Proceedings
An Educational Summit:
Establishing America's Agenda
for Accountability

10th Annual International Precision Teaching Conference
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Fax: (205) 782-5573
The *Journal of Precision Teaching* (ISSN 0271-8200) is a multidisciplinary journal that is dedicated to a science of human behavior which includes direct, continuous and standard measurement. This measurement includes a standard unit of behavior, frequency; a standard scale on which successive frequencies are displayed, the **Standard Celeration Chart**; a standard measure of behavior change between two frequencies, **frequency multiplier**, and a standard, straight-line measure of behavior change across seven or more frequencies, **celeration**. Frequencies, 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 to be considered for publication. Materials submitted for publication should meet the following criteria:

* be written in plain English
* contain a narrative that is brief, to the point, and easy to read
* use the *Journal of Precision Teaching* Standard Glossary and Charting Conventions
* format references according to the *Publication Manual of the American Psychological Association*
* contain data displayed or displayable on the Standard Celeration Chart to justify conclusions made
* direct data points may be submitted, so the Charting Macro program (Slocum, 1990) may produce an electronic version of the Chart
* original charts may also be submitted.

Articles which are not data-based and do not include data displayed on Standard Celeration Charts may be included. These articles should substantially contribute to the development or dissemination of Precision Teaching/Learning. “About PT” is a column for shorter notes.

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Editor's Comments

Claudia E. McDade

This issue of the Journal of Precision Teaching focuses on the Tenth Annual International Precision Teaching Conference held in Park City, Utah March 25-28, 1992. The theme for this conference was "An Educational Summit: Establishing America's Agenda for Accountability." Included in this issue are selected proceedings of conference workshops and presentations. Most conference workshops are available as training packages for agencies, schools, and organizations; contact the presenters directly to negotiate with them.

A list of resource people who can be contacted for assistance in various specialties is also included. Obviously, not every Precision Teacher/Trainer is included in the resources list, but some of the most active people in the field are experienced practitioners willing to share their skills. Contact the Journal with your specialty if you wish to have your name included next year.

John Eshleman provided a parable for this issue which reminds us in a humorous way of the vitality of standard measurement. It might be an interesting "hook" to use on behavioral colleagues who have not taken the Precision Measurement plunge yet. If the colleagues request more information, a nice follow-up might be the overview article on Precision Teaching as a validated educational technology written by Susan Fister, Perry Passaro, and Karen Kemp. They cited pinpointing, building tool skills, requiring cumulative reviews, increasing number of response opportunities, monitoring of performance, and utilizing data-decisions as evidence of the effectiveness of Precision Teaching. Further support for the efficacy of Precision Teaching is provided by a case history of an illiterate, learning disabled adult. A team of tutors from The Ohio State University's PsychoEducational Clinic working with this client biweekly for an academic year assisted him in improving his oral reading fluency and written spelling.

So, this issue of the Journal of Precision Teaching represents two areas where all Precision Teachers should be involved—the annual conference and the Journal! Plan to attend the 11th Annual International Precision Teaching Conference in San Diego next year! Submit a manuscript, or a Chart-Share, for possible publication in the Journal! The best way to promote Precision Teaching is to share it with others. Pleasant Charting!

Please note an error in Volume VIII, Number 2 of the Journal of Precision Teaching: Kimberly Miske's name was inadvertently omitted from an article. The appropriate citation should be:

A Behavioral Measurement Parable

John W. Eshleman

Percent-town was a growing, thriving community - a suburb of that bigger metropolis known as Los Behavior Analysis, called "Los Analysis" or "LA" for short. In percent-town lived a person known simply as the Behavior Analyst. The Behavior Analyst had lived in Percent-town for quite some time, and lately had observed, with a twinge of sadness, the disappearance of erstwhile farms, open spaces, and behavioral domains into shopping malls, housing sub-divisions and psychology clinics. A new sub-division recently had opened up just down the road from where the Behavior Analyst lived. And another couple more sub-divisions and interventions further on down the road were in the works. The road, though, was the same old two-laner, and it seemed to be getting more and more traffic. Rarely were traffic levels as low as they had been in the old times. Mostly, there just seemed to be more and more Stretch-to-Fill-Mobiles and other such vehicles stressing the inadequate infrastructure of the road.

What with the new sub-divisions preparing to open up, the Behavior Analyst, ever the avowed scientist, decided to measure the amount of traffic and the increase thereof (perhaps as a basis to petition for road expansion or a halting of further sub-divisions - but that's beyond the scope of this parable). So, the Behavior Analyst, armed with pencil, tally sheet and metronome beeper, sat outside in the front yard, twice a day, for an hour each time. One hour was morning "rush hour," and the other was not rush hour. The beeper was set to sound once every six seconds. Whenever it went off, the Behavior Analyst would look straight ahead. If there were any vehicles passing by - even one - a check mark would be made on the tally sheet for the six-second interval just concluded. If there were no vehicles for that interval an x would be written on the tally sheet. For each minute there would be 10 tallies, either check marks or x's. For each minute, then, the percent of time intervals that there was traffic would be computed. A minute that had 7 check marks and 3 x's would be scored as 70%, for example. And this sampling procedure was the basis for determining the change in the traffic over time. As the traffic increased, the percentage of intervals with check marks would increase too. And so, day in and day out the Behavior Analyst rigorously sampled the traffic.

Then, one day a pickup truck stopped, and the driver got out. He approached the Behavior Analyst. The driver was a tall, lanky figure, with grayish-white hair. He wore an old blazer with blue pinstripes on a white background, gray slacks, black shoes and glasses. He carried a Halliburton aluminum briefcase. His overall appearance was somewhat suggestive of the Uncle Sam character. He walked up to the Behavior Analyst, and said, "I've driven by a few times this past week in my pickup truck on my way into LA, and I have watched you marking tallies on a recording form. May I ask what you're counting? I'm just curious about what you're doing."

The Behavior Analyst, somewhat miffed that a recording session had been interrupted, nevertheless replied, "I am a Behavior Analyst, and I am measuring the increase of traffic on this road. It seems to be increasing, and I just wanted to assess whether there was a significant difference."

The tall driver, still looking like the Uncle Sam figure, but now poised, faintly reminiscent of a Missoula, Montana flame jumper, grinned and asked, "Oh really? That's kind of interesting. I'm a Precision Teacher and behaviorist myself. What kinds of frequencies and celerations have you been getting?"

The Behavior Analyst, not really familiar with the word 'celeration' unless it had an 'ac' or 'de' prefixed, answered, "My measures indicate that the amount of traffic has increased from 64% of the time to 87% of the time intervals."

Astonished - not by the increase - the Precision Teacher inquired further: "Why percent? Why do you waste time measuring percent of intervals? Doesn't that - aren't your counts on the tally..."
sheet really your own behavior of watching the clock?"

The Behavior Analyst, teeth clenched, strained a forced smile and then explained the sampling procedure, adding, "Anyway, I use a metronome, and don't 'watch the clock.' Besides, if you're a behaviorist, surely you're familiar with interval recording and time sampling. All good applied behavior analysts use it."

Now truly astonished, the Precision Teacher asked, "But why don't you simply count the number of cars themselves that pass by here? Each time a car goes by, you make a tally mark or press a wristcounter." The Precision Teacher thereupon retrieved a wristcounter and pressed it rapidly a few times. Continuing on he said, "Measure the traffic directly! At the end of the hour, you'd stop counting. And then you could figure out the number of cars per minute - - the actual frequency! Then, by plotting these frequencies on Standard Celeration Charts, you could see if the frequency was truly increasing, decreasing, or maintaining over time - - the celeration!!! You could also see the daily bounce! Your interval recording places an arbitrary ceiling of 10 per minute. And, for chrissakes, there's a lot more than 10 cars per minute on the road right now! Here, I have a spare wristcounter. I even have some standard charts that you may have to plot the frequencies." He pulled out a couple of pieces of strange looking chart paper from the aluminum briefcase.

"No thanks," replied the Behavior Analyst tersely.

"But, why not?" returned the Precision Teacher. "Direct measures tell us so much more. Frequency is a universal measure ...."

Growing irate, the Behavior Analyst responded, "My measurement is perfectly okay! Rate sometimes can be too time consuming to take! Or it's not always possible to take! And it may even be irrelevant in some circumstances; maybe a lot of circumstances. Other behavioral measures are appropriate, too. Behavior analysis uses all kinds of acceptable measurement - - just look in the journals. Besides, I've seen those silly blue graphs for years, and I've never seen what all the whoopie is about. The lines are too close anyway. And with my own graphs, I can focus in on the changes. Or I can expand them out to see the big picture." The Behavior Analyst pretended to stretch a rubber band. "And also, the journals won't print those silly semi-log graphs. Now, if you don't mind, I'd like to get back to my applied traffic analysis here."

Aghast, the Precision Teacher choked back an "arghh" and left. Climbing back into the truck, he realized that the Behavior Analyst would continue to sit there and use the tally sheet, not to count the traffic itself directly, but to use it in a bastardized role. And further, that the most revealing and powerful measures of the traffic - - frequency and celeration - - would continue to be overlooked, avoided, put-down, and discounted by that person who otherwise professed an interest in behavior, behavior change, and behavior analysis. The Precision Teacher was glad to be getting out of Percent-town, though.

**Morals**

(1) In the Middle Ages academicians argued over the number of teeth in a horse's mouth. It was a long time before some bright individual suggested that the teeth be counted directly. Even today you find among behavior analysts a persistent resistance to direct measurement: a negative "can't do", "can't measure" attitude instead of a positive "can do" attitude.

(2) What is the best way to convince percent users and stretch charters to adopt standard measurement and standard displays? Logical arguments, reasoning, and even data probably won't be enough. Also, arguing and debating with them probably won't be helpful.

(3) If you're on your way into Los Behavior Analysis, it's better not to stop in Percent-town. Bypass it altogether, if you can!

**Postscript**

This parable came to me when I left late for work one day and got caught in rush hour traffic. There were so many more cars on each road. I got to thinking how a behavior analyst - - absurdly - - might count or measure such a difference, and how each one, such as myself, who is committed to frequency would do so.

In the spirit of actual science, and to accompany this parable with some real data, I actually counted the traffic going past my office window on the avenue a few yards out front. I used an interval recording method described in Cooper, Heron, & Heward (1987), and also counted the frequency and charted it on Standard Charts (e.g., Pennypacker, Koenig, & Lindsley, 1972). The difference in sensitivity of the two recording methods was monumental, with frequency being many
times more revealing of what actually was going on in front of me. Interval recording really is watching the behavior of the clock. Not having a metronome, I had to keep my eyes on my watch to see when the six-second intervals were starting and ending. I could watch the traffic only with my peripheral vision. When I recorded frequency, I could set the one-minute timer on the watch, and then focus all of my attention on the traffic. To this day, I swear I saw a kindly old Uncle Sam figure driving by in a pickup truck, signaling a thumb’s up of encouragement.

References


Dr. John Eshleman serves as an adjunct instructor at The Ohio State University and a training/education consultant in Dublin, Ohio.
CALERA WEEKS

5 MIN. OF % INTERVAL RECORDING FOLLOWED BY
5 MIN. FREQUENCY RECORDING FOR EACH DAY

SUCCESSIONAL MINUTES

10 6-SECOND INTERVALS
PER MINUTE

SUCCESSIONAL MINUTES

VEHICLE TRAFFIC ON LANE AVE, COLUMBUS, OHIO

JWE 12/01/91 2:30-2:40 PM

CHARTER

X2-X4 MORE FREQUENCY
X2 MORE BOUNCE

RECORD FLOORS

SUCCESSIVE CALENDAR DAYS

VEHICLE TRAFFIC ON LANE AVE, COLUMBUS, OHIO

BEHAVIOR AGE LABEL COUNTED

JWE 12/01/91 2:30-2:40 PM

CHARTER
Adult literacy and Precision Teaching: Repeated Readings and See/Cover/Write Practice to Improve Reading and Spelling

William J. Sweeney, Christine K. Omness, Kristin L. Janusz, and John O. Cooper

Roger, a 43 year old adult male with severe reading and spelling deficits was tutored in The Ohio State University PsychoEducational Clinic during the 1990 - 1991 academic year. Precision Teaching, repeated readings, and see-cover-write spelling practice were used for instruction in reading and spelling. Roger's data convincingly demonstrated the effectiveness and efficiency of these procedures for improving his literacy skills.

Literacy is one of the most important skills for successful functioning in our society. McCormick (1987) said: "Reading provides access to employment, increases educational opportunities, promotes social adjustment, offers entertainment, and serves as a source of life-long learning" (p. 3). The importance of reading permeates every level of our society. For instance, a student must read to be successful in school. A teenager must read to take a driver's license examination. An adult must read to complete an employment application. Unfortunately, a large portion of the adult population does not have sufficient reading skills even after years of schooling. Conservative estimates of illiterate and functionally illiterate persons range from 18 million to 31 million (Johnson & Layng, 1992). Although an exact number of reading disabled persons is difficult to establish, it is obvious that efforts to improve adult literacy are needed.

Adult illiteracy is a major social problem for the United States. A technological society depends upon a literate populace to keep the wheels of commerce turning. Adult illiteracy is a major threat to the economic well being of the nation. If the United States is to be economically competitive with other industrialized nations, the society must make the necessary investment in "human capital" by developing programs to prevent and remediate illiteracy (Braden, 1984).

Pennypacker (1986) described urban violence, economic decay, and adult illiteracy as intense national concerns that have been highly resistant to traditional social science solutions in the past. The obvious solution to these societal crises is effective education. This is especially evident in solving the pressing problems of adult illiteracy.

Precision Teaching and Direct Instruction provide measurably superior reading instruction for a broad spectrum of students (e.g., Binder & Watkins, 1990; Brosovich-McGurr, 1991; Carroll, McCormick, & Cooper, 1991; Georgeff, 1991; Lee, 1990). These procedures are equally effective with adults. For instance, Kent Johnson and Joe Layng (1992) from Morningside Academy in Seattle and Malcolm X College in Chicago demonstrated significant improvement in literacy of unemployed, homeless, Afro-American adults as a result of providing instruction with a combination of Precision Teaching and Direct Instruction.


Improving just reading for adult literacy is not sufficient. Literacy instruction also should include communication and language arts skills such as spelling and written expression. Spelling is an integral component to literacy training. Although

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spelling receives less attention today than it has in the past, it remains an essential part of the curriculum in most elementary classrooms (Heron, Okyere, & Miller, 1991). One successful remedial approach to improve spelling uses a copy-cover-compare procedure (Graham & Miller, 1979). With this procedure, the student sees the word to spell, writes the word twice while looking at it (copy), covers the word and writes it again (cover). Finally, the student compares the words written in the see condition with the words written in the cover condition. This procedure emphasizes repeated practice and self-correction.

The copy-cover-compare procedure was adapted to a see-cover-write procedure to investigate the effects of self-correction on the acquisition, maintenance, and generalization of spelling words with elementary school children (Okyere, 1990). This see-cover-write approach was effective in improving the spelling skills of elementary students experiencing spelling difficulty (Okyere, 1990; Okyere & Heron, 1991). See-cover-write is highly individualized and can easily be used with adult learners.

The purpose of this article is to demonstrate the effectiveness of Precision Teaching, repeated readings, and see-cover-write spelling practice for improving the reading and spelling fluency of an adult learner with a severe reading disability.

Method

Participant and Setting

Roger is a 43 year old white male who grew up in a coal mining region of the Mid-west. He had difficulty with academics in public school. Roger has a severe speech impediment that was diagnosed as "lazy tongue" in his early teens. He received speech therapy during junior high school. Roger attributes his reading difficulties to speech problems. This was especially apparent when he used phonics and syllabication to sound out words. Roger dropped out of school in the 10th grade.

Roger worked for 15 years as a butcher at a supermarket in Columbus, Ohio. He developed several adaptive strategies to compensate for his reading deficit. For example, customers spelled the cut of meat for their order. Roger matched what they spelled to the U.S.D.A. markings. He asked for landmarks (e.g., next to the McDonald's) rather than street signs as directions for different city locations. His adaptive strategies were successful. Roger is successfully employed and raised a family. In the early 1980's after observing the help his daughter received in reading and math from the public schools, he tried schooling once again. Roger passed an oral examination through the Columbus Public Schools to receive his Graduate Equivalency Degree (G.E.D.) in 1985.

Starting in the fall of 1990 and continuing for the remainder of the academic year, Roger was tutored in reading and spelling on a biweekly basis. His literacy goals were to read at the 12th grade level, and to spell at the 5th or 6th grade level. A short term goal was to finish a novel during each quarter of the academic year.

Movement Cycle/Measurement Procedure

The movement cycle for oral reading was number of words orally read correctly and incorrectly during a one minute timing. The learning channels for oral reading were see/say. The correct/incorrect pair were the number of words read correctly or incorrectly during a one minute counting period. Incorrect words were marked on a clear piece of transparency film with an erasable overhead marker. These errors included omissions, insertions, substitution (reversals), tutor prompts, repetitions, or skips. Beginning, ending marks, and self-corrections were also marked but were not recorded as incorrects.

The movement cycle for oral spelling was the number of letters orally said and written during a one minute counting period. The number of letters in correct sequence within each word and for stopping at the right letter were counted correct. The learning channels for the oral and written spelling were see/cover/say/write.

General Procedures

The first three authors were tutors in The Ohio State University PsychoEducational Clinic during the 1990 - 1991 academic year. This clinic experience focused on the design and implementation of remedial academic instruction. The emphasis of this clinic was Precision Teaching. Bill Sweeney taught Roger during Autumn Quarter 1990, Chris Omness during Winter Quarter 1991, and Kristin Janusz during Spring Quarter 1991. Each tutor met with Roger twice weekly for an average of 16 sessions per quarter.

A pre-assessment phase was conducted by the first author to determine Roger's reading grade level (Fry, 1968). Also, Bill Sweeney taught Roger to
self-count and self-chart his performance. Roger counted and charted through out the academic year. The three tutors ensured accurate charting by checking the counts and Roger's charting after each counting period. Chart feedback, instructional aims, repeated readings, and see/cover/write spelling procedure were used to improve Roger's reading and spelling fluency.

Reading Pre-assessment
Three reading levels were chosen from the "Reading for Concepts" series (Liddle, 1977). The frequency of words read was counted during one minute timings on Levels C, E, and F. Levels C, E, and F had grade level reading equivalence of 3.2, 4.6, and 5.2 respectively. Total number of words read, and words read correctly and incorrectly were recorded. A summary of Roger's results appears in Table 1:

<table>
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<th>Reading Levels</th>
<th>Words Read Per Minute</th>
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<td></td>
<td>Instr.</td>
</tr>
<tr>
<td>C</td>
<td>94</td>
</tr>
<tr>
<td>E</td>
<td>74</td>
</tr>
<tr>
<td>F</td>
<td>84</td>
</tr>
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</table>

During pre-assessment, Roger's data show his correct responses multiplying and his learning opportunities dividing as he adapted to the one minute counting periods. Most learning opportunities were substitutions and omissions rather than reversals or decoding problems. Bill Sweeney selected Level F - "Reading For Concepts" for beginning instruction. Level F is the most difficult and challenging of the three assessment passages. An aim between 180 and 200 words read orally per minute was chosen.

Spelling Pre-assessment
The initial assessment on spelling was a simple oral spelling test over several spelling lists. Levels A through D from the Houghton-Mifflin Word Recognition Tests were assessed. The Houghton-Mifflin basal reading program contained 20 vocabulary words per instructional level. The spelling lists from levels A through D corresponded to the sight-word vocabulary in the kindergarten through third grade basal reader. Levels A through D were chosen for the pre-assessment because Roger said he was a very poor speller. Results from the spelling assessments are represented in Table 2:

| Spelling Preassessment Summary From Houghton-Mifflin Word Recognition Tests a |
|---------------------------------|----------------|----------------|
| Instructional Levels            | Number of Letters | % Words Spelled |
| Pre-Primer                      | 66 out of 69      | 90%            |
| Primer                          | 69 out of 72      | 95%            |
| Grade 2                         | 48 out of 76      | 55%            |
| Grade 3                         | 62 out of 79      | 60%            |

These pre-assessment scores placed Roger's spelling vocabulary at a grade level equivalent between 2.0 and 3.0. Because levels C and D were both under 85% accuracy, Bill Sweeney believed these levels would be challenging enough to allow for significant learning. The second and third tutors used similar word lists (Dolch, 1960) at corresponding grade levels. The initial aim for the first spelling list was set at 90 correct written letters per minute. This aim was increased to 120 correct letters written per minute on subsequent spelling lists. The initial aim for the first spelling list was determined by using the median score from three one minute time trials where Roger copied words (See/Write) from a paragraph in a local newspaper. The aim was adjusted higher on subsequent spelling lists after Roger became more familiar with the instructional procedures.
Instruction
The instructional procedure remained the same for the duration of the tutoring program. The first 5 to 10 minutes of each session were used to build rapport, review progress on goals, and review assessment data.

The next 10 minutes were used for the counting periods and evaluating the data from the reading and spelling assessments. The next 20 minutes focused on spelling. We used 2 sets of flashcards. Each set containing 20 cards was repeated 3 times each session to build sight-word recognition skills. The tutor showed a sight-word to Roger. He then pronounced the sight-word. If Roger did not correctly pronounce the word in 3 seconds (i.e., one one-hundred, two two-hundred, three three-hundred), the tutor helped him to phonically sound the word. After the correct pronunciation, the flash card was returned to the stack and the next word presented. This procedure continued until Roger completed the 2 sets of 20 flash cards 3 times. These flash card sets were two grade levels above what was assessed during the counting periods because the sight-word and listening vocabulary of most students tend to be more developed than their reading or spelling (McCormick, 1987).

Spelling instruction used an individualized self-correction see/cover/say/write/check/cover/write technique. A sheet was folded into three sections. The words were correctly written on the far left side of the paper. After viewing a particular word, Roger folded the paper to cover the correctly written words. He said the word, and then wrote the word correctly in the first writing space on the second third of the paper. Next, he checked the word by writing portions of the word spelled correctly and circling a space where errors were made until the word was correctly written. After the spelling check, Roger folded the second half, revealing only the last third of the page. On the last third of the page, he again attempted to correctly spell the word. The first and second tutors used the Houghton-Mifflin Word Recognition Tests, while the third tutor used similar words from the Dolch (1960) word lists.

The next fifteen minutes were used for reading instruction. The tutor orally read a given passage. Roger then orally read the passage. If 4 to 6 response prompts were needed or 3 to 5 errors were made, the tutor re-read that same passage. If Roger read the passage with under three errors, the tutor read the next passage. Roger orally read the same passages as the tutor.

The last 5 to 10 minutes were for oral reading in novels, such as The Outsiders (Hinton, 1967), Where the Red Fern Grows (Wilson, 1961), and Rumble Fish (Hinton, 1975). These novels were selected for practice and pleasure reading. Standard Celeration Chart feedback was given. Roger was encouraged at the end of the session to continue reading at home. Praise was given throughout the session, contingent on the continued effort and performance.

Results
Oral Reading
Table 3 presents summary data from Roger's oral reading with repeated readings. Roger met or exceeded the oral reading fluency aim of 180 to 200 words per minute on 6 separate reading passages. The number of sessions to aim became progressively less as new passages were assigned. It took Roger 13 sessions to meet aim with Bill Sweeney, 9 sessions each for two separate passages with Chris Omness, and an median of 5 sessions to meet aim on three separate passages with Kristin Janusz. Charts 1 through 3 show a "jaws" learning picture with the celeration of corrects ranging from x 1.25 to x 1.60 across all six reading passages. The range of learning opportunities decelerated from a x 1.1 to a / 4.0. The median performance change for the six passages was a x 2.25 improvement in oral reading.

See/Cover/Write Spelling
The data regarding Roger's performance with the see/cover/write spelling practice is summarized in Table 4. Roger met or exceeded his aims for the number of letters correctly written in the proper sequence over eight separate spelling lists. These lists increased in difficulty as Roger met aim on the previous list. The number of sessions needed to reach aim with a given spelling list progressively decreased. Charts 4 through 6 showed a "take-off" learning picture with a median celeration for corrects of x 1.30. The learning opportunities remained under 5 with the exception of the second tutor who showed decelerating trends of / 1.90 and / 2.0 respectively. The median performance change for all eight spelling lists was a x 1.60 improvement when using the see/cover/write spelling practice.

Discussion
Roger's oral reading fluency and written spelling improved during tutoring. Roger worked hard and
benefited in both acquisition of spelling and reading fluency. The Precision Teaching procedures were effective as visual feedback for both Roger and the three tutors. In fact, the first tutor was so skeptical of the charted data that he took several sessions after Roger had met aim in reading and spelling to replicate the results. The data convincingly demonstrated the effectiveness and efficiency of using the Precision Teaching measurement procedures to evaluate and guide instructional practice. All three tutors agreed that the use of Precision Teaching was powerful and efficient instruction and should be integrated into as many instructional settings as possible. The feedback from the Standard Celeration Chart motivated Roger to improve his skills in reading and spelling. He repeatedly stated how much he enjoyed and learned with Precision Teaching and the other instructional strategies used in tutoring. In addition, Roger commented on how he liked the active participation of and response prompts from the tutors. Roger said that he hoped his next tutor would actively help him "struggle through a reading passage" and not just provide feedback at the end of a session. He believed that the more involved the tutors were in the measurement and instruction, the more he would learn during tutoring.

All three tutors recommended that Roger continue his instruction in reading and spelling at The Ohio State University's PsychoEducational Clinic. It was also suggested that Roger use Precision Teaching procedures at home for additional practice in reading and spelling. If these home components were included in a systematic, individualized remedial education program, hopefully, he would continue to succeed in his quest to become a more fluent and enduring reader and speller.

Roger was tutored only twice a week. This is a major limitation. All three tutors believe his improvements in oral reading fluency and spelling would be greater if he were tutored on a daily basis over the same time period. An intense, daily routine with Precision Teaching has the potential for remediating Roger's other skill deficits.

The results from this demonstration show the effectiveness of integrating Precision Teaching with other remedial instruction for adult learners. In addition, the results showed the effectiveness of repeated readings and see/cover/write spelling practice for improving oral reading and spelling fluency with an adult learner.

Binder and Watkins (1990) recommend the adoption of measurably superior instructional practices, such as Precision Teaching and Direct Instruction, to address the lack of "basic skills" evident with many students in American schools. This same emphasis on effective education can and should be used to remediate the pressing problem of adult illiteracy. Using Precision Teaching to develop and promote "measurably effective instructional practices" will significant improve adult literacy in the United States.

References


Dr. John O. Cooper is Professor of Special Education at The Ohio State University and honorary Professor in the Center for Individualized Instruction at Jacksonville State University. William J. Sweeney is a doctoral candidate, Christine K. Ornness is a masters candidate, and Kristin L. Janusz is an undergraduate at The Ohio State University, Columbus.
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<th>Tutor</th>
<th>Passage</th>
<th># of Sessions on Reading Passage</th>
<th># of Sessions to Aim</th>
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<th>Celeration of Learning Opportunities</th>
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<td>Tutor 2 - C. K. Omness</td>
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<td>92 - 218</td>
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<td></td>
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<td>x 1.25</td>
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Table 4

Summary Results: See/Cover/Write Spelling

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<tr>
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<tr>
<td># of Sessions on Spelling List</td>
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<td>Passage #4</td>
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<td>Passage #8</td>
<td>2</td>
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a. First tutors See/Cover/Write spelling aims were 105 and 120 letters in the correct sequence and spelled correctly on spelling list 1 & 2 respectively.

b. Second and third tutors See/Cover/Write spelling aims were 120 letters in the correct sequence and spelled correctly on spelling lists 3 through 8.
At no time in the history of education have there been more new ideas and innovations available to educators than there are today (Guskey, 1990). However, despite the claims of their advocates (including the authors of this paper) it is clear that no single instructional strategy or educational innovation will solve all the problems facing teachers (Guskey, 1990). Therefore, educators must direct their efforts toward synthesizing a broad range of effective instructional techniques into a relevant, practical model which can be utilized in classroom practice. Five areas of effective instruction which can be successfully integrated by teachers are described in the following section. After these elements are presented, a discussion of Precision Teaching’s congruence with these components is provided.

Research on effective teaching demonstrates that academic learning is influenced by:

1. the degree to which instruction is aligned with student goals.
2. instruction of prerequisite skills and knowledge.
3. the degree to which teachers present new information in the context of what is already known by students.
4. student time-on-task.
5. careful monitoring of student performance, with opportunities for feedback to correct learning errors.

This research can be applied successfully to students of all ability levels and in any instructional setting (Brophy, 1986). In fact, research conducted by Kulik and Kulik (1986), Ward (1987), Walberg (1990), Kulik, Kulik and Bangert-Downs (1990), demonstrates that when these techniques are properly employed, students who qualify for special education services often experience even greater achievement gains than their more able counterparts, thus reducing the differences in performance between the two groups. Furthermore, these effective teaching strategies permit greater inclusion of students with disabilities in mainstream instructional settings (Guskey, Passaro, and Wheeler, in press). The essential characteristics of these components are described below and visually presented in Figure 1.

The Degree to which Instruction is Aligned with Student Goals
Defining student goals and outcomes and determining mastery of the criteria are the initial steps in directly teaching to the desired goals and objectives of the student’s Individualized Education Program (IEP). Instructional alignment (i.e., teaching what is tested) explains over 60% of the variance in student achievement (Cohen and Hyman, 1991). Although it may seem strange, the effective teaching, outcome-based education, and the effective schools literatures consistently demonstrate that we rarely align what we teach to what we test (Bloom, 1976; Cohen and Hyman, 1991).
Instruction in Prerequisite Skills and Knowledge

The extent to which a learner enters a lesson with the necessary prerequisite skills and knowledge has been demonstrated to explain 50-60% of the variance in student performance (Bloom, 1976; Leyton, 1983). To implement this component, an assessment is usually developed by the teacher to reflect information she/he deem crucial to successfully begin a new course of study. This assessment can be administered at the start of the school year and the results can provide a specific formula for directing instruction for recoupment. Research conducted by Leyton (1983), demonstrated that 'remedial' instruction of prerequisites can, in most cases, be accomplished within two weeks. The pretest and subsequent instruction can help assure that students will not meet with failure. Furthermore, this prerequisite instruction can help facilitate the introduction of new material into an already established student hierarchy.

The Degree to Which Teachers Present New Information in the Context of What is Already Known

New behaviors or materials to be learned should be divided into instructional units/tasks with components that 'spiral' back to previous learning (Bloom, 1971; Gage & Briggs, 1979). 'Spiraling' refers to including information from previous units to provide for cumulative review while introducing new concepts. These units/tasks are then presented and students are guided through the new material, corrected and reinforced along the way until successful independent performance can be assured. This recently learned content should then be thoroughly reviewed prior to any evaluations. Furthermore, it should serve as the foundation for future units/tasks which will be presented.

Students Time-On-Task

High task engagement rates attained through successful classroom management techniques are the most frequent and powerful correlates of student achievement (Brophy, 1986). However, Latham (1985), and Rich and Ross (1989) have demonstrated that students actually spend less than 50% of any given school hour on-task.

Monitoring of Student Performance, Feedback and Correctives

Following a teacher's initial instruction of the material in a unit, an evaluation or quiz should be administered to students, but not necessarily as part of the grading process. Instead this 'test' should be used first and foremost to provide feedback to both students and teachers regarding what was learned well and what was not. Meta-analysis of the effects of systematic 'formative' evaluation on student achievement with special education students yield .7 standard deviation unit higher than students whose programs are not systematically monitored (Fuchs & Fuchs, 1986). These formative evaluations improve student performance by consistently checking on student understanding, identifying what has been learned well and what has not and then directing additional instruction toward any areas in need of further attention.

If mastery of the task/unit is not accomplished, further instruction should then be offered to students who require additional time and practice to learn the material. Strictly speaking, corrective activities are not reteaching. Instead correctives should focus on specific elements or items in the formative test that were not mastered. In this way each student and educator needs to work only on those concepts or skills that have not yet been mastered. In other words, the correctives are individualized. They are also designed to present the material differently and involve the student in alternative learning activities, identifying for the student another, more appropriate approach to learning that concept. These correctives may be worked on with teacher(s), with peers in cooperative learning teams, or by the student independently (Guskey, 1985).

Precision Teaching: Congruence with Effective Practices

Precision Teaching is a validated educational practice that has two primary applications in classroom settings. First and foremost, Precision Teaching represents a set of continuous and direct rate-based measurement procedures for determining the effectiveness of any instructional program, method, material, or tactic (Algozzine, 1983). Precision Teaching does not dictate what should be taught or how instruction should proceed (White, 1986). Rather, this measurement system will provide ongoing feedback to the teacher and the learner as to whether the progress toward end-of-unit objectives or curriculum that represents at least six to eight weeks worth of instruction is improving, maintaining or worsening. This information, which is then charted on a Standard Celeration (learning) Chart, allows for precise decision-making to occur. Teaching becomes more effective and efficient; instructional changes can be made immediately in
order to adapt to the unique needs of each student.

A second application of Precision Teaching involves the use of timed practice exercises (Lovitt et. al., 1990). In this situation, approximately five to eight different instructional items or tasks related to the end-of-unit objectives are presented to the learner. Each item is repeated at least two to three times on a formatted practice sheet, or in a deck of cards, with corresponding answers written on the reverse side of the sheet or card. Other input and output channels can be used such as hear and mark, see and do, etc. Individually, or with a partner, who is checking and providing feedback, the learner says or writes responses to as many tasks as is possible for the student during the timed period. The timed period usually lasts anywhere from 15 seconds to 2 minutes. These practices are provided daily and should directly align with the small slices of information contained on the measurement sheet. Counting and charting of performance is not required for these short, timed practice exercises.

The following discussion will identify the ways in which Precision Teaching is aligned with the five areas of effective instruction identified in this paper:

The Degree to which Instruction is Aligned with Student Goals
The process of defining student goals and objectives, stated in Precision Teaching terminology, is called pinpointing. Pinpointing involves specifying the precise behavior (or movement) in terms of behavior pairs. Selection of behavior pairs involves the identification of the behavior(s) to be increased and the behavior(s) to be decreased often corrects and errors for academic objectives. The behaviors (objectives) which are identified are then represented as test items on an end-of-unit type test. Daily instructional procedures would then be closely aligned with the goals and objectives and the end-of-unit measurement. Additionally, the process of pinpointing includes establishing and articulating rate-based standards of performance which are specified as aims. These aims represent mastery or proficiency levels necessary for skill maintenance and/or progression to subsequent pinpoints. Pinpointing increases the alignment between instruction and student goals.

Instruction of Prerequisite Skills and Knowledge
Precision Teaching procedures include components devoted to the identification and instruction of tool skills. Tool skills are skills that are prerequisite to the performance of other basic skills. Precision Teaching provides for tool skill and basic skill screening procedures, including procedures for identification, placement, and/or grouping of students. Teachers can easily develop their own assessments or probes that are aligned with their instructional units or programs. These probes can be used as the basis for identifying the appropriate starting points for instruction. Assessments representing end of year goals and objectives may also be developed and used for monthly or weekly administration in order to assess student progress toward these larger chunks of curriculum.

The Degree to Which Teachers Present New Information in the Context of What is Already Known by Students
Precision Teaching measurement procedures can provide for the construction of rate-based unit tests that include a percentage of review items (pinpoints). For example, unit tests may be developed in the following proportions: approximately 70% of the items to represent minimal competencies, approximately 15% of the items to represent advanced competencies, and approximately 15% of the items to represent review competencies. The review items would be drawn from the minimal competency items which appeared on all previous unit tests. In this way, the teacher can easily provide for maintenance checks on already mastered information.

Precision Teaching practice procedures also provide for cumulative review. Daily timed practices on new items can be accompanied by shorter, timed practice sessions on items from previous daily lessons.

Student Time on Task
Precision Teaching is not a method for presenting or delivering instruction on new information. However, as a technique which involves students in rate-based measurement and/or practice exercises, these procedures substantially increase the number of opportunities for students to respond. The number of response opportunities is correlated with higher student achievement. Consequently, Precision Teaching procedures can greatly enhance task engagement rates by several minutes a day.

Monitoring Student Performance, Feedback and Correctives
The effects of formative evaluation procedures on
student achievement have been clearly documented (Fuchs & Fuchs, 1986). Precision Teaching is clearly a validated example of one such monitoring procedure which can be effectively integrated into a model for effective instruction. Continuous and direct measurement are underlying premises of Precision Teaching. In fact, Precision Teaching procedures would suggest more frequent (i.e., daily) measurement of student performance than most other mastery learning models. Precision Teaching measurement procedures require ongoing charting of performances which have also been shown to be an important factor in improving student performance (Fuchs, 1986).

Finally, ongoing data-based decision making is an integral component underlying the process of Precision Teaching. Inspecting charted data pictures and asking pertinent questions regarding performance leads the learner and the teacher into the identification and selection of the most effective and appropriate interventions/correctives. This allows for more precise teaching and learning to occur.

Summary
Validated educational technology is available to educators. It is also evident that this technology can be successfully translated, blended, and integrated into classroom practice. By effectively combining these proven practices, teachers can ensure skill mastery.

References


Susan Fister and Karen Kemp are affiliated with the Utah Learning Center, 2290 East 4500 South, Suite 220, Salt Lake City, UT 84117. Perry Passaro is affiliated with the Mountain Plains Regional Resource Center, 1780 North Research Parkway, Logan, UT 84321.
Implementation of Precision Teaching by the Speech-Pathologist

Ginger Pierce

In the field of communicative disorders, it is not always a matter for the speech-language pathologist (SLP) to teach a new behavior alone, but to eliminate an erred response and replace it with a new, positive behavior. Many clients who have a communicative disorder have acquired the use of an erred phonological or linguistic rule system at an automatic level, where the response is made without conscious effort. Whether the task of the SLP is to teach the client an entirely new behavior or a behavior to replace an erred response, it is apparent that the behavior must obtain a high level of proficiency to generalize the correct use in conversation.

The application of Precision Teaching has been shown to be an effective therapeutic process in facilitating the desired behavior at an automatic level. A strong therapeutic program entails explicit instruction, responding with the child, modeling, correcting, reinforcing, and practicing appropriate communicative behavior. Knowing that normal conversation rate is about 120–140 words per minute, one must consider the use of increasing the rate of correct production of the new behavior, if the client is to replace the new response for the erred response in conversation; thus, the use of Precision Teaching is foremost here.

Valuable information, such as the effectiveness of therapy procedures, carry-over and error analysis can be obtained from the Standard Celeration Chart. Whether the target behavior is involving fluency, voice, language, or articulation, the use of timings can be applied. In articulation, different practice sheets enable the therapist to pinpoint specifically which combinations of phonemes are more difficult for the client in the language areas, specifically vocabulary development, auditory discrimination, word retrieval, syntax, multiple meanings, and categorization. Abusive vocal behavior can be charted in a voice therapy program. In implementing a fluency program for stutterers, methodically obtaining fluency in gradually increased time increments has been successful. A key to improved performance is to be specific when addressing short-term objectives with the use of a rate contingency.

In the area of communicative disorders, the real value of a strong therapeutic program linking with Precision Teaching is found in the confidence and increased self-esteem that the clients gain in becoming articulate, expressive, fluent users of our language.

A certified speech-language pathologist, Ginger Pierce is in the Alpine School District. She can be reached in the Special Education Department at 575 North 100 East, American Fork, UT 84003.
A resource teacher and speech-language pathologist have developed a program to improve written language skills of elementary-aged students. These students in special education classes have first been required to perform skills of proofreading and editing of written language prior to production of written work. The students have learned language/vocabulary concepts in conjunction with proofreading and editing of written materials containing capitalization/punctuation errors, by first using Precision Teaching Practice Sheets.

Standard Celeration Charts reveal that overall the children improved skills in editing of capitalization/punctuation errors. Proficiency of concepts contained in most of the isolated skills practice sheets occurred, although not all of the children reached aim of proofing/editing of the short stories.

Reports from these students' mainstream (regular education) teachers indicate the concepts the children have learned are being generalized to the regular class setting. These teachers are reporting (with great surprise) that these students are performing written language assignments with fluency and skill similar to that of the regular student.

Additionally, the students have enjoyed the program. They have not tired of performing skills on practice sheets nor of editing the stories. The coordinators of this project have been equally enthusiastic. The practice sheets they have developed have lent themselves to further exploration of the concepts; thus, they have formulated additional methods, procedures, and variations of presenting the material to the students. Further development of more varied practice sheets is presently in planning stages.

Christine L. Smith, resource teacher, and Debbie Hogan, speech-language pathologist, are affiliated with the Jordan School District in Midvale, Utah. They may be reached at 2131 E. 7000 South, Salt Lake City, UT 84121.
Out of the Classroom and into My Planner: Charting Accountability to Achieve Personal Goals

Bruce Schroeder

Precision Teaching picks up where *Time Management 101* left off. Based on the benefits we have seen in the classroom over the last twenty-five years, it makes sense to look for ways that Precision Teaching could have a positive impact on our personal lives. After setting goals, charting provides a consistent, but flexible, method of creating a visual tracking of progression or regression toward our goals. Decisions can be made and analyzed based on our personal behaviors. Daily, Weekly, Monthly, and Yearly Charts can be used to summarize behavior representing present, future, and even past goals.

A suggested method of using Precision Teaching to assist with personal goals is as follows:

a) set personal goals for yourself, and write them down;

b) select what and how to measure, set aims;

c) count behaviors daily, weekly, monthly, yearly;

d) chart behaviors;

e) decide if you need to adjust or make changes in your behavior;

f) based on interest and progress, adjust and add goals.

As you get started charting personal goals, it is helpful to share your Charts with others to gain insight and clarify your learning pictures. The Chart shown here is one of the first Bruce Schroeder constructed when he started personal charting. He has dozens of Charts and examples from a whole range of personal areas, covering 20 years of personal behavior.

Bruce Schroeder is a program specialist at the Utah Learning Resource Center, 2290 East 4500 South, Suite 220, Salt Lake City, UT 84117. He can be reached at (801) 272-3431.
Magic Pencils - Reading by Writing

Jean Moore

“Magic Pencils” is an approach of combining research-based, successful reading strategies into a “how to” approach to teach elementary students to read. Developed by Jean Moore, a resource teacher who uses it on a one-to-one basis, the approach is both enjoyable and productive with individual students. Magic Pencils integrates the most effective aspects of Direct Instruction, Precision Teaching, brainstorming, dictation, phonics, whole language, planned writing and earned incentives. Students chart their own performances on the Standard Celeration Chart and visually evaluate their progress.

Students are given a mastery-based proficiency test to determine their baseline and as a diagnostic evaluation. After they have used the Magic Pencils program, they are given a posttest. The range of improvement in reading fluency is from 11 to 53% on the posttest. Average improvement in reading fluency measured by rate of words read per minute is 43 for first and second graders, 198 for third graders, 44.5 for 4th graders, and 54.5 for 5th graders.

The accompanying individual Charts indicate performance of two students’ reading from the Science Research Associates’ BRS Satellite cards. Chart 1 shows the performance of a six-year old first grade boy who reached 29 correct per minute with 3 errors on a passage with short “a” sounds and 50 correct per minute with 2 errors on a passage with short “i” sounds. An eight-year-old girl in the third grade is highlighted in Chart 2. On a see-say passage emphasizing short vowels, she reached 63 correct per minute with no errors; on one emphasizing rhyming words, she reached 72 correct per minute with 1 error. Magic Pencils really puts the fun back into the “fundamentals” of reading.

Jean Moore is a resource teacher at East Elementary School, Iron County School District, Cedar City, Utah. She can be reached at 255 E. College Avenue, Cedar City, UT 84720 or (801) 586-2840.
Package Name SR:BR Satellite-Reading Fluency

Name: N - boy (6yrs/1st grade)

30 DAY PRIMARY CHART

Correct Error

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0 - Correct
X - Error

Successive Calendar Days

S/s passage 0-5 (short vowels) A to U

S/s passage 0-13 (Rhyming Words)
Learning With Precision Teaching: A Gift We Share at the Haughton Learning Center

Elizabeth Haughton, Gina Freeman
Carl Binder

Developing each individual's learning potential is our goal. After participating in our Learning Success programs, students, parents and teachers have made extremely positive comments about the development of academic skills, social interactions and personal confidence. Although each individual program is dynamic and unique, the Haughton Learning Center teachers continuously check the seven components we believe are essential for Learning Success.

1. Caring and commitment by all team members. This means active thinking, high energy and responsible action.
2. Essential pinpoints, tool skills which enhance all learning, must be fluent (within successful adult performance ranges).
3. All curriculum stated as Learning Outcomes, with a framework of tool, basic and advance skills.
4. Both performance and learning are measured using the Standard Celeration Chart, which provides clear communication and immediate feedback to the educational team.
5. Fluency levels on all Learning Outcomes to insure retention, endurance and application of skills and knowledge.
6. Multi-channel planning and practice using the Learning Matrix.
7. Student involvement - include: personal aims, curriculum options and shared decision making - remember, The Child Knows Best.

Amazing discoveries will occur when you identify the essential pinpoints, practice efficiently, measure continuously and chart on a Standard Celeration Chart.

Director of the Haughton Learning Center, Elizabeth Haughton and her sister, Curriculum Director, Gina Freeman, are both learning specialists. Their Center is located at 3166 Jefferson Street, Napa, CA 94558. They can be reached at (707) 224-8863. Dr. Carl Binder is President of Precision Teaching and Management Systems, Inc., Nonantum, MA.
Frequent Flyers: The Effect of Increased Fluency Practice at Planned Intervals on Students with Severe Memory Deficits

Aileen Stan-Spence, Ian Spence, Craig Whited, and Jim Welch

At Ben Bronz Academy, Hartford, Connecticut, some students are severely dyslexic or discalculic. They have a history of between six and eleven years in school with minimal progress in reading or math. In reading, three classes using “Let’s Read”, SRA Decoding, and SRA Comprehension, and two Precision Teaching fluencies per day have brought only modest accelerations. In mathematics, two classes and one fluency check per day have also brought only modest gains. An approach to accelerate the learning of students who have a history of flat celeration lines in the basic fluency areas of sight word recognition and arithmetic facts was sought.

A breakthrough has been achieved by increasing the number of fluency performances required and spreading them throughout the day. This has been done by rearranging the academic schedule, enlisting parent help in fluency checks in the evenings and weekends, computerizing arithmetic facts, and charting feedback.

Dr. Aileen Stan-Spence is Director of the Learning Incentive, Inc. and her husband, Dr. Ian Spence, is Headmaster of Ben Bronz Academy. Craig Whited and Jim Welch are students at Ben Bronz Academy. For further information, contact the Spences at 139 N. Main Street, West Hartford, CT 06107 or (203) 236-5807.
The Use of a Functional Analysis in Conjunction with Precision Teaching Procedures to Eliminate Food-Grabbing Behavior in a Student with Autism

Martisa Register, K. Richard Young, and Stanley E. Register

Matt was a 13-year-old student with autism who exhibited chronic food-grabbing behavior. Prior to baseline, a functional analysis was implemented to determine the function of the behavior. Matt was found to engage in this behavior to get more food. His food preferences were identified prior to the functional analysis. The treatment condition consisted of having additional preferred food available for him to point to and sign, “eat”, then “please.” These signs were a part of his repertoire, but were not signed clearly. By reinforcing his request with food and progressively requiring clearer communication, the food-grabbing behavior was eliminated. During reversal his rate of food-grabbing returned to baseline levels. When treatment was reinstated, his food-grabbing returned to zero. These results are illustrated on the accompanying Standard Celeration Chart. Additional data were collected on the rate of staff-prompted and student initiated interactions.

Martisa Register, Richard Young, and Stanley Register are affiliated with the Department of Special Education at Utah State University, Logan, UT 84322-2865. They can be reached at (801) 750-3236.
Suspending Disbelief: Teaching Experienced LD Teachers to Use Precision Teaching and Persuading Them to Use It

Patricia M. Daly

Twenty graduate students who were experienced teachers of the learning disabled took an advanced methods course as part of their Master’s Degree Program. For one-fifth of the course they learned how to use Precision Teaching, completing a mini-project in their classrooms applying PT principles. Compared with undergraduates who lack an experiential basis to evaluate teaching methods, these graduate students were more like consumers. They tended to be more critical, demanded more justification, and expected immediate relevancy.

The focus of this presentation was discussion of a follow-up survey of these teachers’ use of Precision Teaching after completion of the course. Respondents reacted to both the stated goals of Precision Teaching as a data-based decision-making tool and to their use/non-use of it. Specifically, teachers indicated whether they used the Standard Celeration Chart in their content area. Charts of those who did use them were presented. The accompanying Chart illustrates reading aloud performance of a learning disabled ten-year-old fourth grader who reaches aim quickly.

Non-users of Precision Teaching specified reasons for not incorporating PT into their instructional approaches. All responses were considered within the framework of accountability and social validity for the teacher educator.

Dr. Patricia M. Daly can be reached in the Department of Counseling and Special Education, 208B Rowe Hall, Central Michigan University, Mt. Pleasant, MI 48859 or at (517) 774-3606.
Self-Select vs. Programmed Presentation: Does the Child Know Best?

Ian Spence and Wells Hively

Does the child know best when it comes to selecting which fluency aim to practice? The goal of this study was to compare the effect of self-select of which skill to practice versus progression through a teacher-planned hierarchy of math facts. Three groups of students tackled arithmetic fluencies under different conditions. The behavers reported their results.

Thirty-four students, all experienced charters, practiced their arithmetic fluencies on the Arithmetic Automizer computer program at Ben Bronz Academy. They do one-minute fluency timings on the computer up to four times per day, and are able to evaluate their progress by viewing Standard Celeration Charts, generated by the computer. The program was designed so that the student could choose his/her own level of arithmetic problem to work, even though meeting preset criteria advances the program to the next level of difficulty.

If a student is given the choice of which level or problem to work, will he/she progress as fast as when the levels are teacher chosen? We speculated that some students may not know best at the outset, but through examining their own progress, they would sharpen these skills. In this project students self-selected into the following three groups:

(a) Start at a specific level and systematically advance through preset levels by meeting criteria;
(b) Choose their own new level each time they meet criterion;
(c) Choose their own problems out of a presentation screen of all the possible problems, by skipping those they did not wish to try.

Students evaluated their own progress and chose spokespersons to bring their observations to the Tenth International Precision Teaching Conference. Typically, students favored systematic advancing, unless they had already mastered most of the fluency aims. In that case, they preferred choosing their own problems.

Dr. Ian Spence is the Headmaster and Dr. Wells Hively is the Research Director at the Ben Bronz Academy. For further information, they may be contacted at 139 N. Main Street, West Hartford, CT 06107 or (203) 236-5807.
Fluency is Precision Teaching's definition of true mastery - accuracy plus speed, or quality plus pace. Most people understand the importance of fluency and have a common-sense appreciation of it. Research from a variety of fields beyond Precision Teaching has confirmed that fluency (what cognitive psychologists call “automaticity”) is associated with retention and maintenance of skills and knowledge, endurance or resistance to distraction, and application or transfer of training. Examples from such “performance” fields as athletics, playing musical instruments, martial arts, dance, and language learning illustrate the importance of fluency. Most educators do not understand that fluency is also the definition of mastery in academic and professional skills and knowledge. What we know about fluency from common experience, as well as from human factors engineering, verbal learning studies, perceptual motor learning research, human information processing research, the study of reading, and other fields, can be useful in discussions with other teachers, students, parents, and the general public. Reviewing what we know and suggesting ways of using this knowledge when telling others about Precision Teaching is vital to our growth and influence. By discussing findings from fields outside PT, we add credibility to our field and to our efforts to promote fluency-based education.
Utilizing Precision Teaching and Curriculum-Based Measurement to Effectively Build and Monitor Behavior

John Downs

Precision Teaching and Curriculum-Based Management (CBM) are two formal measurement systems used for instructional decision making that have essential commonalities and distinctions. According to Fuchs and Deno (1991), there are two major modes of instructionally relevant measurement into which Precision Teaching and CBM can be categorized. The first model, known as “specific subskill mastery measurement”, includes Precision Teaching when assessing basic academic skills. The second model, a “general outcome measurement”, would include curriculum-based measurement as developed to assess the areas of oral reading, writing, spelling, and arithmetic.

Precision Teaching practitioners familiar with the history and literature of the field, realize the diversity and flexibility of Precision Teaching as a set of measurement and teaching procedures. Assessment of basic skills, as practiced by most Precision Teachers, is a formative, daily process of measuring specific short term objectives. However, Precision Teaching conventions, as utilized by some practitioners, have also been shown to be applicable to evaluating student progress in a summative fashion, while continuing to provide students and teachers with a means to build and measure basic skill performance on a daily basis. Examples of such projects date back to 1978 with CHARTS (Changing Achievement Rates of Teachers and Students) from the University of Washington (Lovitt, Fantasia, and Heliotis); MEPS (Monitoring Educational Performance of Students), also out of the University of Washington (White and McElwain, 1978); the Boys Town Schools’ Monthly Assessment Program (MAP), used with junior high and high school students from 1984--89; and recent work in monitoring reading performance with elementary students under the direction of Sheila Fox from Western Washington University.

Both Precision Teaching and CBM are based on behavioral principles of observational assessment. Their commonalities are greater than their distinctions. As suggested by Fuchs and Deno (1991), an appropriate blend of the two might contribute significantly to providing a nondiscriminatory database that could be used across a range of decisions used in developing and evaluating student programs.

John Downs is Principal at Wegner School in Boys Town, NE. He can be reached at the Wegner School, Father Flanagan’s Boys Home, Boys Town, NE 68010.
"Yes, Virginia, There is Learning Taking Place..."
It's All in the Approach - Course Builder™, PT, and Thee

Claudia E. McDade, A. Jane Barnes,
John M. Brown, and Patti Doeltz

This session provided an overview of the Computer-Based Precision Learning System™ and student learning success strategies at Jacksonville State University's Center for Individualized Instruction, featuring a hands-on approach to discovering learning the PT-CAI Center way. Practical PT learning approaches in areas of study skills, English and writing, quantitative skills, psychology, reading (rate/comprehension), and ACT preparation were presented and shared, including examples of various PT learning strategies and interventions with implementation techniques. The Center team, McDade, Barnes, Brown, and Doeltz, presented the Center for Individualized Instruction's instructional - learning strategies, ranging from using the Computer-Based Precision Learning System™, to developing probe-practice sheets and SAFMEDS. Standard Celeration Charted data, both individual learner and collective summary, exemplifying PT - CBI strategies that work (in the areas of psychology, reading, writing, and algebra), were shared and discussed with session attendees.

The accompanying Charts illustrate some Precision Teaching interventions used in the Center for Individualized Instruction. Students in a freshman orientation seminar were asked to construct SAFMEDS from a list of 130 common words found frequently in freshmen level textbooks (e.g., braggadocio, genre, imbue, inferential, plethora). Chart 1 is a summary of Jane Barnes' section's pre-test and post-tests in which they were given a sample from the 130 words and asked to write a brief definition of as many as possible in 5 minutes. Chart 2 indicates the SAFMEDS performances of each member of the class. A freshman student with severe cerebral palsy in Claudia McDade's section is highlighted in Chart 3. His performance also indicated biweekly, one minute silent novel reading passages, followed by one minute writing of complete thoughts from the passage (i.e., a comprehension task). While all other students in the class improved their comprehension fluencies, the cerebral palsy student's slope remained fairly flat because he could not write fluently.

In a developmental writing class students are given rate-based pre-and post-tests on major error identification, definitions of homonyms (e.g., your--you're, patience--patients, some--sum) from which they construct sentences, as well as parts of speech identification. John Brown's developmental writing classes are illustrated in Charts 4-6. Pre and post major error identification performances are presented in Chart 4. Chart 5 is a summary of one of John Brown's developmental writing sections on pre- and post-tests of homonym definitions and appropriate sentences. Daily practice of a variety of Precision Teaching strategies contributed to the pre versus post-test improvements on parts of speech identification in Chart 6.

In Spring, 1992, students used the Computer-Based Precision Learning System™ in courses from the Departments of Anthropology, Learning Skills, and Psychology. A typical student performance on the system in PSY 335: Theories of Personality, covering thirteen theorists, is shown in Chart 7.

About half of the approximately 4000 students who use the Center for Individualized Instruction yearly come for tutoring. Patti Doeltz, graduate assistant, supervises tutoring activities. Her work with one student in Psychology 201 using SAFMEDS is illustrated in Chart 8. The student maintained above average grades in all courses except Psychology 201. The student was shown how to make SAFMEDS by utilizing key words and phrases within each chapter, and how to chart his own progress on the Standard Celeration Chart. He attended tutoring sessions 3 times a week for 4 weeks with each session lasting for 60 minutes. He was timed on his SAFMEDS for 1 minute at the end of each tutoring session. Even though the words, chapters, and SAFMEDS changed each week, by using his own SAFMEDS and by charting his own progress, the student's study habits as well as his grades greatly improved.

Staff of the Center for Individualized Instruction includes Dr. Claudia McDade, Director, Jane Barnes, Assistant Director, John Brown, Instructor, and Patti Doeltz, Graduate Assistant. For further information contact them at Jacksonville State University, Jacksonville, AL 36265-9288 or (205) 782-5570.
Measuring the Change of Attitudes and Opinions

David Keller, Stephan Graf, and Bruce Schroeder

Dr. O.R. Lindsley first began using the multiply scale in 1976, to measure the attitudes of his university graduate students. It soon became apparent that attitude scaling could become a far more sensitive and differentiating endeavor than had previously been held by a majority of researchers and practitioners. Adequate measurement of human attitude can no longer be accomplished through the use of the traditional 5-point Likert scale. Use of a traditional 5-point scale to measure human attitude is like trying to measure the length of a 20-foot serpent under a microscope; one will never see the big picture.

Major advances can be accredited to the 19-point multiply scale. The additional scale steps provide an opportunity to identify even subtle attitude differences with far greater precision. The 19-point multiply scale dimension expands measurement to parameters which approach the entire range of human attitude.

Presenters have field tested the 19-point multiply scale in a variety of educational settings. These include university course evaluation; workshop evaluation; and evaluation of an alcohol awareness class. These data are available from them. An example of a course evaluation on a 19-point scale follows. To facilitate audience learning the 19-point multiply scale was used a pre-post assessment instrument in the workshop. Materials were disseminated to assist participants in constructing 19-point attitude scale items. Additionally, participants had an opportunity to practice the scaling techniques. Presenters encouraged participants to use the 19-point multiply scale to measure attitude change in a variety of settings. Use of the 19-point multiply scale is restricted only by the limits of human imagination.

Dr. David Keller is affiliated with the School District of Flambeau in Troy, WI 54563, while Dr. Stephen Graf is a Professor of Psychology at Youngstown State University, Youngstown, OH 44501, and Bruce Schroeder is affiliated with the Utah Learning Resource Center, Salt Lake City, UT 84117.
EVALUATION OF PRESENTATION

Please rate the CONTENT of this presentation in comparison with presentations you have attended at other professional meetings.

MORE  SAME  LESS
1000x  500x  200x  100x  50x  20x  10x  5x  2x  1x  1/2  1/5  1/10  1/20  1/50  1/100  1/200  1/500  1/1000

Please rate the ORGANIZATION of this presentation in comparison with presentations you have attended at other professional meetings.

MORE  SAME  LESS
1000x  500x  200x  100x  50x  20x  10x  5x  2x  1x  1/2  1/5  1/10  1/20  1/50  1/100  1/200  1/500  1/1000

Please rate the APPROPRIATENESS OF THE MEDIA used in this presentation in comparison with presentations you have attended at other professional meetings.

MORE  SAME  LESS
1000x  500x  200x  100x  50x  20x  10x  5x  2x  1x  1/2  1/5  1/10  1/20  1/50  1/100  1/200  1/500  1/1000

Please rate the APPLICABILITY of this presentation TO YOUR SETTING in comparison with presentations you have attended at other professional meetings.

MORE  SAME  LESS
1000x  500x  200x  100x  50x  20x  10x  5x  2x  1x  1/2  1/5  1/10  1/20  1/50  1/100  1/200  1/500  1/1000

COMMENTS (including suggestions for improvement):
An Introduction to Precision Teaching

Ray Beck and Denise Conrad

This fundamental hands-on introduction to Precision Teaching is vital to anyone wishing to learn the basics of teaching and learning with Precision. It demonstrated the critical steps to successfully implementing a measurably superior performance technology in any classroom or organization. Various forms of the Standard Celeration Chart were discussed. Participants developed necessary skills of Charting, drawing and interpreting learning pictures, selecting pinpoints, setting aims, and making Chart-based decisions. Participants were also shown how to construct practice sheets, SAFMEDS, and other curriculum materials, as well as how to manage their classrooms or organizations with Precision. Participants were given a training manual to blend Precision Teaching into their current instructional schedules.

The workshop presenters were thorough in their approach to reaching the “Rookie” Precision Teacher. In William Walking’s Precision Teaching Handbook, he states, “Education needs something”. “Precision Teaching offers a substantial promise of providing the basic science principles which can effectively support an applied science of instruction. Precision Teaching is a systematic body of facts derived from an analysis of teaching and learning.” In this workshop, Beck and Conrad presented the origins of Precision Teaching beginning with B. F. Skinner, continuing up to Ogden R. Lindsley. These questions were addressed by the presenters: What are the objectives of Precision Teaching? What is the general nature of Precision Teaching? What problems does Precision Teaching avoid or overcome, when compared with much of current, traditional educational practice? Should all teachers use the principles and procedures of Precision Teaching? Are there different laws which govern the behavior of children? How effective is Precision Teaching in producing valued behavior outcomes?

In conclusion, the presenters left those in attendance with two important Precision Teaching thoughts:

(1) A Precision Teacher is one who cares enough to give his/her very best.

(2) “The child knows best” - Ogden R. Lindsley

Precision Teaching training workshops can be arranged by contacting:

Dr. Ray Beck
Sopris West
P. O. Box 1809
Longmont, CO 80502

Dr. Ray Beck was Director of Special Education, Great Falls Public Schools, Montana, and Project Director of the Precision Teaching Project. Denise Conrad is a trainer from the Great Falls Precision Project, Great Falls, MT.
Advanced Precision Teaching

Richard West, K. Richard Young, Susan Fister, and Janet Freston

Beyond the basics, this workshop was conducted by a group of veteran Precision Teachers for experienced practitioners. Included in the discussion were innovative applications of Precision Teaching, unique Standard Celeration Charts, use of Precision with unique populations, and training and management issues. Practical difficulties in implementing Precision Teaching in various organizations were expressed by participants. The team of experts and participants addressed these implementation issues with possible solutions from their experience. Advanced issues such as pinpointing, determining aims, counting and charting procedures, and data-based decision making were discussed.

Teaching Children to Chart

Michael Maloney

Classrooms in which Standard Celeration Charts are kept by the children yield the highest rate of learning. It seems obvious that to promote excellence in classrooms and to encourage teachers to maintain their own charting behavior, the Charts should be placed in the hands of children. Many years of Precision Teaching have also demonstrated that children can learn to monitor their own behavior and to make their own data-based decisions using established rules.

Especially for novice Precision Teachers, the notion of teaching students to chart is scary. Through a Direct Instruction teaching methodology, participants enhanced their knowledge of the Standard Celeration Chart and learned procedures to teach others—including young children—to chart.

Dr. Richard West is affiliated with Utah State University’s Exceptional Child Center, while Dr. K. Richard Young is affiliated with the Department of Special Education at Utah State University. In addition to coordinating the program of the 10th Annual International Precision Teaching Conference, Susan Fister is affiliated with the Utah Learning Resource Center, 2290 E. 4500 South, Suite 220, Salt Lake City, UT 84117.

Dr. Michael Maloney founded The Learning Center, a private school combining Direct Instruction with Precision Teaching. He can be contacted at 28 Isabel Street, Belleville, Ontario, Canada K8N 5A5.
Instructional Design

Kent R. Johnson

This workshop taught participants about the design of instructional materials using the most advanced programmed instruction technologies and Skinner's analysis of verbal behavior. Topics include:

(1) analyzing instructional content into nine types of learning: psychomotor (responses, chains, kinesthetic repertoires), simple cognitive (associations, sequences, verbal repertoires), and complex cognitive (concepts, principles, strategies);

(2) preparing instruction plans for each type of learning;

(3) evaluating each type of learning;

(4) writing sequences of tasks, including mathematics and rules approaches;

(5) designing fluency building exercises for each type of learning.

For background information, read:

This workshop is available to any interested group of school, corporation, or other workplace staff. Contact Dr. Kent R. Johnson at Morningside Academy, 810 Eighteenth Avenue, Seattle, WA 98122 or (206) 329-9412 for details.
Who's in Control?
Marion Steiger and Marian Hunt

This workshop assisted participants in gaining a step-by-step approach to solving academic and behavior problems in the classroom. Typically, students are continually told what they should not be doing; however, there are few to no instructions or alternatives in correcting offending or inappropriate behaviors. Students should be taught a multitude of positive behavior management interventions that work. Directing student self-control through personal goal setting, self-monitoring, and structuring an intervention/motivation system has proven to be an effective classroom management system. A variety of model interventions indicate the power of letting students control their own program. Research has shown the efficacy of allowing students to identify their individual strengths and weaknesses and then to participate in developing their own program.

The approach described in this workshop results in increased self-responsibility, ownership of problems, and a positive behavior change. Such self-monitoring increased the student's ability to control his/her own behavior and allowed students to determine their individual reinforcement program which provided a systematic motivational tool. Impressive data by teachers and students demonstrated the specific procedures for teachers to use with students in all settings. Ones that teachers can immediately put into place in any classroom were particularly emphasized.

Marion Steiger, Cluster Leader, and Marian Hunt, Cluster Teacher, are affiliated with the Copperview Elementary School, Jordan School District, Midvale, Utah. Contact Ms. Steiger or Ms. Hunt at 8449 South 150 West, Midvale, UT 84047.
Fluency Building With *Think Fast*

Joseph Parsons and David Polson

This hands-on workshop taught participants how to prepare and use computer-based instruction employing *Think Fast* and *Think Fast* Teacher Utility programs. Together, these two programs provide an efficient authoring and delivery system based on principles of behavior analysis and elements of Precision Teaching. Some key features of *Think Fast* include: (1) automatic fluency data collection; (2) on-screen fluency charts; (3) varied card format; (4) Say and Type response modes; (5) fill-in-missing Keywords response mode; (6) one-to ten-minute timings; and (7) built-in prompting. Some key features of *Think Fast* Teacher Utility program include: (1) easy generation of decks; (2) setting of student Aims; (3) reading and collection of data from student disks; and (4) generation of student summary reports.

Parsons and Polson described and illustrated how *Think Fast* has been used effectively in school and university settings in Canada and the United States to build fluency with terms and facts. Following an introduction to *Think Fast*, the presenters assisted participants in developing one or more personalized “decks” of computer flash cards using an MS-DOS microcomputer. Each participant received a complete *Think Fast* teacher’s package including a teacher license for *Think Fast* to use with his/her own students.

Development with MasterLearn Systems

James Cowardin and John Eshleman

Participants in this workshop learned to use the latest in Computer-Based Training involving Precision. Businesses and schools across the United States have implemented MasterLearn Systems in a DOS platform. The system allows independent, individualized, frequency-based study and ensures thorough mastery of material. Participants were given a highly motivating training program requiring active responses and shown how they could input their own material for any skill they wished their employees to master. A major benefit of MasterLearn Systems is that it reduces training time in half, as well as resulting in more thorough development and retention of skills.

Dr. Joseph Parsons and Dr. David Polson are affiliated with the University of Victoria, Canada. For further information, contact them at Counselling Services, University of Victoria, Victoria, B. C., V8W 3P2 or (604) 721-8341.

Dr. Jim Cowardin is President of MasterLearn Systems where Dr. John Eshleman is a consultant. For information regarding Computer-Based Training using MasterLearn Systems, contact them at 1488 West Lane Avenue, Upper Arlington, OH 43221.
Using PracticeSheeter™ to Make Your Own Practice Sheets

Stephen Graf

PracticeSheeter™ allows the Precision Teacher to create custom-designed practice sheets. Available in IBM, Macintosh, and Apple versions, PracticeSheeter™ generated student-tailored materials to increase fluency skills. Participants identified options and formats available for creating drill sheets. Each participant received a copy of PracticeSheeter™ to use in his/her agency or school.

Combining a Functional Analysis of Behavior, Computer Technology, and Precision Teaching to Solve Challenging Problem Behaviors

K. Richard Young, Martin Blair, Emily Kemblouski, and Edward Cancio

An expert computer system, known as Decel, was designed to assist teachers in dealing with challenging problem behaviors of students. It allows teachers to conduct a functional analysis of problem behaviors and to design an appropriate positive intervention for eliminating such behaviors. Decel then monitors students' progress by displaying data on a logarithmic scale and suggesting data-based decisions.

Dr. Stephen Graf is Professor of Psychology at Youngstown State University and can be reached at 7779 Lee Run Road, Poland, OH 44514. PracticeSheeter™ is a registered trademark of Zero Brothers, Inc.

Dr. Richard Young, Martin Blair, Emily Kemblouski, and Ed Cancio are affiliated with the Department of Special Education, Utah State University, Logan, UT 84322.
Precision Teaching Resource Guide

Just as earlier Precision Teaching conferences have brought together practitioners and researchers to share ideas and results, the Tenth International Precision Teaching/Learning Conference showcased over fifty leaders in the field. For those who are searching for assistance from more experienced Precision Teachers, the following list of resource people may be helpful. Feel free to contact them with any question at all!

**Founding Father**
Ogden R. Lindsley
Rt. 1, Box 157
Lawrence, KS 66044

**Elementary Education**
Doug Bates
Utah State Office of Education
250 East Fifth South
Salt Lake City, UT 84111

Cheryl Hennessey
Salt Lake City School District
420 N. 200 West
Salt Lake City, UT 84103

Marian Hunt
Copperview Elementary School
8449 South 150, West
Midvale, UT 84047

Carla Petersen
Salt Lake City School District
420 N. 200 West
Salt Lake City, UT 84103

Eleanor Peterson
Washington Elementary School
420 N. 200 West
Salt Lake City, UT 84103

James R. Peterson
Ephraim Elementary School
151 South Main Street
Ephraim, Utah 84627

Laura Masters Ringard
Haughton Learning Center
3166 Jefferson Street
Napa, CA 94558

Sandra Shipman
Washington Elementary School
420 N. 200 West
Salt Lake City, UT 84103

Marion Steiger
Copperview Elementary School
8449 South 150, West
Midvale, UT 84047

**Secondary Education**
Robert Cefalo, Chairperson
Science Department
Box Elder High School
380 South 600 West
Brigham City, UT 84302

Marianne Comeia
South Ogden Jr. High School
43rd Madison
Ogden, UT 84403

Corinne Melmar
Box Elder Jr. High School
18 South 500 East
Brigham City, UT 84302

Steven Morgan
Box Elder High School
380 South 600 West
Brigham City, UT 84302

Sally Oostyen
South Ogden Jr. High School
43rd Madison
Ogden, UT 84403

Gloria Rasmussen
South Ogden Jr. High School
43rd Madison
Ogden, UT 84403
Secondary Education (continued)
Paul R. Schulte
Box Elder Junior High School
18 South 500 East
Brigham City, UT 84302

James L. Wilson
Biology Department
Box Elder High School
380 South 600 West
Brigham City, UT 84302

Malcolm Neely
4041 S. 298th Street
Auburn, WA 98001

Higher Education
Stephen Graf
Department of Psychology
Youngstown State University
Youngstown, OH 44555

Claudia McDade, Director
Center for Individualized Instruction
Jacksonville State University
700 Pelham Road, North
Jacksonville, Alabama 36265-9982

Training
Carl Binder
PT/MS, Inc.
P.O. Box 169
Nonantum, MA 02195

Michael J. Cameron
Evergreen Center
345 Fortune Boulevard
Milford, MA 01757

Anne Desjardins
1243 Sumac Drive
Logan, UT 84321

Bruce Ruby
Evergreen Center
345 Fortune Boulevard
Milford, MA 01757

Performance Management
Judith A. Crandall, President
Learning Technology Associates
2319 Foothill Drive, #260
Salt Lake City, UT 84109

Henry S. Pennypacker
Mammatech
930 NW 8th Avenue
Gainesville, FL 32601

Betty Walls
8019 Kenwood
Kansas City, MO 64131

Self-Management
Denise Cona
Great Falls Public Schools
1209 Nashway Road
Nisswa, MN 56468

Judith Crandall
Learning Technology Associates
2319 Foothill Drive
Salt Lake City, UT 84109

Marian Hunt
Copperview Elementary School
8449 South 150, West
Midvale, UT 84047

Tom Lovin
University of Washington
Child Development/Retardation Center
Seattle, WA 98195

Marion Steiger
Copperview Elementary School
8449 South 150, West
Midvale, UT 84047

Tutoring
Enid Adams
Ephraim Elementary School
151 South Main
Ephraim, UT 84627

Marie Beacham
Ephraim Elementary School
151 South Main
Ephraim, UT 84627

Patti Doeltz
Center for Individualized Instruction
Jacksonville State University
700 Pelham Road, North
Jacksonville, Alabama 36265-9982

A. Jane Barnes
Center for Individualized Instruction
Jacksonville State University
700 Pelham Road, North
Jacksonville, Alabama 36265-9982
Tutoring (continued)
Melodie M. Bolli
Ephraim Elementary School
151 South Main
Ephraim, UT 84627

Clarene Brenchley
Ephraim Elementary School
151 South Main
Ephraim, UT 84627

Edward J. Cancio
Department of Special Education
Utah State University
Logan, UT 84322-2865

Kay Ericksen
Ephraim Elementary School
151 South Main
Ephraim, UT 84627

Sue McAffee
Ephraim Elementary School
151 South Main
Ephraim, UT 84627

Kimberly Miske
Mt. Logan Middle School
875 N. 200 East
Logan, UT 84321

Reading
Vickie Carter
Canyon View School
903 East 450 South
Kaysville, UT 84037

Pamela Jeppson
Nephi Elementary School
380 East 200 North
Nephi, UT 84648

Bonnie Kennedy
Nephi Elementary School
380 East 200 North
Nephi, UT 84648

Chris Kupfer
Southwest Educational Development Center.
Box 725
Cedar City, UT 84720

Betty Mikkelsen
Nephi Elementary School
380 East 200 North
Nephi, UT 84648

Eleanor C. Petersen
Washington Elementary School
420 N. 200 West
Salt Lake City, UT 84103

Sandra Shipman
Salt Lake City School District
420 N. 200 West
Salt Lake City, UT 84103

Cheryl Stephensen
Nephi Elementary School
380 East 200 North
Nephi, UT 84648

Claudia E. McDade
Center for Individualized Instruction
Jacksonville State University
700 Pelham Road, North
Jacksonville, Alabama 36265-9982
Sandra Shipman  
Salt Lake City School District  
420 N. 200 West  
Salt Lake City, UT 84103

Writing  
John M. Brown  
Center for Individualized Instruction  
Jacksonville State University  
700 Pelham Road, North  
Jacksonville, Alabama 36265-9982

Debbie Hogan  
Bella Vista Elementary  
2131 East 7000 South  
Salt Lake City, UT 84121

Christine L. Smith  
Bella Vista Elementary  
2131 East 7000 South  
Salt Lake City, UT 84121

Math  
Kathy Gehrke  
Puruvian Park School  
1545 East 8425 South  
Sandy, UT 84093

Eleanor C. Petersen  
Salt Lake City School District  
420 N. 200 West  
Salt Lake City, UT 84103

Sandra Shipman  
Salt Lake City School District  
420 N. 200 West  
Salt Lake City, UT 84103

Marilyn Wright  
East Midvale Elementary School  
6990 South 3rd East  
Midvale, UT 84047

Janet Meyer  
Weber School District  
5320 S. Adams Avenue  
Ogden, UT 84405

Dennis Hogge  
Weber School District  
5320 S. Adams Avenue  
Ogden, UT 84405

Sue Goodsell  
Weber School District  
5320 S. Adams Avenue  
Ogden, UT 84405

Spelling  
Michael J. Maloney  
Quinte Learning Center  
28 Isabel Street  
Belleville, Ontario  
Canada K8P5A5

Data Decisions  
Suzanne Fitch  
Institute for Effective Education  
248 Nutmeg Street  
San Diego, CA 92103

Mary L. Meehan  
Institute for Effective Education  
248 Nutmeg Street  
San Diego, CA 92103

Sally Oostyen  
South Ogden Junior High School  
4300 Madison Avenue  
South Ogden, UT 84403

Denise Orme  
Jordan School District  
9361 South 3rd East  
Sandy, UT 84070

Joseph A. Parsons  
Counselling Services  
University of Victoria  
Victoria, B.C., Canada V8W3P2

David A. D. Polson  
Counselling Services  
University of Victoria  
Victoria, B.C., Canada V8W3P2

Gloria Rasmussen  
South Ogden Junior High School  
4300 Madison Avenue  
South Ogden, UT 84403

Kenneth Traupmann  
248 Nutmeg Street  
San Diego, CA 92103

Richard West  
644 East 2200 North  
Logan, UT 84321

Richard Young  
Dept of Sp. Ed.  
Utah State University  
Logan, UT 84321

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Computer-Assisted Instruction
James Cowardin
MasterLearn System
1488 West Lane Avenue
Upper Arlington, OH 43221

Claudia McDade, Director
Center for Individualized Instruction
Jacksonville State University
700 Pelham Road, North
Jacksonville, Alabama 36265-9982

Charles Olander
Department of Biology
Jacksonville State University
700 Pelham Road, North
Jacksonville, Alabama 36265-9982

Joseph A. Parsons
Counselling Services
University of Victoria
Victoria, B.C., Canada V8W3P2

David A. D. Polson
Counselling Services
University of Victoria
Victoria, B.C., Canada V8W3P

John W. Eshleman
143 Blakeford Drive
Dublin, OH 43017

Stephen Graf
Department of Psychology
Youngstown State University
Youngstown, OH 44501

Tim Slocum
1243 Sumac Drive
Logan, UT 84321

Drug Prevention
Ed Cancio
Utah State University
UMC 68, Dept of Sp Ed
Logan, UT 84322

Rehabilitation
Becky Slater
Glad Tidings Academy
1050 South 44th Street
Decatur, IL 62521

Chris Kupfer
Southwest Educational Dev. Ctr.
Box 725
Cedar City, UT 84720

Maurine Newton
Weber School District
5320 S. Adams Avenue
Ogden, UT 84405

James Pollard
Christian Hill Convention Center
19 Varnum Street
Lowell, MA 01850

Inner Behavior
Abigail Calkin
631 Lane Street
Topeka, KS 66606

John O. Cooper
The Ohio State University
356 Arps Hall
1945 N. High Street
Columbus, OH 43210-1172

Special Education
Owen R. White
Exp Ed. Unit, WJ-10
University of Washington
Seattle, WA 98195

Felix Billingsley
EEU/CDMRC, WJ-10
University of Washington
Seattle, WA 98195

William Wolking
Special Education
University of Florida
Gainesville, FL 32611

Beatrice Barrett
W. E. Fernald State School
Box 158
Belmont, MA 02178
Notes from Below the Floor

The Journal of Precision Teaching is designed to assist people with diverse interests share information or data (usually in the form of behavior frequencies) in a uniform format (the Standard Celeration Chart). Typically, a person with data submits it to the Journal in order to share it with people who might be interested. The purpose of Notes from Below the Floor is to reverse the process—people without data (and thus residing below the record floor) can use this column to find people who have the data they want, or to entice people into collecting some.

Submissions should generally take the form of “Data Wanted” advertisements which are brief, describe your interest, and provide your name, address and telephone, FAX, or E-Mail number. For example:

**DATA WANTED**
Concerning the Use of Frequency-Based Decision Rules in Computer-Based Instruction

I know of computer programs that accept frequency data and generate Standard Celeration Charts. I know of computer-based instructional programs that provide summaries of session frequencies for external charting and evaluation. I even have several megabytes of moment-to-moment responses frequencies collected during computer-based instructional programs, but not used by those programs for making internal branching decisions. As far as I can tell, however, existing computer-based instructional systems make internal branching decisions (e.g., to provide remedial assistance; to move to a more advanced frame; to terminate the program after “mastery” has been reached) based solely on accuracy data. Does anyone have access to data generated by computer-based instructional programs that use moment-to-moment frequency data for internal branching decisions? It seems that the increased power of instructional decisions based on such data would be tremendous. Anyone interested in sharing data or ideas?

Owen R. White, Director, Exp. Ed. Unit, WJ-10 University of Washington, Seattle, WA 98185 (206) 543-4911

Responses to the solicitations and issues presented in this column may take the form of responsive material submitted for publication in JPT. Regardless of publication, however, direct contact among interested parties is encouraged.
Chart Share Guidelines

People wishing to share interesting charts without writing lengthy "articles" are encouraged to submit a Standard Celeration Chart-share. Each Chart-share is limited to two pages in length—one Chart and a maximum of one page of explanatory text. The Chart and accompanying text will be printed on reverse sides of the same page to ensure they will not be separated or removed from the Journal for copying.

The Chart: The Chart should be as self-explanatory as possible. All the information at the bottom of the Chart (i.e., Supervisor, Adviser, Manager, etc.) should be completed descriptively as possible. All charting conventions should be followed. If additional symbols or extensions of the conventions are required, they should be explained in an appropriate "Key." For example, if in addition to charting "words said correctly" with a • and "words said incorrectly" with an x, you wish to note "words omitted" with a Δ, that should be noted on the Chart. Each phase of a multi-phase project should be clearly labeled with brief but descriptive phrases. For example, instead of labeling phases, "Phase I, Phase II," etc., the phases might be labeled, "One minute of practice; teacher charts results," and "Same practice; learner charts results." Additional notes should be provided as necessary to explain the project, unplanned events which appeared to affect performances, and other features of interest.

The Back: The back of the Chart may be used to explain the project in more detail. At a minimum, try to provide the following:
1. title for the project;
2. your name and affiliation;
3. names and affiliations of other people involved in the project (first names, initials, or pseudonyms may be used to protect privacy, if necessary);
4. the purpose or goal of the project;
5. the specific measurement cycle(s) or target(s) being evaluated;
6. a brief statement of what you learned from the project.

Space permitting, you may add as much additional comment or discussion as you wish. If the submission exceeds the space available, the Journal editors will make whatever changes are necessary while trying to preserve the basic message of the Chart-share.

-- Owen R. White, Consulting Editor
Journal of Precision Teaching

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