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Employing Error Drill and Feedback to Improve the Legibility of Manuscript and Cursive Handwriting

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The effects of an error drill and feedback procedure for improving the legibility of both manuscript and cursive handwriting were evaluated with a 14 year old, ninth grade male. The criteria provided for judgment of readability/legibility were based on size and formation of each upper and lower case letter for manuscript writing samples, and size, slants, and letter formation of lower and upper case letters for the cursive handwriting samples. Precision Teaching techniques were used to count, record, chart, and make instructional decisions about the legibility of the student's handwriting. Results showed an increase in the frequency of correct individual letters written and a dramatic decrease in the learning opportunities (i.e., incorrect size, slants, and letter formation) for both manuscript and cursive handwriting samples. Important instructional implications of adopting measurably superior data-based procedures for improving the legibility of manuscript and cursive handwriting are discussed.

Language is indeed our most distinctive feature as human beings (Vander Zanden, 1987). "Written language," Vander Zanden stated, "is secondary and developed in imitation of the spoken word." At all levels the ability to convey thought through language enables us to communicate. Business people, teachers of all levels, and the general public realize that increased handwriting illegibility causes communication problems (Manning, 1986). "During the past several decades," Manning asserts, "teachers have neglected to teach proper handwriting techniques."

Handwriting is a communication skill in literacy (Hansen, 1978; Sweeney, Salva, Cooper, & Talbert-Johnson, 1992, in press). Teachers have lowered handwriting standards either because of lack of knowledge, improper instructional techniques, or the attitude that this instruction should only take place in the lower grades (Manning, 1986). The dominant concern in the handwriting area has been focused on the elementary level (Peck, Askov, & Fairchild, 1980; Manning, 1986; Sweeney et al., 1992, in press). Little teaching of handwriting traditionally occurs at the middle and secondary levels (Manning, 1986).

The major objective in handwriting instruction is legibility (Hansen, 1978; McLaughlin, 1980; Mercer & Mercer, 1989; Talbert-Johnson, Salva, Sweeney, & Cooper, 1991). Various procedures have been implemented to improve the legibility of handwriting and have ranged from complex token reinforcement programs (McLaughlin, 1980) to academic positive practice and response cost (McLaughlin, Mabee, Byram, & Reiter, 1987).

The purpose of this research was to evaluate the effects of remediation, error drill and feedback on handwriting. The investigation focused on both manuscript and cursive writing with a secondary student. The primary setting for the intervention was in the home.

Method

Student and Setting

The student, Paul, was a 14 year old male, enrolled in the ninth grade. He attended a small rural junior high, and earned above average grades at the time of the research. The student expressed a desire to improve the legibility of his handwriting. The parent and teachers also felt that the student's handwriting was illegible

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and therefore difficult to read. This was a concern because this could interfere with the student's academic success in the classroom.

Data collection took place in the home between 7:00 p.m. and 9:00 p.m. Instruction occurred in a quiet area of the home, at a full size desk.

Collection of Writing Samples and Development of Probe Sheets

A sample of manuscript and cursive handwriting was produced by the student and collected by the first author. The student viewed the correct formation of individual letters from the sample of his school work, and these were then placed on a probe sheet (i. e., see to write letters in isolation). The student's school work also provided letters that were placed on probe sheets for remediation. Similar probe sheets were used for cursive handwriting samples. The frequency of letters placed on the probe sheets ranged from 100 to 135.

Rating and Grading

The criteria provided for judgment of readability/legibility involved size and formation of each upper and lower case letter for manuscript writing samples (Hansen, 1978; McLaughlin et al., 1986). Samples for manuscript writing came from home generated samples, as well as having the student fill out job applications. Size and formation (two movements) defined legibility. For cursive handwriting, the criteria involved size, slants, and formation (three movements per letter) for both upper and lower case letters.

The student and first author used a transparency with the correct model to judge the legibility for both individual manuscript and cursive letters. The first author explained [to the student] the criteria for corrects in manuscript with respect to size and formation. The criteria used for cursive letters for corrects and incorrects involved size, slants, and formation.

Experimental Design and Conditions

An AB single subject replication design (Kazdin, 1980) was employed to assess the effectiveness of the error drill and feedback procedure.

Baseline. Letters to practice and target for remediation came from random school generated work samples. This procedure generated a sample of 75 small and capital cursive letters and 150 small and capital cursive letters. Many of the targeted and repeated isolated letters occurred on the probe sheets. The student was timed for one-minute to determine the frequency of corrects and learning opportunities (i.e., error rate). The student received no feedback or instruction. Baseline data collection lasted for 3 sessions.

Error drill + feedback. The student was given a prepared sample of manuscript to serve as a model for both upper and lower case letters. The student would then write two pages of manuscript in a non-timed manner. The student then completed a one-minute self-timed writing sample of both upper and lower case letters. Legibility was assessed by the first author with respect to size, slants, and formation.

The procedure used for cursive handwriting was similar. Models of upper and lower case letters provided a visual sample for upper and lower case cursive letters. The student would practice the model, producing two pages of cursive letter writings. Then the student would take part in a one-minute timed probe sheet. The instructional aim for writing cursive letters was 125 movement per minute, while the instructional aim for writing manuscript letters was 75 movements per minute. The student would then produce two pages of practice letters in both cursive and manuscript, after which the researcher and the student would discuss error types and the corrective measures needed to remediate. Finally, the student would complete a one-minute time trial for the session. The first author conducted an assessment of legibility that evaluated size, slants, and letter formation. Error drill and feedback lasted for 15 sessions.

Reliability of Measurement

Reliability of measurement took place and reflected the frequency of letters produced. If the two observers scored the letters in the same manner, an agreement was noted. Any deviations reflected a disagreement. Agreement between the two observers for manuscript ranged from 85 and 95% (M = 90%). For cursive writing the two observers agree

between 87 to 97% with an overall mean of 93%.

Results

The data from Charts 1 and 2 indicate improvement in the legibility of manuscript and cursive handwriting with the use of an error drill and feedback program. The frequency of correct responses related to size, slants, and individual letter formation increased for both manuscript and cursive handwriting samples, while the frequency of learning opportunities (i.e., errors) dramatically decreased during the error drill and feedback conditions. During baseline, the median frequency of correctly written individual letters for the manuscript handwriting sample was 51 per minute, with scores ranging from 40 to 60, while the median of correctly written individual letters for the cursive handwriting sample was 60 per minute, with scores ranging from 40 to 70. The median of learning opportunities for individual letters of manuscript handwriting was 30 per minute, with scores ranging from 28 to 32, while the median learning opportunities for individual letters of cursive handwriting was 90, with scores ranging from 80 to 110. This was compared with the error drill and feedback conditions resulting in median scores for correct frequencies of individual letters written per minute of 73 and 124, with ranges from 51 to 80 and 90 to 235 for manuscript and cursive handwriting samples respectively. Further, the learning opportunities dramatically decreased during the error drill and feedback condition, with medians of 9.5 and 20 and ranges of 1 to 30 and 2 to 80 for manuscript and cursive handwriting samples.

Results from Chart 1 and 2 show an accelerating data path from the frequency of correctly written letters and a decelerating trend in learning opportunities during the error drill and feedback conditions for both manuscript and cursive handwriting respectively when compared with baseline trends. Data for the correct letters written for both manuscript and cursive handwriting appear to be accelerating at a x1.25 or x6.0 in baseline. Even though the corrects appeared to be accelerating, the learning opportunities during baseline, remained stable at a x1.00 or decreased very slowly at a ÷1.25. The first author believed that it was important to decrease the learning opportunities at a much greater rate, and therefore the decision was made to implement the error drill and feedback condition.

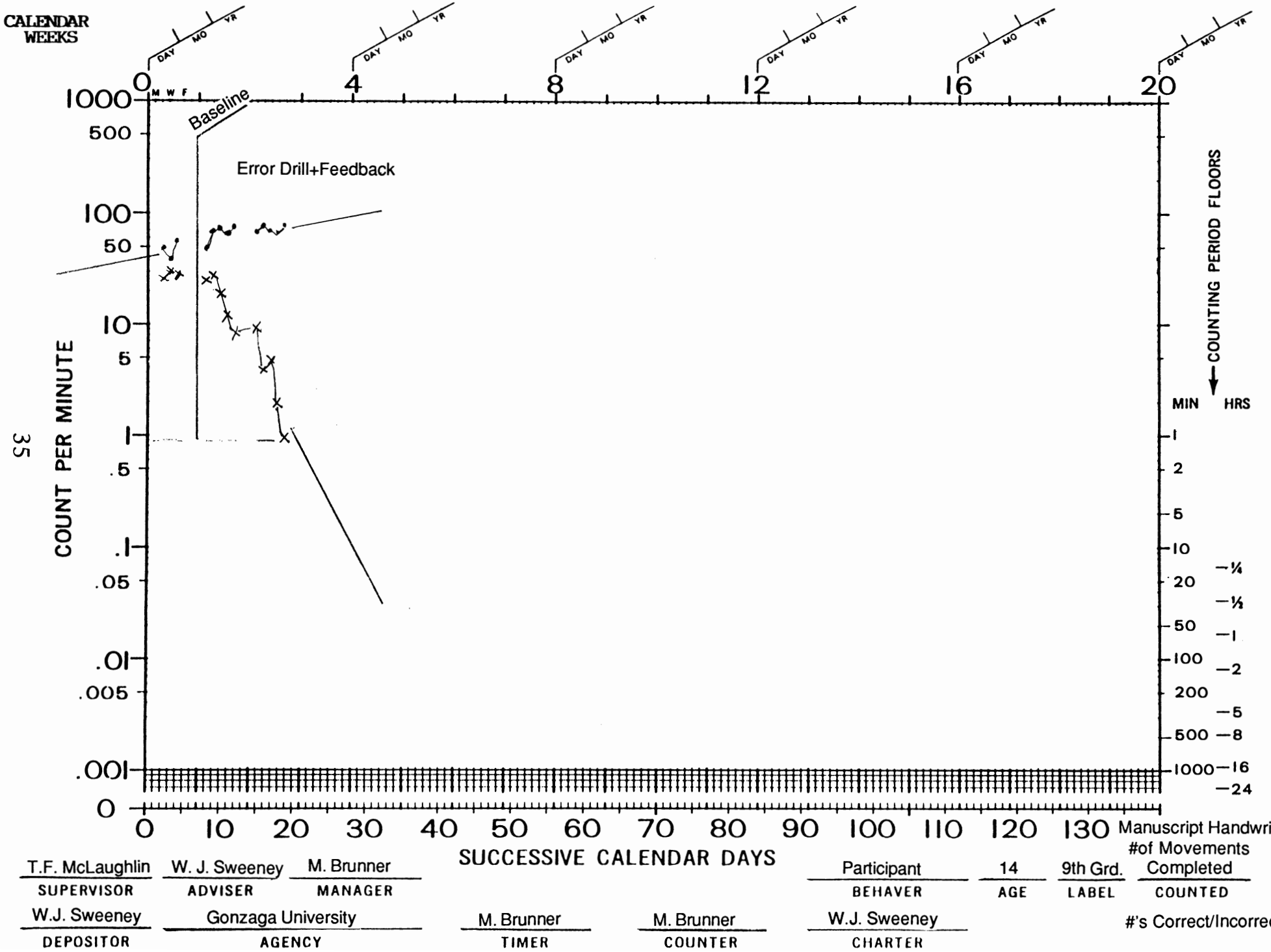
During the error drill and feedback condition, the student's celeration on correct letters written for both manuscript and cursive handwriting accelerated by x1.25 and x2.0, while learning opportunities decelerated by a ÷7.00 and a ÷6.00 respectively. These resulted in a "jaws" learning picture for the manuscript handwriting samples, and a "cross-over jaws" learning picture for the cursive handwriting sample.

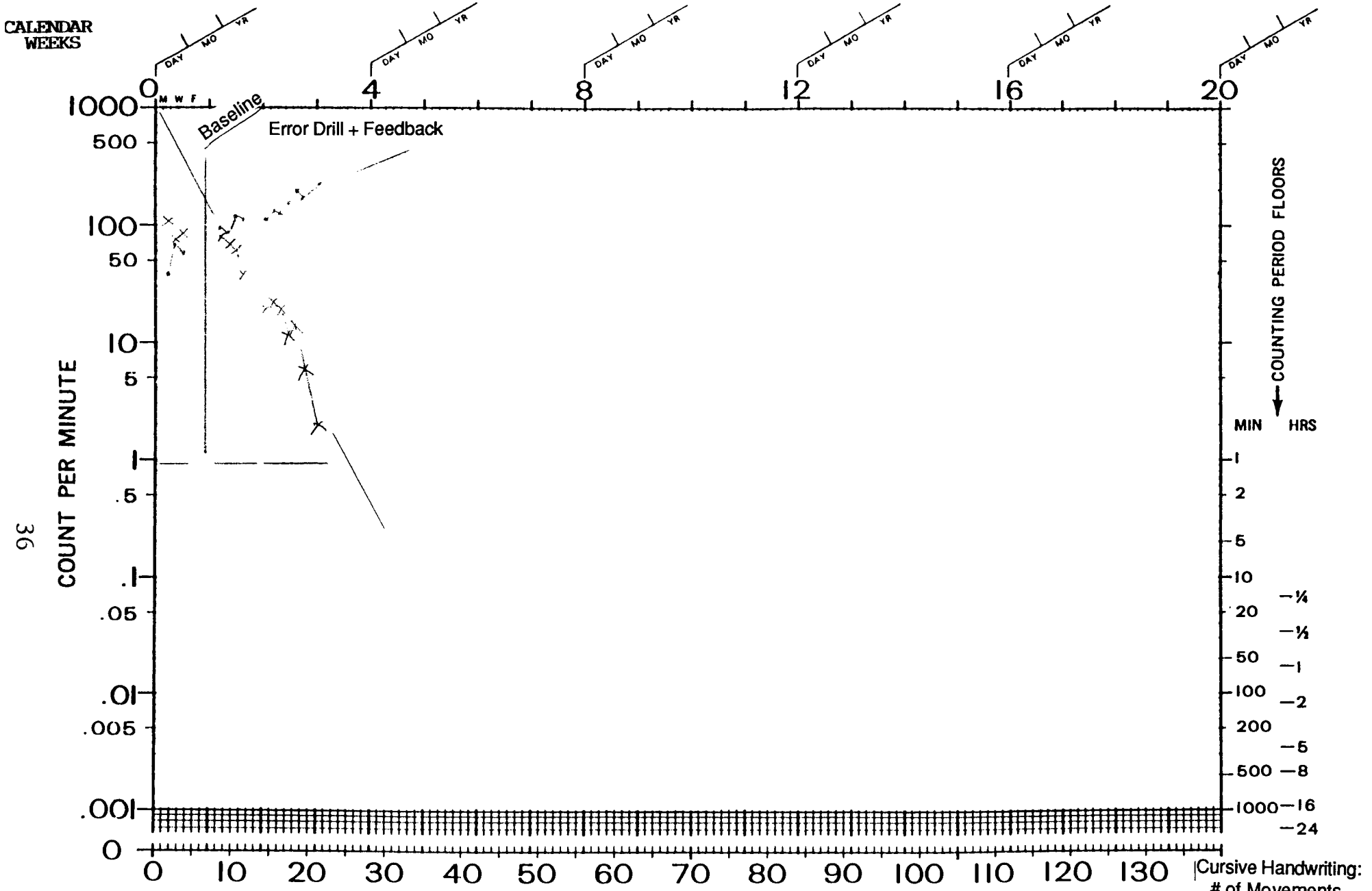
The overall performance change for the frequency of correct letters written during the error drill and feedback condition increased at a x1.7 and learning opportunities decreased by a ÷30.00 on the manuscript sample. This compares to an overall baseline performance change for the frequency of correct letters written of only a x1.5 and performance changes in learning opportunities of x1.0. Similarly, the overall performance change for the frequency of correct letters written during the error drill and feedback condition increased at a x3.0 and learning opportunities decreased by a ÷40.00 on the cursive handwriting sample. This compares to an overall baseline performance change for the frequency of correct letters written of only a x1.7 and performance changes in learning opportunities of ÷1.4.

Discussion

Many factors contribute to the legibility of handwriting--size, slants formation, position of writing implement, posture, environmental setting, topography and instructional strategies (Sweeney et al., 1992, in press; Talbert-Johnson et al., 1991; Hanson, 1976; Manning 1986; Mercer & Mercer, 1989; Peck et al., 1980). The focus of the present study was simply size, slants and formation.

The data from this study indicate that with improvements in the awareness of handwriting problems, as well as with an intervention designed to remediate these deficits, student legibility can be increased. Remediation of


CALENDAR WEEKS
DAY MO YR
0 4 8 12 16 20
M W F
1000
500
100
50
10
5
1
.5
.1
.05
.01
.005
.001
0
Baseline
Error Drill+Feedback
COUNT PER MINUTE
COUNTING PERIOD FLOORS
MIN HRS
1
2
5
10
20
50
100
200
500
1000
¼
½
1
2
5
8
16
24
0 10 20 30 40 50 60 70 80 90 100 110 120 130
SUCCESSIVE CALENDAR DAYS
Manuscript Handwriting: #of Movements Completed
#'s Correct/Incorrect
T.F. McLaughlin
SUPERVISOR
W. J. Sweeney
ADVISER
M. Brunner
MANAGER
Participant
BEHAVER
14
AGE
9th Grd.
LABEL
COUNTED
W.J. Sweeney
DEPOSITOR
Gonzaga University
AGENCY
M. Brunner
TIMER
M. Brunner
COUNTER
W.J. Sweeney
CHARTER


CALENDAR WEEKS
DAY MO YR
0 4 8 12 16 20
M W F
Baseline
Error Drill + Feedback
1000
500
100
50
10
5
1
.5
.1
.05
.01
.005
.001
0
COUNT PER MINUTE
COUNTING PERIOD FLOORS
MIN HRS
1
2
5
10
20
50
100
200
500
1000
¼
½
1
2
5
8
16
24
0 10 20 30 40 50 60 70 80 90 100 110 120 130
SUCCESSIVE CALENDAR DAYS
Cursive Handwriting: # of Movements Completed
#'s Correct/Incorrect
T. F. McLaughlin
SUPERVISOR
W. J. Sweeney
ADVISER
Mary Brunner
MANAGER
Participant
BEHAVER
14
AGE
9th Grade
LABEL
COUNTED
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DEPOSITOR
Gonzaga University
AGENCY
Mary Brunner
TIMER
Mary Brunner
COUNTER
W. J. Sweeney
CHARTER

handwriting difficulties with secondary students has been shown to be an effective means to improve the legibility of handwriting (Manning, 1986; Peck et al., 1980; Sweeney et al., 1992, in press; Talbert-Johnson et al., 1991; Mercer & Mercer, 1989).

Overall improvements in handwriting legibility appeared to generalize to the classroom setting. However, the student's cursive handwriting still showed some difficulty with legibility. The major difficulties still experienced by the student dealt with slants and the speed with which the student wrote in school. These problems appear to be problems of fluency, and future research could address them. Other research has shown that as fluency increases, so does legibility (McLaughlin, 1980; Sweeney et al., 1992, in press). Using actual data from the student's daily work at school would provide a more powerful demonstration of the effects of the intervention. Due to time constraints this was not possible.

In an age of technical and mechanical communication, handwriting has seemingly become almost an archaic tool (Peck et al., 1980). Although mechanical means of communication has developed rapidly, handwriting remains an individual expression (Peck et al., 1980). Written expression is one way we are perceived by the world around us (McLaughlin et al., 1986). Be it a job application or personal communication, legibility in handwriting can affect others' perceptions of us (Manning, 1986). Encouragement of legibility and remediation of student handwriting is an appropriate focus for all teachers and is a functional skill which generalizes to all areas of a student's life (Hansen, 1978; McLaughlin, 1980; McLaughlin et al., 1986; Manning, 1986).

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