A Precision Teaching database 77
William Wolking
Michele Gerent

Group language activity to increase recall of facts 85
Carole Peterson
Rosemary Holman

From 1¼ miles to a marathon: monitoring on the Standard Celeration Chart for 31 months 86
Patrick McGreevy

About PT 91
EDITORIAL POLICY

The Journal of Precision Teaching is a multi-disciplinary journal 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 successive frequencies, frequency multiplier, and a standard, straight-line measure of behavior change across seven or more successive 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 considered for publication.

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

The Journal of Precision Teaching is published quarterly in April, July, October and January by Plain English Publications, P.O. Box 7224, Kansas City, Missouri 64113. Each volume begins with the April issue. Volume I began in April, 1980. The annual subscription rate is $20.00 to libraries, $16.00 to individuals and agencies, and $12.00 to full-time students, payable in U.S. currency. The single copy price is $5.00. Advertising rates are available upon request.

Subscriptions and correspondence should be addressed to Plain English Publications at the address above. Submissions should be sent to Patrick McGreevy, Editor, Journal of Precision Teaching, Louisiana State University, Special Education, 201 Peabody Hall, Baton Rouge, Louisiana 70803.

Any article is the personal expression of the author. Likewise, any advertisement is the responsibility of the advertiser. Neither necessarily carries Journal endorsement.

Library of Congress ISSN number: 0271-8200
**A PRECISION TEACHING DATABASE**

William Wauqg
Michele Gerant
University of Florida

"A database is a shared collection of interrelated data designed to meet the needs of multiple types of end users."

"Database technology is unlikely to succeed unless the end users it serves are intimately involved in certain aspects of its design."

These are quotes from an authority on database technology (Martin, 1981), which introduce themes for this article about a database for precision teachers and trainers. The article describes the database and illustrates some current uses. We want to share our work at this stage in its development to encourage participation and feedback by a wider audience.

Who Needs a Database? Why?

Precision Teachers have helped develop an effective technology for accurately describing changes in human performance and learning. A standard dimension of behavior, frequency, a sensitive and convenient unit, movements per minute, and a universal display device, the Standard Celeration Chart, have advanced us far beyond traditional educational measurement procedures. For the individual child and pinpoint, PT procedures make it easy to observe behavioral variability, so we can apply our strategies and tactics to improve teaching and learning.

So far, so good. We can detect within child variability with relative ease. At the level of the Chart, our technology is effective. However, we don't have a technology of similar power for analysis across charts. Active Precision Teachers produce a large number of charts. As yet, no system has evolved for "managing" them. It's difficult to use PT data to get an accurate look at the across pinpoint, learner, or teacher picture. A PT database can help us see across chart, learner, and teacher variability as clearly as we can already see changes in learning and performance on individual charts.

The answer to the question we posed in the heading above is, "Everyone who wants to take a macro look at Precision Teaching data needs a database." For instance, we as teacher trainers, are primarily interested in discovering and controlling sources of variability among our practicum teachers. Gilbert (1976) reasons that if one human being in a setting is capable of high productivity and efficiency, then we need to ask ourselves why everyone in the setting isn't making similar accomplishments. We apply this model to try to bring our least productive and efficient teachers up to the performance of our most effective teacher. This will be possible only if we can see the variability in productivity and efficiency among our student teachers. Curriculum developers may be more interested in using the database to look at variability across instances of performance on the same pinpoint or curricular material.

Many of us need a database, even baseball managers. Recently, an article described how Joe Torre, manager of the Atlanta Braves was using a database composed of player statistics to make managerial decisions during a game. For instance, if an opposing hitter has a high batting average against the pitcher on the mound, Torre will get these data in time to make a decision to replace the pitcher with one showing a better record against that hitter. The punch line of the article was this quote from Torre, "Managing a baseball team by hunch is fun, but a little data couldn't hurt."

The Behavior Bank

Precision Teachers actually recognized the need for a database early. Ogden Lindsley and Carl Koenig designed and managed a database, called the Behavior Bank, almost 15 years ago (Koenig, 1971; Pennypacker, 1973). It was an ingenious and ambitious project, years ahead of its time. Psychologists and educators who made contact with the Behavior Bank witnessed an important pioneering effort. It is unlikely that there is any behavior database today that comes close to the creativity and scope of its design.

We don't know the reasons for closing the Behavior Bank. However, a little first hand experience with it brought out some problems, chiefly those associated with centralized mainframe computer operations. By today's standards the Behavior Bank was distant, expensive, slow and clumsy—it wasn't "user friendly."

Microprocessors to the Rescue

Microprocessor technology and the advent of decentralized personal computing make it possible for Precision Teachers to create their own local database. These local systems are "user friendly," avoiding the problems of mainframe systems, and yet may be designed to do a variety of different and sophisticated jobs.

The primary requirements for such a local database are a microcomputer with disk drives, a Visi-Calc type spreadsheet program, and, of course, data. Our particular database uses the
IBM PC microcomputer and either the Multiplan or Lotus 123 spreadsheet. Other microcomputers and software programs, such as the TRS-80, Models III or 4, the Franklin Ace 1000 or 1200 models with Visi-Calc or Super-Calc, or the Apple IIe, with an 80 column board, will also work. The main differences between these systems will be convenience and speed.

A Trainer's Database

At the University of Florida, our primary responsibility is to prepare quality special education teachers—a teacher training function. It follows that some of the features of the database described meet the unique needs of teacher trainers and supervising teachers more than others.

The first step in creating the database was to develop an easy way for teachers to record their data. We developed a sheet called the Decision and Outcome Form. One copy is used for each pinpoint taught and is attached to the Standard Celeration Chart. Information on the form is organized by phase. A phase being that period of teaching during which planned conditions of instruction remain constant. Teaching conditions, outcomes, and change decisions are recorded for each phase. The data recorded are: learning channel; component aim (stage—accuracy or fluency building); set size (e.g., number of spelling words in the teaching set); materials used; supporting pinpoints taught simultaneously; performance standard; learning picture; first and last frequency for corrects and errors (these are not actual data points, but are obtained by drawing the learning line and then recording the frequency where the learning line crosses the first and last calendar days in the phase); decision rule used (decision rules are printed on the bottom of the form); and a brief description of the change made at the end of the phase.

These data from the Decision and Outcome Form are the primary input to the database. Using the IBM PC, we enter the data into a Multiplan spreadsheet. A spreadsheet is a matrix of columns and rows. Our sheet uses 23 columns. The first 13 columns accept data from the Decision & Outcome Form. The last 10 columns show the learning outcomes—different measures of effectiveness and efficiency. Each row in the matrix stores the data for a phase. Student teachers who produce lots of phases have a matrix with many rows.

Figure 1 is the Teaching and Learning Database: Teacher Report for one student teacher's practicum work for Spring semester 1983 (15 weeks). This report is too large to reproduce in full. A number of phases (rows) have been deleted from the middle. However, the summary at the bottom of the report includes the omitted data. The top section of the report gives identifying data, report titles and the data. The next section displays information on the practicum teacher, teaching setting, and course taken. Below that is a section that describes the learners. The next section, TEACHING AND LEARNING OUTCOMES, is the main body of the report—presenting the phase-by-phase data for all the learners and pinpoints taught during the semester. Immediately following is the SUMMARY OF OUTCOME MEASURES. This section summarizes data across all phases and provides totals, medians, and other values. Following this is a two page section that lists other kinds of experiences the teacher may have had during the semester. Examples of other experiences include: participation in staffing conferences, consulting with other school or nonschool specialists, etc. The last section of the report is titled BULLETIN BOARD. We use this section to commend our students, to make suggestions for change, and to post notices. The student is encouraged to respond in writing where it says "Comments."

The main section of the report, TEACHING AND LEARNING OUTCOMES, has many headings. Some are easy to interpret, while others will need clarification. Table 1 provides a brief explanation for each heading.

The PT Database in Action

Our first full use of the database was with eight students enrolled in practicum courses in the Department of Special Education, Spring semester 1983. The student teachers came to this course with widely different kinds and amounts of experience and expertise. Some were new to education, having just transferred from another college. Others were completing their last practicum before graduation. Practicum placement also varied. Five students were placed in elementary resource rooms for children with varying exceptionalities (learning disabilities, behavior disturbances, intellectual impairments). One teacher was placed in an alternative school for middle-school emotionally handicapped youth, and two were placed in self-contained rooms for the physically impaired and multiply handicapped.

Both authors and another doctoral student were supervisors. We held a weekly meeting, about an hour long, to teach and maintain the database system and to share charts. Our early sessions were devoted to teaching the Decision and Outcome Form, a generally easy job. A few problems developed with students who had not had prior PT training. The most persistent was recording actual first and last frequencies instead of those determined by the celeration line.
Figure 1

Teaching and Learning Database: Teacher Report

DEPARTMENT OF SPECIAL EDUCATION

UNIVERSITY OF FLORIDA

REPORT DATE: April 19, 1983 -- Final Report

TEACHER-- Carol M.
TEACHING AT-- Elem with Betty N.
COURSE-- Grad practicum in LD- teaching and inservice

Learner's Name | Age | Sex | Program | Grade | Comments
--- | --- | --- | --- | --- | ---
Kenny | 10 | M | LD | Third | IEP Focus: Ginn reading and preparing to move to new school
Wanda | 6 | F | EMH | First | IEP Focus: Pre-academic letter and number skills
John | 10 | M | EH | Fourth | IEP Focus: Ginn reading and Heath math
Keith | 11 | M | EH | Fourth | IEP Focus: Positive classroom social behavior & Sullivan reading skills
Cleveland | 11 | M | LD | Fifth | IEP Focus: Reading and behavior problems

TOTAL STUDENTS TAUGHT: 5

TEACHING AND LEARNING OUTCOMES

Learner Skill-- Pinpoint Phase Set Focus Tmgs CalDays Tmgs/Day CFF CLF EFF ELF PFStdA CelCor CelErr Cordys Er dys Ogs Lops Ogs/Day Lops/Day
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | ---
Kenny | S/S Math rneg | 1 | 75 | A | 21 | 16 | 1.31 | 8 | 27 | 4 | 1 | 0 | 1.70 | 1.83 | 27 | 29 | 1425 | 225 | 89 | 14
at aim | 2 | 75 | F | 6 | 2 | 3.00 | 24 | 28 | 1 | 1 | 0 | 1.72 | 1.00 | 3 | 3 | 300 | 150 | 0 | 0
S/W learn chnl | 3 | 36 | F | 9 | 3 | 3.00 | 47 | 48 | 1 | 1 | 0 | 1.05 | 1.00 | 3 | 3 | 36 | 0 | 12 | 0
Wanda | S/S Color names | 1 | 21 | A | 6 | 2 | 5.00 | 5 | 12 | 4 | 1 | 0 | 21.12 | 4.13 | 43 | 8 | 56 | 15 | 28 | 2
slice back | 2 | 4 | A | 21 | 15 | 1.40 | 28 | 42 | 4 | 1 | 0 | 1.21 | 1.91 | 18 | 29 | 56 | 12 | 4 | 1
add colors | 3 | 8 | A | 30 | 17 | 1.76 | 15 | 24 | 5 | 1 | 0 | 1.21 | 1.94 | 21 | 33 | 72 | 32 | 4 | 2

SUMMARY OF OUTCOME MEASURES

x's /'s

TOTAL PHASE COUNT= 114

SUM= 1654
MAXIMUM= 75
AVERAGE= 18
MINIMUM= 0

OTHER (not accuracy/fluency) OBJECTIVES= Maintenance() Endurance() Generalizm: Mat/Thr() Setings() Compliance() Sptn Use()
OTHER FIELD EXPERIENCES= Parents Conf(2) Staffing Conf(1) Reg Program() Write IEPs(2) PT, OT, Spch, Phys Contacts()

BULLETIN BOARD

** What can I say, Carol! This effort is tremendous. You have demonstrated high proficiency in many teaching skills. You have also produced more behavior change than we have yet documented by one student. Congratulations on a job exceptionally well done.

I need to find out from you how you recorded data when you did three timings on one and only one day. No growth ever shows, but I'm sure some took place.

Thanks for all you have helped us learn about teaching and learning. We all wish you the best and hope you have an exciting and rewarding career in education. Please keep in touch and share your skills and data with others.

COMMENTS--
By the last third of the semester, teachers were looking forward to discussing their reports. During the last meeting, the faculty distributed the latest version of their teaching reports and then left the room. When we returned, they were actively discussing technical aspects of their teaching. They seemed to be well under the control of the information database and were busy sharing and learning from each other. The database report was beginning to serve as a qualitative difference in productivity and classroom teaching. Ratings using the database detect major differences during each third of the semester.

The database covers so many aspects of teaching and learning, that almost every teacher was "best" at something. Some were highly skilled from the start. Others made improvements in productivity, efficiency, or both during each third of the semester.

An important consequence of this system is that using the database detects major differences within and across teachers that are not detected by supervisors who rely on direct observation of classroom teaching. Ratings of form and process tend to miss or mask large quantitative and qualitative differences in productivity and efficiency within and across teachers. Also, the person who enters the data into the computer seems to have a more intimate knowledge of the specifics of teaching and learning dynamics.

**Summary Reports**

Figures 2 and 3 display the Teaching and Learning Database: Summary Report. This report uses most of the data in the database to print a report using 19 different measures to describe teaching activities and learning outcomes. It is designed to achieve two objectives: first, to permit easy comparisons across teachers; and second, to provide a convenient summary of the total productivity and efficiency of all our practicum teachers. The summary report has many uses. Staff may use the data to analyze the effects of various training, supervisory, and placement procedures. Our special interest is to develop procedures for bringing the celerations and total productivity of teachers on the low end, up to the levels of teachers in the top quartile. The data may also be used as an empirical basis for reinforcing outstanding teaching, and for reporting teacher effectiveness to local school districts.

The first part of the Summary Report contains identifying and is displayed in Figure 2. Figure 3 displays the second part of the Summary Report and contains two sections: Teacher Input Options and Teaching and Learning Outcomes. The variability of outcomes is of particular interest. The range of variability is often > X5 and in some cases > X25. Even differences this large, on important dimensions of teaching, are nearly impossible to recognize by supervisors using direct classroom observations of teacher form and process—a serious shortcoming of traditional practice.

**New Measures**

We have used a few new measurement units: Cordys, erdys, ogs and lops. One objective of the database is to provide solid measures of teaching productivity, as well as measures of efficiency. As we see it, celeration is a good measure of efficiency—the rate of learning during a phase. Across many phases the median celeration and the proportion of celerations > X2 and < X1.25 describe teaching efficiency. However, we do not have a measure of productivity. For example, two teachers may both produce X1.8 celerations teaching new vocabulary words. They are identical in the rate (efficiency) of learning produced. However, one teacher may only sustain this rate of improvement for 5 days, while the other sustains it for 10 days. Their efficiency is the same, but the latter is twice as productive.

Cordy is a measure of productivity and is defined in Table 1. Cordy is short for "celeration correct days." Erdy is the analogous measure for error movements. It is short for "celeration error days." We believe these two measures give PT technology a useful measure of combined teacher-learner productivity. It takes some experience with cordys and erdys before they have intuitive meaning.

Another new unit is the Og. Carl Binder (1982) described the Og as a unit of knowledge or force, and attributed its origins to Eric Haughton. Ogs are found by multiplying the amount of curricular material by the performance frequency. For example, writing 20 spelling words at 22 words per minute, produces a force of 440 Ogs (20 X 22). Since the basic unit of our database is the phase, we have defined an Og as the product of the set size (amount of curricular material) multiplied by the frequency change in a phase. If, while learning 20 spelling words, a student progressed from a starting frequency of 8 words per minute to an ending frequency of 22 words per minute, 280 Ogs would be produced (20 X 14). Lops, short for "learning opportunities," are analogous units applied to the change in error frequencies during a phase. Ogs and lops are handy units for analysis of amount of curricular material on learning, as well as for describing total knowledge produced.
## Teaching and Learning Database: Summary Report -- Identifying Panel

### Teaching and Learning Database

**DEPARTMENT OF SPECIAL EDUCATION**

**UNIVERSITY OF FLORIDA**

**SUMMARY REPORT SPRING SEMESTER 1983**

### Identifying Information

<table>
<thead>
<tr>
<th>Teacher Name</th>
<th>University Supervisor</th>
<th>School</th>
<th>Host Teacher</th>
<th>Course</th>
<th>Prev. Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alecia F.</td>
<td>Gerent</td>
<td>Elem.</td>
<td>Pat S.</td>
<td>EMR 6801-3cr</td>
<td>Transfer from Arts and Sciences College. No ed. courses or experience.</td>
</tr>
<tr>
<td>Jean H.</td>
<td>Wolking</td>
<td>Class</td>
<td>Susan P.</td>
<td>EED 6943-4cr</td>
<td>Four yrs. paid spec. Ed. exper. Last practicum.</td>
</tr>
<tr>
<td>Nadia H.</td>
<td>Branscum</td>
<td>Elem.</td>
<td>Eleanor H.</td>
<td>ELD 6944-3cr</td>
<td>One yr. pd. experience with severe emot. probs. Last practicum.</td>
</tr>
<tr>
<td>Jill L.</td>
<td>Gerent</td>
<td>Elem.</td>
<td>Barbara H.</td>
<td>EPH 6942-6cr</td>
<td>Four yrs. + exper. at Sunland with adult retarded. 1st. practicum.</td>
</tr>
<tr>
<td>Lynn N.</td>
<td>Wolking</td>
<td>Sch.</td>
<td>Susan C.</td>
<td>EED 6943-3cr</td>
<td>No pd. exper. Last practicum. Graduating in August.</td>
</tr>
</tbody>
</table>
### Teaching Input Options

<table>
<thead>
<tr>
<th>Teacher</th>
<th>Number of Learners</th>
<th>Number of Pinpoints</th>
<th>Number of Phases</th>
<th>Number of Phase Changes</th>
<th>Median Length</th>
<th>Median Timings</th>
<th>Percent Accuracy</th>
<th>Percent Fluency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Becky</td>
<td>6</td>
<td>24</td>
<td>53</td>
<td>29</td>
<td>Days=18</td>
<td>485</td>
<td>0.45</td>
<td>32</td>
</tr>
<tr>
<td>Alecia</td>
<td>2</td>
<td>5</td>
<td>16</td>
<td>11</td>
<td>15</td>
<td>84</td>
<td>0.41</td>
<td>80</td>
</tr>
<tr>
<td>Jean</td>
<td>4</td>
<td>22</td>
<td>84</td>
<td>82</td>
<td>8</td>
<td>221</td>
<td>0.38</td>
<td>42</td>
</tr>
<tr>
<td>Nadia</td>
<td>2</td>
<td>9</td>
<td>34</td>
<td>25</td>
<td>14</td>
<td>193</td>
<td>0.64</td>
<td>74</td>
</tr>
<tr>
<td>Jill</td>
<td>4</td>
<td>6</td>
<td>9</td>
<td>3</td>
<td>14</td>
<td>70</td>
<td>0.86</td>
<td>89</td>
</tr>
<tr>
<td>Susan</td>
<td>2</td>
<td>10</td>
<td>55</td>
<td>45</td>
<td>5</td>
<td>918</td>
<td>3.00</td>
<td>51</td>
</tr>
<tr>
<td>Carol</td>
<td>5</td>
<td>33</td>
<td>113</td>
<td>80</td>
<td>7</td>
<td>1654</td>
<td>2.18</td>
<td>58</td>
</tr>
<tr>
<td>Lynn</td>
<td>6</td>
<td>16</td>
<td>70</td>
<td>54</td>
<td>4</td>
<td>345</td>
<td>1.00</td>
<td>3</td>
</tr>
</tbody>
</table>

**TOTALS** 31 125 434 309 xx 3960 xx xx xx

**Highest=** 6 33 113 80 xx 1654 3.00 89 97
**Median=** 4 13 54 37 11 283 0.75 54 45
**Lowest=** 2 5 9 3 4 7 0.38 3 11
**Hi/Lo Mult=x3.0** x6.6 x12.5 x26.6 x4.5 x23.6 x7.9 x29.6 x8.8

### Teaching and Learning Outcomes

<table>
<thead>
<tr>
<th>Teacher</th>
<th>Cel Cor</th>
<th>x2.0</th>
<th>x&lt;1.25</th>
<th>&gt;1.25</th>
<th>Cel Cor</th>
<th>x2.0</th>
<th>x&lt;1.25</th>
<th>&gt;1.25</th>
<th>Cel Err</th>
<th>x2.0</th>
<th>x&lt;1.25</th>
<th>&gt;1.25</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Becky</td>
<td>9</td>
<td>1.13</td>
<td>75</td>
<td>11</td>
<td>1.14</td>
<td>1172</td>
<td>1331</td>
<td>11</td>
<td>5532</td>
<td>790</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alecia</td>
<td>0</td>
<td>1.11</td>
<td>75</td>
<td>0</td>
<td>1.01</td>
<td>200</td>
<td>184</td>
<td>0</td>
<td>995</td>
<td>22</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jean*</td>
<td>1</td>
<td>1.08</td>
<td>80</td>
<td>8</td>
<td>1.01</td>
<td>944</td>
<td>874</td>
<td>3</td>
<td>7361</td>
<td>1575</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nadia</td>
<td>4</td>
<td>1.61</td>
<td>45</td>
<td>53</td>
<td>2.35</td>
<td>502</td>
<td>1371</td>
<td>5</td>
<td>19357</td>
<td>2487</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jill</td>
<td>33</td>
<td>1.72</td>
<td>44</td>
<td>0</td>
<td>1.27</td>
<td>194</td>
<td>121</td>
<td>0</td>
<td>2304</td>
<td>175</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Susan</td>
<td>56</td>
<td>2.44</td>
<td>4</td>
<td>47</td>
<td>1.55</td>
<td>879</td>
<td>1205</td>
<td>11</td>
<td>27289</td>
<td>1549</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carol</td>
<td>28</td>
<td>1.56</td>
<td>34</td>
<td>41</td>
<td>1.62</td>
<td>1685</td>
<td>3938</td>
<td>12</td>
<td>46675</td>
<td>3591</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lynn</td>
<td>56</td>
<td>2.44</td>
<td>4</td>
<td>9</td>
<td>1.01</td>
<td>942</td>
<td>582</td>
<td>68</td>
<td>25488</td>
<td>554</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTALS** xx xx xx xx xx 6518 9606 xx 135001 10743

**Highest=** 56 2.44 80 53 2.35 1685 3938 68 46675 3591
**Median=** 19 1.59 39 10 1.21 910 1074 8 13359 1169
**Lowest=** 0 1.08 2 0 1.01 194 121 0 995 22
**Hi/Lo Mult=x56** x2.2 x40 x53 x8.7 x8.7 x32.5 x68 x46.9 x163

* Jean was teaching in an afternoon tutorial program. The children were seen only twice a week. The other teachers usually saw their students four times a week. We try to schedule a Monday, Tuesday, Thursday, Friday teaching week. In our experience, 2 and 3 day teaching weeks produce poor learning.
Table 1
Explanations of Headings for the Teaching and Learning Database:
Teacher Report-- Teaching and Learning Outcomes

<table>
<thead>
<tr>
<th>Heading</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learner</td>
<td>Name of student</td>
</tr>
<tr>
<td>Skill--Pinpoint</td>
<td>Learning channel and pinpoint description</td>
</tr>
<tr>
<td>Phase</td>
<td>Assigns sequential number to phases within pinpoint</td>
</tr>
<tr>
<td>Set</td>
<td>Number of units in teaching set, e.g., number of spelling words in teaching set. Some pinpoints don't have a set number, e.g., reading</td>
</tr>
<tr>
<td>Focus</td>
<td>A= accuracy building  B= fluency building</td>
</tr>
<tr>
<td>Tmgs</td>
<td>Number of timings during the phase</td>
</tr>
<tr>
<td>CalDays</td>
<td>Phase length in calendar days</td>
</tr>
<tr>
<td>Tmgs/Day</td>
<td>Average number of timings/day for phase</td>
</tr>
<tr>
<td>CFF</td>
<td>First frequency of phase for correct movement-- on the celeration line</td>
</tr>
<tr>
<td>CLF</td>
<td>Last frequency of phase for correct movement-- on the celeration line</td>
</tr>
<tr>
<td>EFF</td>
<td>First frequency of phase for error movement-- on the celeration line</td>
</tr>
<tr>
<td>ELF</td>
<td>Last frequency of phase for error movement-- on the celeration line</td>
</tr>
<tr>
<td>PfStdA</td>
<td>Performance standard attained during the phase-- Great Falls performance standards used</td>
</tr>
<tr>
<td>CelCor</td>
<td>Celeration (mov/min/week) for corrects-- a multiplier unless less than 1</td>
</tr>
<tr>
<td>CelErr</td>
<td>Celeration (mov/min/week) for incorrects-- a divider unless less than 1</td>
</tr>
<tr>
<td>Cordy</td>
<td>Celeration for corrects multiplied by the number of calendar days in the phase; a measure of productivity</td>
</tr>
<tr>
<td>Erdy</td>
<td>Analogous to Cordy, but using celeration for errors</td>
</tr>
<tr>
<td>Ogs</td>
<td>Last frequency of phase (on the celeration line) minus first frequency of the phase times the number of units in teaching set</td>
</tr>
<tr>
<td>Lops</td>
<td>Analogous to Ogs, except calculated with error frequency change</td>
</tr>
<tr>
<td>Ogs/Day</td>
<td>Number of Ogs divided by number of calendar days in the phase</td>
</tr>
<tr>
<td>Lops/Day</td>
<td>Number of Lops divided by number of calendar days in the phase</td>
</tr>
</tbody>
</table>
Some Results

Figure 3 summarizes our work for Spring semester 1983. Eight teachers taught 31 learners 125 pinpoints and made 309 changes. Changes represent either a move to the next pinpoint or an attempt to improve learning or performance. There were a total of 3960 timings. We have found a high positive correlation between median timings per calendar day and median celerations for corrects.

Variability among teachers is large. The range of this variability may be seen by looking at the rows displaying Hi/Lo Multipliers, the last data row of each panel. The number of learners taught has a X3 range. At the other extreme, we find great variability in the number of timings and number of changes. Also, notice the differences in focus of learning. Ninety-seven percent of Lynn's phases were committed to fluency building. Jean, Susan and Carol each had a pretty even split between accuracy and fluency building. Alecia and Jill concentrated on accuracy building—reducing errors.

Looking at the outcome measures, we see that the median celeration for corrects across all eight teachers was X1.59. The median percent of the celerations for corrects > x2.0 was 19. Looking at the less favorable outcomes, we see a median of 39% of the celerations for corrects < x1.25. A large proportion of these celerations were on motor skill pinpoints taught to physically handicapped children early in the practicum. The median celeration for errors was /1.21, with a median of 10% > /2.0. Although it is difficult to make the data on cordys, erdys, ogs, and lops meaningful in this brief article, let's look at how these units may be used. Becky, working with elementary age physically impaired/multiply handicapped children had a relatively low median celeration for corrects—X1.13. Yet she was the second most productive teacher in terms of cordys, with a total of 1172. This means that, although the learning rates of her students were relatively low, these rates were sustained over a large number of days. In contrast, Susan produced one of the highest median celerations for corrects, but was ranked fifty in terms of total cordys. She produced rapid learning for relatively short phases—high efficiency, median productivity. The difference between cordys and erdys for a teacher describes the relative productivity between fluency and accuracy building.

Summary

We have described how to make a database that will be "friendly" and suit local needs of Precision Teachers. The equipment, software and knowledge needed puts this type of database within reach of many Precision Teachers. We have also suggested some of the functions this kind of PT database will serve well. Precision Teaching provides a technology capable of producing consistently effective individual instruction. The basis for this seems to be the high quality, sensitivity, and visibility of the data produced. However, a large number of local databases are needed to provide the broadest possible foundation for an increasingly effective technology for teaching and learning.

It seems certain that we will all come into increasingly frequent contact with databases of all kinds as we progress further into the information age. An interesting feature of any database is that it accumulates new uses, once a base of quality data exists and access to the data is made easy. The development of professional sports is an excellent example of this phenomenon. Over the years new player and team statistics have been invented and incorporated into the database of the team and ultimately the league. The database is used with great skill by the press, broadcast media and team owners to build and sustain interest in the individual player, team, league and sport. The database provides a language of, and facts about, the sport. Imagine a conversation about baseball without comparisons of batting averages, earned run averages, or standings in the league.

The uses our practicum students made of the database they generated makes us believe that teaching and learning can be easy to talk about accurately and nonpejoratively—and can be almost as much fun as discussing baseball, football, basketball or hockey. There will certainly be fewer knee injuries! To paraphrase Braves's manager Joe Torre, "Teaching, and training teachers by lunch is a lot of fun, but a little data couldn't hurt." Help save (to disk) Precision Teaching. Create a database!

Dr. William Wolking is a faculty member and Michele Gerent is a doctoral student in the Department of Special Education, University of Florida, Gainesville, Florida.

REFERENCES


system for sharing precise information.
Teaching Exceptional Children, 3, 57.

Martin, J. An end-user's guide to data base.


Chart-sharing

GROUP LANGUAGE ACTIVITY TO INCREASE RECALL OF FACTS

Carole Peterson and Rosemary Holman
SIMS Project

Background

The activity described in this article was conducted in an Oral Language class with eight severely learning and language disabled junior high students. This class is part of the SIMS Project, which provides a highly structured data-based program of individualized instruction for severely learning disabled junior high students. SIMS stands for Systematic Instructional Management Strategies, terms which describe the learning environment designed to systematically establish individualized academic and social goals for each student and to continuously monitor and evaluate student progress toward these goals. The Oral Language class, which meets daily for one hour, is co-taught by a learning disabilities teacher and a speech clinician.

The students participate in a 15 minute group activity focusing on language objectives from orally presented material. These include: 1) participating five times in a discussion, 2) answering questions appropriately, 3) answering questions in complete sentences, 4) asking questions appropriately, 5) identifying the main idea. The following activity evolved from attempts to design more oral language probes that could be used to monitor the group as a whole. The purpose of this probe was to increase recall of facts form orally presented material.

Method

During the group time, the learning disabilities teacher read and asked questions from a selection in the Mott Basic Language Skills Program. The sections focused on the lives of Charles Lindberg, Walt Disney and Althea Gibson. A short discussion followed reviewing the important information with the students. A one-minute group timing of think/say facts was conducted. The students were assigned seats for this activity so that the first student responding rotated weekly. Each student was given five seconds to initiate a response before moving on to the next student. The learning disabilities teacher monitored this through visual and oral cues. The speech clinician counted the responses as either correct, incorrect, or a repeat on a master tally sheet, which was reviewed with the students before a second timing was done that week. This procedure was performed and the results were charted once a week for seven weeks. To determine an aim, the following measures were taken into consideration:

1. Guidelines set forth by Unique Curriculums Unlimited (10-30 ideas said from material read);

2. A free frequency was taken by instructing the group to think/say material that they had mastered (naming different kinds of food). The group named 29 foods in one minute;

3. A frequency aim was calculated by multiplying the frequencies for the first and second timings each by 50%, and adding these amounts to each frequency. This measure was suggested by the California Guideline for Rate Survey developed by the California Child Service Demonstration Center.

The group aim was set at 13 facts/minute for both weekly timings. When the group reached this aim by the fourth week, a new aim was calculated and set at 20 facts/min. It was at this point that the teachers decided to use the following interventions in an attempt to see how close the students could get to their free frequency:

1. The students predicted the number correct for each timing based on the previous week's data and/or the first timing for that week;

2. Tangible reinforcers were given when predicted aims were met;

3. Thirty second practice timings were conducted and a strong emphasis was placed on giving one or two word facts; and
4. The time interval allowed between responses was reduced from five to three seconds.

Results and Conclusions

As shown in Charts 1 and 2, the group's correct responses accelerated by X2/month on the first timing and by X2.5/month on the second timing. The aim was met in both weekly timings. In analyzing the results, we found that when one or two word responses were given, the total number of facts increased (see the fifth, sixth and seventh data points). As the students came closer to their free frequency, the form or quality of their responses improved. Also, by resetting the goal and using interventions, the students were able to recall facts from orally presented material approximating their free frequency.

This activity was a positive experience for the students and the teachers involved. This was the first attempt at setting a group rather than individual aims. It is our hope that by using similar group activities there will be some carryover to students' performances on their individual language aims.

Carole Peterson is a learning disabilities teacher and Rosemary Zolman is a speech and language clinician with the SIMS Project, Special Education Service Center, Room 110, 304 Upton Ave. S., Minneapolis, MN 55406.

FROM 1-1/4 MILES TO A MARATHON: MONITORING PROGRESS ON THE STANDARD CELEBRATION CHART FOR 31 MONTHS

Patrick McGreevy
Louisiana State University

On March 28, 1981, I purchased an inexpensive pair of running shoes, marked out a course with the aid of the odometer in my car and proceeded to run very slowly. At the end of 1-1/4 miles, I stopped because of fatigue. I was disappointed, because I had decided to chart "runs miles without stopping" on the Daily Standard Celebration Chart, and I had completed the movement only once. Chart 1 displays this initial performance on the Monthly Standard Celebration Chart.

Even though I was very sore the next day, I ran two miles before stopping. I experienced my first frequency multiplier—x2! I was beginning to feel encouraged. I ran 15 of the next 31 days, charting my daily performance and

watching my weekly improvement on the Daily Standard Celebration Chart. On the 31st day, I ran 3 miles for the first time. On that day, I decided to run in a 10,000 meter race to be held at the Association for Behavior Analysis (ABA) Convention on May 29th. This decision left only 32 days to prepare for the race.

I began running 4.6 days per week, attempting to increase my longest run each week. One week before the race, I ran 5 miles for the first time. On May 29, 1981, I completed the ABA 10,000 meter race in 57 minutes and 15 seconds (over 9 minutes per mile). The important word in the previous sentence is "completed." I was very excited! I had run 6.2 miles without stopping—a x6 frequency multiplier from my first day on the road, just 63 days ago. This performance is also displayed in Chart 1.

During the next 12 months, I continued running 3-6 days per week and entered a number of 10,000 meter races. My best performance was 44:02 (about 7 minutes and 35 seconds per mile). On June 6, 1982, I entered and completed my first half-marathon (13.1 miles) in 1:42:49 (about 7:20 per mile). I was elated! I had run over 32 miles—a x13 frequency multiplier from March 28, 1981. This performance is also shown in Chart 1.

During the next 12 months, I continued running 4-5 days per week, entering about fifteen 10,000 meter races. My best performance was 40:29 (about 6:33 per mile). On June 5, 1983, I entered and completed another half-marathon race in 1:36:21 (about 7:26 per mile).

Two months later I decided to train for my first marathon (26.2 miles). I ran 660 miles in 3-1/2 months, training for the "big" race. I charted "runs miles without stopping" on the Daily and Weekly Standard Celebration Charts. I also charted my longest run each week on the Weekly Standard Celebration Chart. My weekly performance and monthly improvement are shown in Chart 2. On October 30, 1983, I completed my first marathon in 3:34:21 (about 8:08 per mile). As I was coming down the last hill, I could see the finish line about 1/2 mile away. I started thinking about that first 1-1/4 miles and how far I'd come. I cannot adequately describe in this article how I felt at that moment. My body was almost totally drained, but my spirits were higher than they've ever been. Here I was, about to complete a performance I never dreamed possible! I had multiplied my "runs miles without stopping" performance x6 from my first day on the road, 31 months ago (see Chart 1).

During this 31 month period, I recorded "runs miles without stopping" on either the Daily or
student predictions

- tangible reinforcers
- 30-second practice timings: one or two-word facts
- 3 seconds between responses

chart 1. a group language activity: first timing
Peterson, Carole, and Holman, Rosemary. Group language activity to increase recall of facts.


- **Student predictions**
- **Tangible reinforcers**
- **30-second practice timings:** one or two-word facts
- **3 seconds between responses**

To increase recall of facts.

Peterson, Carole, and Holman, Rosemary. Group Language activity
Chart 1. Notable Running Performances over a 31-month Period

- First day of running
- First 10,000 meter race (57:10)
- First half marathon race (1:42:49)
- First marathon (3:34:21)

McGreevy, Patrick. From 14 miles to a marathon: monitoring running on the standard calendar chart for 31 months.
Chart 2. Marathon Training

Macy's Marathon - 30 Oct 83 (3:34:21)

- total miles/week
- longest run (in miles) each week
Weekly Standard Celeration Chart about half the time. While training for a race, I always charted both daily and weekly performance. During a "maintenance" period, I often stopped charting. If my weekly mileage or long runs began to decrease, I started charting again and set an aim for another race. The last 31 months have taught me the value of daily charting, setting aims, and believing in the ability to multiply your own performance on a specific movement well beyond your current expectations.

By the way, after two months "off" the Chart, I'm back with a new aim--to complete the Kansas City Marathon on May 6, 1984, in less than 3:20.

Patrick McGreevy is an assistant professor of Special Education--Severely and Profoundly Handicapped at Louisiana State University, 201 Peabody Hall, Baton Rouge, LA 70803.

About PT

NOTES FROM THE EDITOR

Patrick McGreevy

This issue concludes Volume IV of JPT. A renewal form for Volume V is attached to the inside front cover. Please fill out this form and return it with your check or purchase order as soon as possible. Notice that two-year subscriptions are now being offered. Also notice that there is a place on the renewal form for your comments and suggestions. We are attentive to your suggestions, so please feel free to make them.

Substantial quantities of Volumes III and IV are still available. Why not give a subscription to Volume III to one of your colleagues and let this volume be a programmed event for up-to-date subscribing? You might also want to use one or both of these volumes in your classes.

Dr. Eric Haughton, one of the early developers of the Standard Celeration Chart and Precision Teaching, a contributor editor of this journal and a friend of many Precision Teachers, recently received a diagnosis of a tumor of the lower bowel and cancer of the liver. He underwent successful surgery for the former and is currently receiving treatment for the latter. Over the last 18 years, Eric has provided many Precision Teachers in North America with instruction, encouragement and moral support. Those of you who would like to express your encouragement and support for Eric can write him at: Loyalist College, ECE, Box 4200, Belleville, Ontario, Canada K8N 5B9. Eric, our thoughts are with you!

In order to get more people involved in the Journal and the manuscript review process, we will be selecting a number of new consulting editors. If you would like to nominate a colleague, please send us her/his name.

Please note that your editor has accepted a new position on the Special Education faculty at Louisiana State University. Please send formal manuscripts, Chart-sharing articles and other correspondence to the following address: Louisiana State University, Special Education, 201 Peabody Hall, Baton Rouge, LA 70803. The office number is 504-388-6876. To reach your editor in the evening or on the weekends, please call 504-924-6530. If the phone has not been answered, a recording will come on immediately after the fifth ring. The recording device is voice-activated, which means that, after the tone, you can leave as long a message as is necessary. Messages will be attended to and calls will be returned as soon as possible. If you do not wish to leave a message on the tape, please hang up before the fifth ring. As in the past, subscriptions and subscription renewals should be sent to Plain English Publications.

The Journal is soliciting formal manuscripts and Chart-sharing articles for future issues. In addition to manuscripts describing experimental and descriptive research conducted using group designs, the Journal would like to encourage the submission of formal manuscripts and Chart-sharing articles that describe experimental research conducted using single subject designs, where the Standard Celeration Chart is used to display and analyze the data (dependent variable).

The Journal is also soliciting responses to and material for the eleven About PT columns. Send your reactions and material to the column editors or the journal editor. Column editors should submit their completed columns to the editor by March 1, June 1, September 1, and January 1.

Beginning with this issue of JPT, the format for references will be changed in accordance with the changes outlined in the new Publication Manual of the American Psychological Association (3rd ed.). If you have access to this manual and you are planning to submit a formal manuscript or Chart-sharing article, please use the new format. However, since many teachers do not have access to this document, and since our
The annual convention of the Association for Behavior Analysis (ABA) will be held in Nashville, Tennessee, May 28-31. Many Precision Teachers are planning to attend. Information on this conference can be obtained from a member of ABA or from ABA, Department of Psychology, Western Michigan University, Kalamazoo, Michigan 49008. One of the highlights of this conference is the annual Standard Celeration Chart-sharing session. In addition, there is a rumor to the effect that this session will be followed by an aerobic or possibly anaerobic social event. In the next issue of JPT, we will attempt to substantiate or refute this rumor.

AROUND THE STANDARD Celeration CHART

Patrick McGreevy

One of the publication criteria of the Journal is the use of the Journal of Precision Teaching Standard Glossary and Charting Conventions, which was most recently revised in October, 1982. This standards document and publication criterion was originally suggested by Ogden Lindsley, Gene Stromberg, Steve Graf, Ray Beck and others, and was adapted from the glossary in the Handbook of the Standard Behavior [Celeration] Chart (Pennypacker, Koenig, & Lindsley, 1972). This document was intended as an alternative to APA format and was an attempt to standardize the Charts and some of the narrative so that readers would find it easier to read, understand and make use of material contained in the Journal. This document was also intended as a guideline to practitioners so that Charted projects could be more easily shared, understood and repeated. Teachers who are new to Precision Teaching may find it helpful to review this brief document. Teacher-trainers may want to use it in courses or workshops. The most recent revision of this document is contained in each volume of the Journal and was most recently printed in Volume IV, Number 2 (Summer, 1983). Within this edition of the Around The Chart column the editor will review the charting conventions used by most Precision Teachers and will suggest some changes in the standards document. The editor will also suggest that four new charting conventions be included in this document. Teachers who are new to Precision Teaching may find this column helpful and may want to keep it as a reference.

Chart 1 displays the following charting conventions currently used by most Precision Teachers and contained in the Journal of Precision Teaching Standard Glossary and Charting Conventions (Third Revision: October, 1982):

**Accelerating Target**--a movement the behaver, manager, advisor, or supervisor expects to accelerate; the frequency is symbolized by placing a dot on the Chart.

**Decelerating Target**--a movement the behaver, manager, advisor, or supervisor expects to decelerate; the frequency is symbolized by placing an "\(\times\)" on the Chart.

**Counting Period Ceiling**--the highest frequency observable under a given counting procedure; symbolized by drawing a dash line on the Chart connecting the Friday and Monday lines.

**Median Frequency**--the middle frequency in a frequency distribution; symbolized by drawing a "\(<\)" on the Chart.

**Celeration Line**--the best-fit, SOLID straight line constructed through seven or more continuous frequencies of a given movement on the Standard Behavior (Celeration) Chart.

**Frequency Aim**--the expected phase-ending frequency for a given movement; symbolized by drawing AN AIM STAR, "\(A\)" WITH THE HORIZONTAL LINE at the expected frequency AND THE POINT OF THE STAR on the day the aim was set.

**Change Day**--first day of a phase change; symbolized by drawing a SOLID vertical line.
Chart 1. Present and Suggested (*) Charting Conventions
covering that day line on the Chart.

Ignored Day—a day on which the behavior being measured occurs but is not charted; THE FREQUENCY IMMEDIATELY PRECEDING AND IMMEDIATELY FOLLOWING AN IGNORED DAY(S) SHOULD BE CONNECTED.

No Chance Day—a day on which the behavior being measured has no chance to occur; THE FREQUENCY IMMEDIATELY PRECEDING AND IMMEDIATELY FOLLOWING A NO CHANCE DAY(S) SHOULD NOT BE CONNECTED.

Duration—the amount of time it takes to complete one occurrence of a behavior; 1/number of minutes spent behaving; SYMBOLIZED BY DRAWING A SHORT, HORIZONTAL LINE ON THE CHART INTERSECTING WITH A DAY LINE.

Latency—the amount of time between the occurrence of a signal and the beginning of a movement; 1/time from signal to start of movement; SYMBOLIZED BY DRAWING A SHORT, HORIZONTAL LINE ON THE CHART INTERSECTING WITH A DAY LINE.

Chart 1 also displays the following charting conventions currently used by many Precision Teachers, but not presently included in the standards document. The editor is suggesting that these conventions be included in the standards document:

Calendar Dates on the Chart—dates written across the top of the Chart specifying the date of every fourth Sunday for 20 weeks; a day/month/year format is used as follows, 15/Jan/84.

Celeration Envelope—an envelope formed by the construction of two lines parallel to a celeration line; one line passes through the frequency farthest above the celeration line and one line passes through the frequency farthest below the celeration line; the bounce around celeration is the vertical distance along any day line from the bottom to the top of the envelope.

Chart 1 also displays suggested charting conventions for two items presently included in the standards document. Charting conventions have not previously been proposed for these items. The editor is suggesting that the following conventions, specified in all caps, be included in the standards document:

Frequency Multiplier (jump up or jump down)—value by which one frequency is multiplied or divided to obtain a second; SYMBOLIZED BY DRAWING "\*" OR "/" FROM THE FIRST TO THE SECOND OF TWO CONSECUTIVE FREQUENCIES ON THE DAY LINE OF THE SECOND FREQUENCY.

Celeration Multiplier (turn up or turn down)—value by which one celeration is multiplied or divided to obtain a second; SYMBOLIZED BY DRAWING "\*" OR "/" FROM THE FIRST TO THE SECOND OF TWO CELERATION LINES OR FROM A PROJECTED CELERATION LINE TO A CELERATION LINE EXACTLY ONE WEEK AFTER THE TWO CELERATION LINES INTERSECT OR WOULD INTERSECT IF EXTENDED IN EITHER DIRECTION.

Chart 1 also displays two new items with suggested charting conventions that are not presently included in the standards document; the editor is suggesting that the following items and charting conventions be included in this document:

Projected Celeration Line—an expected celeration line based on a current celeration line drawn through seven or more continuous frequencies; symbolized by drawing a dash line extending one or two weeks from a celeration line.

Projected Celeration Envelope—an expected celeration envelope based on a current celeration envelope drawn through seven or more continuous frequencies; symbolized by drawing two dash lines extending one or two weeks from a celeration envelope.

Readers of this column are encouraged to write the editor and express their opinions about his suggested changes in the standards document. In addition, readers should feel free to express their own suggestions for change in this document. Remember the whole point of standardizing our language and our charting conventions is to facilitate communication.
TEACHER TO TEACHER

Caryn Robbins

Daily monitoring of students' learning requires strategic and organizational effort. It is not easy. If the monitoring is done only for the sake of accountability, it is likely to be an exercise in frustration for the teacher. Monitoring students' daily performance on the Standard Celeration Chart enables teachers to learn about their students' learning. After charting performance data for seven to ten days, a learning picture develops which gives us much more information than what happened on each day. Learning pictures give us information we can't get from teaching and observing. They confirm or deny our suspicions. They are tools for decision-making. I invest time and effort into monitoring my students' daily performance on their individual programs. However, I spend very little time agonizing over program decisions and make better decisions.

In my special education preschool classroom, myself and two paraprofessionals carry out program training and performance monitoring. We meet on a bi-weekly basis to look at learning pictures and make program decisions. If the learning picture is improving, we make a decision as to whether the acceleration is rapid enough to reach the aim in a short period of time. If so, a decision is made to continue without a program change. Sometimes a child's performance is improving, but the celeration line predicts it will take several months to reach the aim. Our preschoolers have too little time and too much to learn for that kind of leisurely gain. As a result, often we make changes in programs when improvement is very slow.

Programs with maintaining or worsening learning pictures are always examined and changed. For our handicapped preschoolers, we are generally looking for the most efficient learning channel set and the most powerful consequences. When one program has a maintaining or worsening learning picture, while all others are improving for the same child, we look at differences in the way we are teaching or differences in the programs. When all of a child's programs have maintaining or worsening learning pictures, we look at the child's total environment. Maintaining or worsening learning pictures across all of a child's programs have often reflected trouble at home.

There are two good references describing the use of the Chart as a decision-making tool. I will list them, rather than try to say what's already been well said:

(1) Teaching and Learning in Plain English (2nd edition), available from Plain English Publications;


Learning pictures provide us with objective reasons for making decisions. They put the student's bad days in perspective and take the teacher's bad days out of the picture. An isolated low performance may be frustrating to a student, but charting that performance often shows it to be within average daily bounce. Learning pictures allow students to visibly monitor their own learning and not rely on us for their only feedback. Teachers are no different than other professionals. While we do not intentionally deceive, each of us has our own set of experiences and values that bias our views. It is more difficult to "see" progress in a child who, in the last few days, has used every inappropriate means possible to gain your attention, than in one who has been a model citizen. Our charts erase our subjectivity in the same way that laboratory tests confirm or deny a medical doctor's suspicions.

It is easy to base your program decisions on the learning picture when it confirms your hunch. It's much harder to make a decision to change when the learning picture looks nothing like what you "think" is happening. I've heard many people who are learning to make chart-based decisions say, "It doesn't look like it here, but I know she's about to catch on." I've said that myself, made a decision not to change the program and have subsequently been proven wrong many times. It's a little threatening to monitor learning, because it may prove our hunches wrong. On the other hand, it's ludicrous for us to think that those hunches alone can help us pick the best materials, learning channel sets, teaching strategies, and rewards for each individual student. I'm finding greater reward in knowing that I'm catching my mistakes than I ever did when I only "felt like" my students were learning.
People working within Precision Teaching are using some of the most accurate, sensitive and valid formative data available in the Human Services area. There are several reasons supporting this fact, including the pioneering work of B. F. Skinner in the use of frequency as basic data and the work of Og Lindsley in monitoring successive frequencies of thousands of human acts. Many other contributing people could also be mentioned. However, being aware of your Precision Teaching mentors and their genealogy will create a reasonable list.

Some of us in teaching or research run into confrontations with our historical measurement precedents. Test styles have been so rigid for the past 40 years, that new approaches, however clear and operational, are often placed on the defensive. My own experiences as one of the early field advisors and supervisors causes me to be quite sensitive and practiced in discussing this interesting, while complex area. In the past few years I've been developing an overhead transparency and handout to attempt to explore this labyrinthian, nether region. Furthermore, we continually wish to refine our information base, so discussion along with comparisons may unearth other significant factors.

Contrasts

Repeated measurement or monitoring forms a cornerstone of a different foundation of information than that of traditional or commercial testing. Two reasons we monitor performance are to chart changes and to forecast change on the personal level. We relate the individual's charts to group or other reference data. Testing attempts to relate group data to static individual data. Actuarial data (used by insurance and testing companies) cannot forecast individual's outcomes.

Precision Teaching practitioners monitor individual and programme-related concerns. Commercial tests, cover the waterfront, including a wide spectrum of topics, in order to meet market and administrative needs, not those of individuals.

Both measuring systems attend to the two major Quantities: Quantity 1 is temporal (calendar and interval) and Quantity 2, the content of the performance. Testing obscures the frequency data inherent in all standardized tests while frequency is a consistent unit of our information.

Both systems work to ensure the accuracy of their data. Precision Teachers break performance into significant packages to explore and to meet individual needs and characteristics accurately and precisely, such as corrects, skips and learning opportunities. Testing generally relates only to accuracy and acceptability.

Measuring—from Test to Monitoring

Let us now go through Figure 1 with my brief comments. Each of you will have personal experiences to relate to, so mine are designed as stimulants, telegraphic. We'll hit the high spots and clarify some of the hot spots.

Commercial/Personal: Standardized tests often commit to multiple-choice and machine scoring formats for largely economic considerations. These formats can be intimidating and distracting to both behavers and managers. We strive for a fully informed team involving usual behaviours, high comfort and trust levels. Data on my personal pinpoints are for, and belong to me personally.

Minifeedback/Maxifeedback: In the worst testing situations even concerned teachers do not learn results. Behavers who chart regularly receive maximum, immediate, feedback while managing their own projects. Behavers are operating as self managers and resource seekers.

Average/Proficient: Standardized tests relate your performance to the mean of your peers. Suppose you are in first grade, and the mean peer-norm is 50 words correct per minute on oral reading. Is 50/minute competent, fluent or proficient?

We use different frames of reference depending on the behaver's interests, desires and needs. We may ask for a personal aim at the start: "better than I was." We may use some peer data, and in the final analysis we owe it to each behaver to determine levels that will ensure Retention, Endurance and Application of their learnings. Many of us recognize this topic as deserving immediate study. Since we are a "Nation at Risk" we need to determine and implement education based on substantial proficiency levels. Few decision guidelines exist. What performance levels do you use when deciding on new phases? How much is enough?

Fail/Support: If you can't answer an item on a test, you fail the item. One of the classic IQ items is "What is Mars?" Robin answers, "Candy bar." She fails the item. We structure monitoring to support Robin through changes. There are supports for productive change in
MEASURING

TESTING ...................... →
(STATIC)

- PRE-PACKAGED FORMAT
- USUALLY NO STUDENT FEEDBACK
- RELATES ONLY TO PEER-NORMED GROUP
- CAN FAIL - "OBSCURE" CRITERIA
- SNAPSHOT
- CAN'T FORECAST - ONLY RELATE GROUP STATIC NORMS TO YOU
- UNRELATED TO CLASSROOM OUTCOMES AND GOALS - TENDS TO BE INSENSITIVE AND HETEROGENEOUS
- MULTIPLE CHOICE
- QUALITY ONLY (PACE IMPLIED) WITH GRADE/AGE LEVEL CONTENT
- DIFFICULT TO VERIFY (VALIDATE) OURSELVES
- GRADE/AGE LEVEL TRANSLATION TO METAPHORS

MONITORING CHANGE .......... →
(DYNAMIC)

- CLASSROOM TOPICS AND CONCERNS
- STUDENT RECEIVES FEEDBACK
- RELATED TO COMPETENCY - RETENTION ENDURANCE - APPLICATION - PERFORMANCE STANDARDS (REA/PS)
- FAILURE FREE - INFORMATION
- CONTINUOUS PROCESS
- FORECASTING POSSIBLE: REPEATED SERIES NECESSARY - CHARTED TO BE EFFECTIVE
- DIRECTLY RELATED TO EDUCATIONAL GOALS - VALID, RELIABLE, SENSITIVE, HOMOGENEOUS
- CONSTRUCTED RESPONSE
- ASSESS PACE AND QUALITY, AS WELL AS RATE OF CHANGE
- CAN BE VERIFIED (EMPIRICAL) IN EACH CLASSROOM
- DIRECT REFERENCE TO COMPETENCE (REA/PS) STANDARDS
Precision Teaching procedures and techniques (Feel Better, Robin?)

Snapshot/Continuous: Testing, even pre-post, are one shot events. Whereas we check performance repeatedly based on regular calendar cycles.

Now/Forecasts: We cannot forecast from a single observation—not navigators, not weather folks, not medics, not ETS, not behavers, not managers, not you and, certainly not me! Therefore snapshot, commercial tests offer static hints about a person's strengths and needs. Since we don't know the rate of change, we can't estimate the necessity of intervention or the intensity of intervention required. Ten day screening data improves people at x1.3 M/m/week, on the average—some more, some people less. We have learned not to project a flat line from initial frequencies, an unfortunate, incorrect assumption in current testing and statistical approaches. Slope is one of our power-pieces to understanding measurement and individuals. This should make you feel good as statistical approaches. Slope is one of our repeatedly based on regular calendar cycles.

Since we don't know the rate of change, we can't estimate the necessity of intervention or the intensity of intervention required. Ten day screening data improves people at x1.3 M/m/week, on the average—some more, some people less. We have learned not to project a flat line from initial frequencies, an unfortunate, incorrect assumption in current testing and statistical approaches. Slope is one of our power-pieces to understanding measurement and individuals. This should make you feel good as statistical approaches. Slope is one of our repeatedly based on regular calendar cycles.

Now/Forecasts: We cannot forecast from a single observation—not navigators, not weather folks, not medics, not ETS, not behavers, not managers, not you and, certainly not me! Therefore snapshot, commercial tests offer static hints about a person's strengths and needs. Since we don't know the rate of change, we can't estimate the necessity of intervention or the intensity of intervention required. Ten day screening data improves people at x1.3 M/m/week, on the average—some more, some people less. We have learned not to project a flat line from initial frequencies, an unfortunate, incorrect assumption in current testing and statistical approaches. Slope is one of our power-pieces to understanding measurement and individuals. This should make you feel good as statistical approaches. Slope is one of our repeatedly based on regular calendar cycles.

Unrelated/Relevant: U.S. law 94-142 requires that measurement relate to behaver's programmes and goals. Goodbye IQ. Adios, traditional diagnostic and labeling testing. Au revoir to heterogeneous test sections. Hello to valid, reliable, usually homogeneous items with SENSITIVITY! The fact that our data are sensitive is worth more consideration, so see the next thrilling installment of this column.

Prompt/Produce: Prompted, test-taking behaviour (multiple choice format) differs from normal, performance ecology. Each of you know several anecdotes about people who have guessed their way to "success" in prompted tests. Success? Monitored performance is similar to real-life production, often requiring multiple, compound learning channel sets. This is in marked contrast to commercial testing's slavish use of See/Select-Mark THE CORRECT choice.

Monoview/Multiview: Traditional tests report some aspects of the quality of your effort, translated into meaningless grade-level statements. Does anyone here know what "4.2 in math" or "equivalent to grade 10 reading" means? Our data set includes categories of performance—correct, legible, requires improvement, learning opportunities, skips, to name a few—as well as presenting the rate of change through the family of Standard Celeration Charts. Changing the rate of change is our goal. We strive to maximize performance gains for each person.

Validity/Valid: Tomes have been composed to justify the use of remotely chosen items presented by commercial tests in our performance settings. Enough said. (If you wish to study this topic from an historical perspective, check the history of "operational definitions" with a friendly psychologist. My, my!) Our data are valid, since when we monitor math, we measure our area of programming and of concern. This approach allows us to empirically verify our data, continuously, in each setting, on each project.

Metaphor/Relation: Perhaps, one day, it will be deemed immoral or unprofessional to translate raw data into an unknown? We do not know what age 2.6 on the Denver (or whatever test) means. We are unable to interpret what mental age 6.9 means. We cannot programme for a person who "scores" 8.2 on the language section of the CTBS, the ITBS or the FUTZ. On the other hand, directly quantified performance of specific topics, monitored over time aids everyone's understanding. We require clear awareness of relationships between events and performance. We've got it, let's use it.

If your head spinning? My suggestion is that you personalize these points. Play with the ideas a bit. If you don't need to dwell on the testing side, skip those points. Concentrate on "how do we improve our monitoring?" That is the question.

Afterword

About 20 years ago, Og Lindsley presented ideas about the deficits of standardized testing (maybe in a course, perhaps at a local or national conference, maybe in a marathon rap session in some North American hotel room). He pointed out that we were in the process of standardizing the information format and flow relating to people and that we would gain significantly from our implementation of frequency monitoring along with Standard Celeration Charts. On the other hand, traditional testing worked strenuously to structure procedures—instructions, page format, administration minutiae as well as attempting to determine appropriate content, even sequences. Overconcern, and testing biases applied to inappropriate areas of classroom and research efforts contributes to weakening our people.

We regularly see performance levels seldom observed or recorded before our efforts. Our expectations are challenging. We support the behavers thoroughly, while delighting in their gains. We are humble in the realization of the magnitude of the task and of the potential gains to individuals and our communities associated with maximizing personal development.

Thank you for your attention. My next piece will explore the topic of data sensitivity. The
old terminology was Validity and Reliability, we are adding a crucial factor to our data concerns: Sensitivity.

RESOURCES


Acknowledgements

Thank you for support and encouragement: Elizabeth Haughton, Claudette McGuire (graphics) and Diane Brownson (word processing).

AIMSTAR is an Apple II+ or e) program for Precision Teachers. This column is a preliminary review of AIMSTAR. As far as we know, this is the first commercially available program for Precision Teachers. AIMSTAR is designed "... for the classroom teacher who collects performance data on her students but lacks the necessary time or support to carry out more formalized management procedures (e.g. graphing, plotting progress lines, or invoking decision rules)."

INSTALLATION. Insert the AIMSTAR disk into drive 1 and turn on your Apple. The program loads automatically. You supply the date and the number of disk drives you are using and the main menu is presented. Insert an initialized disk in drive 2 to store student data files. That's all there is to getting started. Unfortunately, there is no mention of how to make a backup copy of the master program disk. None of the copy programs available worked to make a backup. There is also no mention of how to replace a defective or lost disk.

PERFORMANCE. Eight menus control program functions: main menu, enter/edit student names, enter/edit student files, enter/edit data, chart data, execute decision rules, record strategy changes, and print reports. The menu system works well. Setting up a student file and entering data is straightforward. You are always given a chance to edit the data you just entered before it is saved. Starting a student file involves using the main menu and the first three menus listed on the main panel. First, enter the student's name and a three-digit identifier. Next, enter a description of the student's program—name it, classify as active or inactive (no longer inputting data), data type, frequency, duration, latency, percent), set the aim date, and the aim frequency. Then the option is presented to record what is called a textual description of the program. You may bypass this or use a mini word processor to write a brief description of: antecedent events, correct movement, incorrect movement, and consequence of correct and incorrect movements. Inputting chores are completed by moving to the next menu and entering the data for the student's program. A screen is provided for each data day. You record the date, number correct and incorrect, and number of minutes and seconds in the counting period. This screen also shows the number of the teaching strategy in effect.

Now you are ready to use AIMSTAR's four
functions: charting (a variety of chart types and options are available); applying decision rules (White-Liberty rules are used); recording changes in the instructional program and printing reports (program description, print data file, print results of decision rules). The charting utility works well. You may select a standard 6 cycle chart or various expanded versions of the same. Charts follow most charting conventions and include correct and error frequencies, change lines, a minimum celeration line and optional extras—a horizontal line at the aim rate, most recent 6 day celeration lines (no values given), and a pointer. The charting facility may be of particular value to trainers for teaching and immediately illustrating various charting and performance analysis procedures and options. We have not been able to get the decision rule utility to work. Whenever used it puts up a System Error #16 message and "hangs" the program, despite a message on screen that says, "Press Any Key to Continue." All of the other functions seem to work as described.

EASE OF USE. AIMSTAR is easy to use. The menus make available choices clear. It's easy to get from one menu to another. Many screens have default settings, conveniently used by pressing the enter key. The space bar is used to toggle choices on several of the data input screens. Key functions are generally intuitive or in keeping with standard Apple usage. Experienced Apple users will find AIMSTAR easy.

ERROR HANDLING. Most screens provide opportunities to revise newly entered data before it's saved. As noted above, the program hangs when you get System Error #16 message. It also hangs if you try to use the print functions when your Apple is not attached to a printer. This problem is noted in the manual, however. Most errors are not disastrous, but some are definitely inconvenient. Error recovery still needs some work.

DOCUMENTATION. The program manual comes in a three ring binder. It includes an introduction, an overview, a tutorial (the main section), auxiliary AIMSTAR functions, and three appendices. While the manual enables the new user to run the program and use most of its functions, documentation is not a strong point of AIMSTAR. The manual is 72 Xeroxed pages of dot matrix print. There is a brief table of contents, but no index, no list of commands or diagram of program functions, and no running headers on the pages to make it easy to find a particular chapter or appendix. There are quite a few typos and grammatical errors. The manual does get the basic job done, but it doesn't have many niceties or look professional. It does a good job of depicting AIMSTAR screens crucial to program management. A serious shortcoming of the manual is its failure to mention that no backup copy is provided or possible to make. Also, no mention is made of the policy on replacement copies, their availability or cost.

HOW TO PURCHASE. Order from ASIEP Education Company, 3216 NE 27th, Portland, Oregon 97212. The list price is $195. This includes the program diskette, a tutorial diskette, and the manual. The tutorial diskette was not included in my kit. An attachment said it would be along in a couple of weeks. The program authors are Ted Hasselbring and Carol Hamlett of Peabody College.

SUMMARY. AIMSTAR is not a polished program yet. The decision rules are not easy to make work, error recovery is not fully developed and the documentation is not quite professional in form or function. There are also a few program features that would seem to be easy to include that are not present. For instance, minimum celeration lines for errors, data values for most-recent celeration lines and the option of selecting how many days the most-recent celeration line calculation includes. The package is not up to what the public expects of commercial programs in this price range today. However, I still think AIMSTAR will be useful to me and believe a lot of other Precision Teachers will think so too. Whether classroom teachers will find it functional is an open question, but it may be especially useful to Precision Teaching trainers, workshop providers, and researchers. It should help all of us apply and learn decision rules. We encourage the AIMSTAR authors and publisher to continue to refine this promising program.

LETTER TO THE EDITOR

Dear Patrick,

I read with some interest your prompt to send along references to Precision Teaching in other publications. Here's why!

... (I recently became aware of) a 1982 article in the American Journal of Occupational Therapy by Kenneth Ottenbacher that (supposedly) introduced the celeration line to occupational therapy (Ottenbacher, Kenneth. [1982] Patterns of postrotary nystagmus in three learning-disabled children. American Journal of Occupational Therapy, 36, 657-663.)

I checked out the article ... Ottenbacher references Owen White's split-middle paper (White, O. R. [1974] The split middle: a "quickie" method of trend estimation. Experimental Education Unit, Child Development and Mental Retardation Center, University of
Washington.) and uses the "quickie" method to draw (straight-line) slopes (he calls them celerations) through his data. On closer inspection, though, the ordinates of his graphs are equal interval scales—plus I progressions of postrotary nystagmus. This is especially interesting since he projects the baseline data with these add-subtract straight lines. It is consistent then that Ottenbacher report his slopes with (plus and) minus signs.

More interestingly, though, is Ottenbacher's data recharted on the Standard Celeration Chart (see Chart 1). As you would guess, the characteristic add-subtract variability is gone. . . . the correctly recharted data graphically display the patterns of change in the duration of post rotary nystagmus in a far more dramatic (and useful) way. Check out how closely those frequencies hug the celeration line. So little bounce in a duration measure has rarely been seen in my experience.

... 

Sincerely,

Jim Pollard
Merrimack Education Center
101 Mill Road
Chelmsford, MA 01824

Thanks go to Jim Pollard for sharing this letter and recharted data. It is clear that Ottenbacher did not understand that celeration lines cannot be drawn on an equal interval (add-subtract) chart and that celeration is a specific measure that summarizes seven or more frequencies displayed only on the Standard Celeration Chart.

If you have similar information to share or you just want to express your feelings about something, why not send a letter to the editor!

Values of the slopes (incorrectly called celerations) reported by Ottenbacher:

Subject 1: Baseline \( \times 1 \) / 1.4
Subject 2: Baseline \( \times 1 \) / 1.4
Subject 3: Baseline \( \times 1 \) / 1.2

+1.21 +1.57 +1.00 -1.02 +1.00 -1.08

Weekly mean durations of postrotary nystagmus
Utah State University
Department of Special Education
Training Program
To Prepare Professionals To Work With
Persons With Severe Handicaps

Emphasis On:
- Functional Skill Training for Severely Handicapped for School, Community Life and Work.
- Applied Behavioral Analysis
- Systematic Instruction
- Vocational Training

Experience With:
- A Variety of Handicapping Conditions (Autism, Multi-handicapped, Mental Retardation, Deaf-Blind)
- Persons from Preschool to Adult
- Precision Teaching

Bachelor's Degree
- Over 1,000 hrs Supervised Direct Experience with Handicapped Persons
- Year Long Internship
- School Age through Adult (Vocational) Program

Master's Degree
- M.Ed., M.S.
- Full time and Summer Programs
- Supervisory Training
- Graduate Assistantships Available

Doctoral Degree
- Ph.D., Ed.D.
- Research
- Program Development
- Grant Experience
- Graduate Assistantships Available
- University Teaching Experience
- Administrative Certification

For Further Information:
Contact: Dr. Richard Young
Director, SH Programs
Department of Special Education
UMC 65 Utah State University
Logan, Utah 84322
Phone: (801) 750-3246
ORDER FORM

<table>
<thead>
<tr>
<th>Price</th>
<th>Quantity</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Teaching and Learning in Plain English (2nd. edition)**
by Patrick McGreevy, Ph.D.

$18.95

A comprehensive, plain English introduction to Precision Teaching

If purchased in lots of 10 or more

17.05

Postage and handling ($1.50 per copy for the first five copies and .50 per copy for each additional copy)

**Journal of Precision Teaching**

The multi-disciplinary journal of standard behavior measurement

Volumes I-III ($16.00 per volume for libraries, 12.00 per volume for agencies and individuals, and 8.00 per volume for full time students; this includes postage and handling)


Volume II (April, 1981- January, 1982)

Volume III (April, 1982- January, 1983)

Volumes IV, V and VI ($20.00 per volume for libraries, 16.00 per volume for individuals and agencies, and 12.00 per volume for full time students; this includes postage and handling)

Volume IV (April, 1983- January, 1984)

Volume V (April, 1984- January, 1985)

Volume VI (April, 1985- January, 1986)

**Abacus Bead Counters**

$4.00

These counters have a counting capacity of 99 on each of two strands

If Missouri resident, add 5.7% Sales Tax

TOTAL (please enclose check or purchase order)
Dedicated to Mrs. Irene McGreevy, a very special person, and to the children, who, by sharing their Charts, taught us what we know.