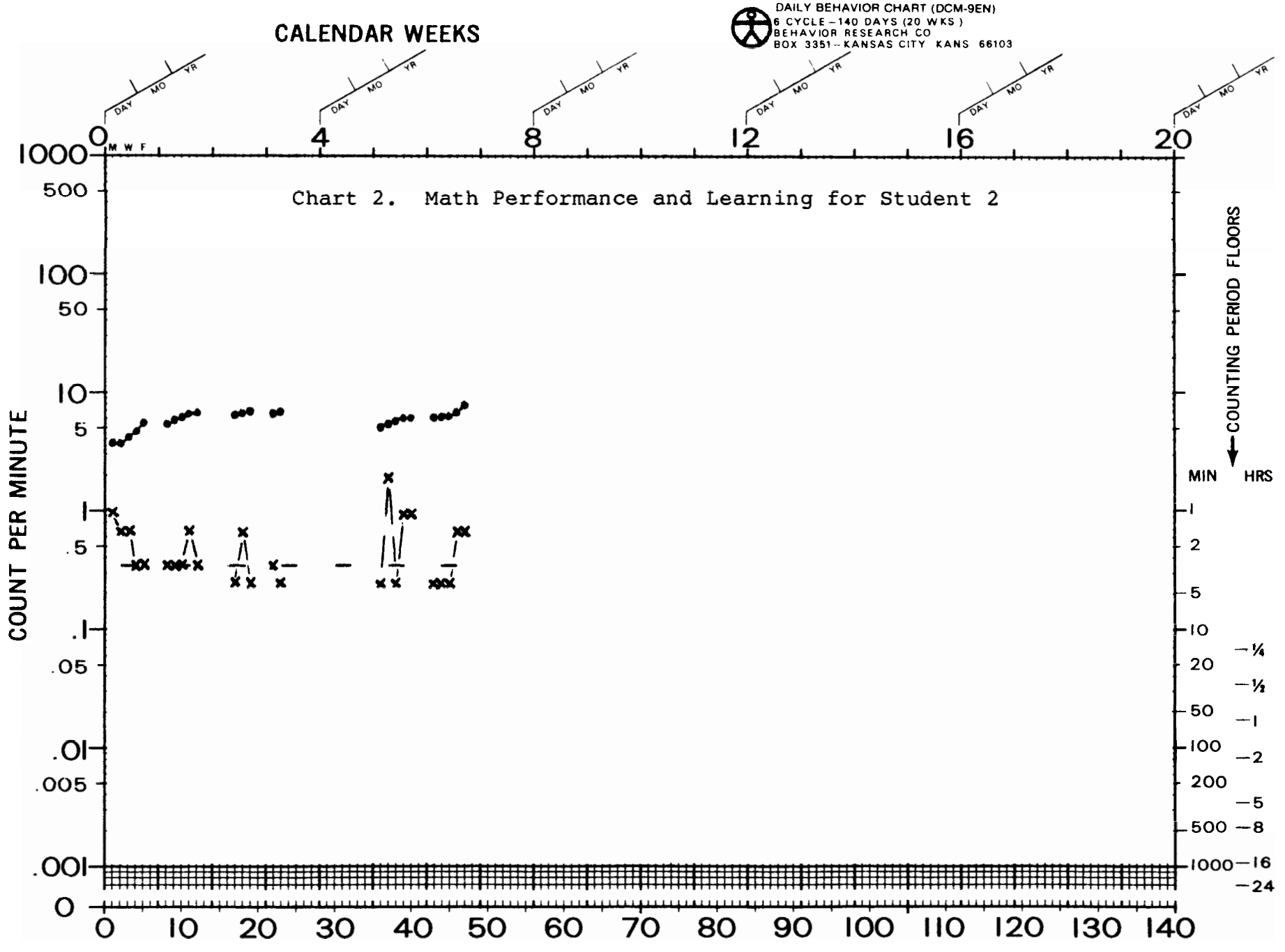
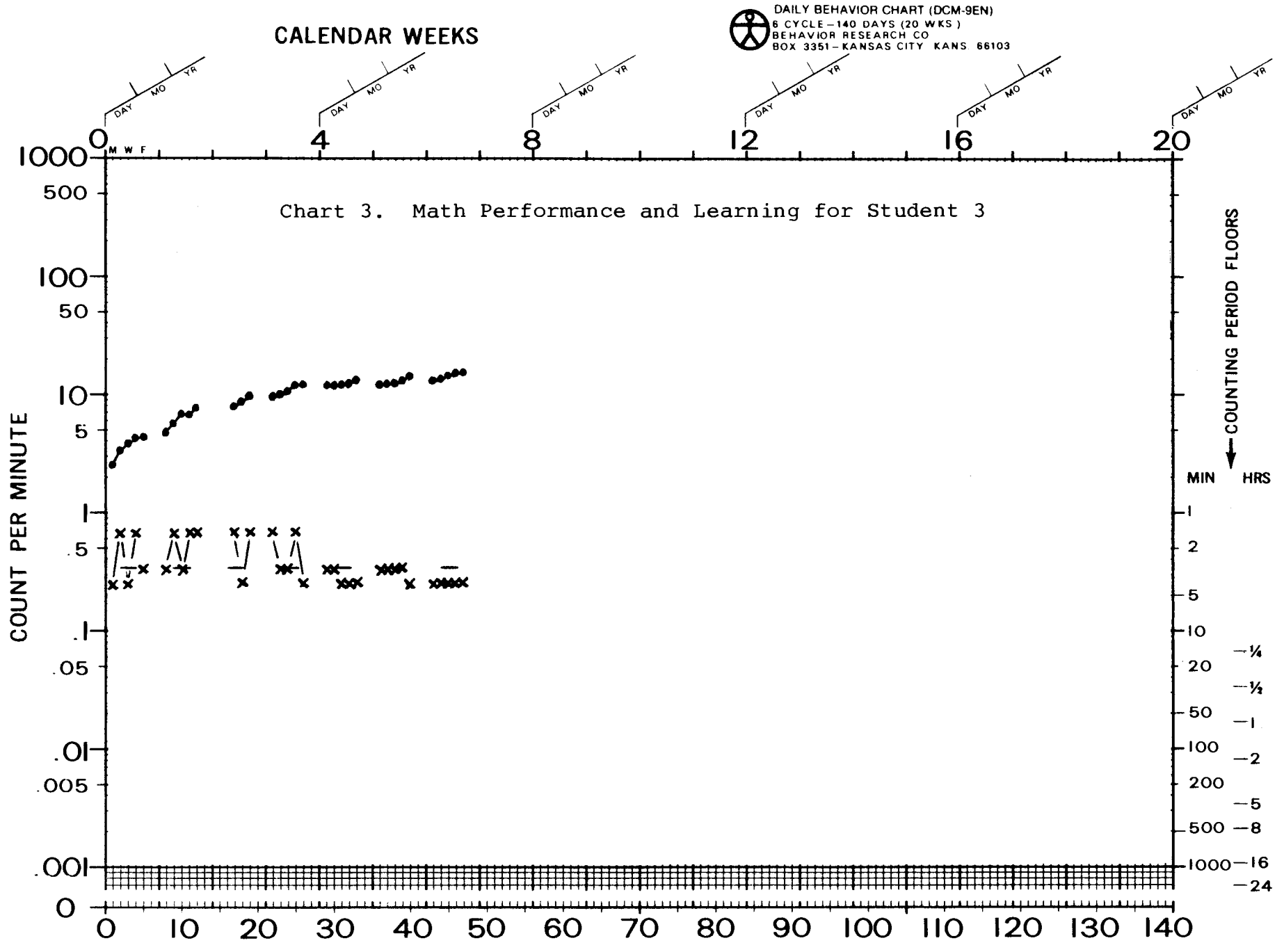


Chart 2. Math Performance and Learning for Student 2

SUPERVISOR	ADVISER	MANAGER			BEHAVER	AGE	COUNTED
					Student 2		writes digits
DEPOSITOR	AGENCY		TIMER	COUNTER	CHARTER		
							addition facts with sums 0-10

Journal of Precision Teaching, 1990, 7, 6B



Journal of Precision Teaching, 1990, 7, 6C

SUPERVISOR	ADVISER	MANAGER		Student 3		writes digits
				BEHAVER	AGE	COUNTED
DEPOSITOR	AGENCY	TIMER	COUNTER	CHARTER	addition facts with sums 0-10	

Table 1

The Pretest, Posttest, and Gain Score Frequencies for the Experimental and Control Groups

Student	Pretest	Posttest	Gain Score
Experimental Group			
1	1.8*	13.5	11.7
2	1.8	9.0	7.2
3	1.3	13.5	12.2
Control Group			
4	1.7	2.5	0.8
5	1.2	3.9	2.7
6	1.4	3.8	2.4

* digits per minute

The individual charts of the students in the experimental group (see Charts 1, 2, and 3) reveal good learning pictures and rates of progress. Errors decelerated and corrects accelerated significantly, even for student 2, who was absent for one week.

Discussion

Precision Teaching techniques were successful even with students who were physically limited. However, since Precision Teaching is a multi-faceted approach, it is important to attempt to pinpoint the exact reasons for the gains of the experimental group. The students in the experimental group were exposed to two factors not provided to the control group: (1) timed practice and (2) student charting and immediate feedback using an easily interpreted graphic display. Either one or both of these factors could be responsible for the gains of the experimental group.

The charting component of Precision Teaching appeared to motivate the students, as both the teacher and the teacher-aide reported that the three students in the experimental group kept asking if they could take the charts home and kept reminding the teachers to check their learning pictures. Moreover, two of the students in the control group kept asking for charts. One student in the control group indicated that he needed a chart to see if he was doing better.

In their discussion of data collection, Kerr and Nelson (1983) propose that graphic recording of data not only motivates students but teachers to continue their collection of data. The value of charting is supported in a study by Brandstetter and Merz (1978), who found that a group of fourth graders made greater reading gains when their daily performance scores were charted on a graph as compared to being recorded on a data summary sheet.

Perhaps, the difference in gain scores was due to the participation of the children in Precision Teaching. Lovitt (1977a) has stressed the motivational value of self-management in effecting behavioral change in children. Coleman

(1966), in his study of integration, found that black students were more successful educationally when they felt control over their own destinies.

Following the completion of the study, Precision Teaching techniques were used with all the students in the math class.

References

Bower, R., & Meier, K. (1981). Will the real slow learner please stand up? **Journal of Precision Teaching, 11**(2), 25-27.

Brandstetter, G., & Merz, C. (1971). Charting scores in precision teaching for skill acquisition. **Exceptional Children, 45**(1), 42-48.

Cohen, M. A., & Martin, G.L. (1971). Applying precision teaching to academic assessment. **Teaching Exceptional Children, 3**(3), 147-150.

Coleman, J. (1966). **Equality of educational opportunity.** U.S. Department of Health, Education and Welfare, Office of Education.

Isaacs, M. (1976). Precision teaching of the deaf. **American Annals of the Deaf, 118**(6), 686-690.

Johnson, E.C. (1971). Precision teaching helps children learn. **Teaching Exceptional Children, 3**(3), 106-110.

Kerr, M. K., & Nelson, C.M. (1983). **Strategies for managing behavior problems in the classroom.** Columbus, Ohio: Charles E. Merrill.

Lindsley, O. R. (1971). Precision teaching in perspective. **Teaching Exceptional Children, 3,** 114-119.

Lovitt, T.C. (1977a). **In spite of my resistance I've learned from children.** Columbus, Ohio: Charles E. Merrill.

Lovitt, T.C. (1977b). Precision teaching. **Early Years, 7**(9), 44-45, 64.

Mangold, S. (1978). The importance of precision teaching in the education of visually impaired students being mainstreamed into public school: Part 1. **Education of the Visually Handicapped, 10**(1), 1-9.

Eleanor Crawford is a teacher of the Physically Impaired, Orange County Public Schools, Orlando, FL. Judy Olson is an Associate Professor in the Department of Exceptional and Physical Education, University of Central Florida, Orlando, Florida 32816.

A COMPARISON OF THIRTY-SECOND AND SIXTY-SECOND FREQUENCIES

Karen M. Sroka
University of Florida

The Multidisciplinary Diagnostic and Training Program (MDPT) at the University of Florida (Tesch & Fox, 1984) serves children in kindergarten through sixth grade from fourteen counties in north central Florida. Typically these children are referred because they have exhibited complex medical, learning or behavior problems, or combinations of these, and the referring agent is seeking assistance with determining effective interventions. To address the question of appropriate academic methods or materials, some MDTP children are placed in a specialized diagnostic classroom for a period of six weeks. While there, these students are exposed to a variety of techniques and materials in the areas of math, reading, language arts, and behavior management. The efficacy of many of the interventions is monitored using Precision Teaching. Because these students