The Problem: Changing teacher behavior to deliver attention to students can be difficult and time consuming for both the therapist and teacher. A more efficient approach to obtaining improvement on permanent product academic measures may be to reinforce students for soliciting teacher attention for their good work.

Procedures: Students were delivered a tangible item contingent upon soliciting their teacher's praise for work on reading skills assignments. The number of solicitations for praise was recorded in both reading and math periods. A percent correct score was obtained for each reading assignment and compared to the scores of a reference group.

Findings: The children solicited their teacher's praise for reading and math assignments. Three of the four subject children improved on reading assignments as compared to the reference group.

Conclusions: It is possible to use a tangible reinforcer to introduce students to natural contingencies that will subsequently maintain soliciting behaviors.

Recommendations: This study has lent support to the hypothesis that solicited teacher attention can serve as a reinforcer, but further investigations are necessary to conclusively establish the effects on permanent product academic measures.
THE EFFECTS OF SOLICITED ATTENTION
ON PERMANENT PRODUCT ACADEMIC MEASURES

A Thesis
Presented to
The School of Graduate Studies
Drake University

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts

by
Clinton P. Sturdevant
August, 1978
THE EFFECTS OF SOLICITED ATTENTION
ON PERMANENT PRODUCT ACADEMIC MEASURES

by

Clinton P. Sturdevant

Approved by Committee:

Margaret E. Lloyd
Chairperson

Stuart C. Redman

Dean of the School of Graduate Studies

437680
**TABLE OF CONTENTS**

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION AND REVIEW OF THE LITERATURE</td>
<td>1</td>
</tr>
<tr>
<td>METHODS</td>
<td>4</td>
</tr>
<tr>
<td>RESULTS</td>
<td>10</td>
</tr>
<tr>
<td>DISCUSSION</td>
<td>21</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>24</td>
</tr>
</tbody>
</table>
LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Median difference scores for the last 11 days of baseline (trained and instructed solicitation for Angie) and the last seven days of trained, instructed and programmed solicitation.</td>
<td>17</td>
</tr>
</tbody>
</table>

LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Solicitation of attention to correct reading items as a result of baseline, trained solicitation (TS), trained and instructed solicitation (TIS), and trained, instructed and programmed solicitation (TIPS).</td>
<td>12</td>
</tr>
<tr>
<td>2. Solicitation of attention to correct math items as a result of baseline, trained solicitation (TS), trained and instructed solicitation (TIS), and trained, instructed and programmed solicitation (TIPS) of attention to correct reading items.</td>
<td>14</td>
</tr>
<tr>
<td>3. The difference between percent correct for subject children and reference children as a result of baseline, trained solicitation (TS), trained and instructed solicitation (TIS), and trained, instructed and programmed solicitation (TIPS). The shaded portion indicates minimum possible difference.</td>
<td>16</td>
</tr>
<tr>
<td>4. A comparison of the total number of episodes of teacher attention received by subject and reference children during the last ten reading assignment periods.</td>
<td>19</td>
</tr>
</tbody>
</table>
Chapter I

INTRODUCTION

Teacher attention has been shown to serve as a reinforcer for a variety of classroom behaviors (Broden, Bruce, Mitchell, Carter & Hall, 1970; Schutte & Hopkins, 1970; Hasazi & Hasazi, 1972; Pinkston, Reese, LeBlanc, & Baier, 1973). Several procedures for increasing teacher attention or praise for appropriate classroom behavior have been investigated (Cooper, Thomson, & Baer, 1970; Van Houten & Sullivan, 1975; Horton, 1975). Instructions and feedback plus instructions seem ineffective in increasing teacher praise. Feedback plus social praise has been found effective in increasing rates of teacher praise to students, but a collateral increase in children's instruction following or academic performance has not always been documented (Cossairt, Hall, & Hopkins, 1973).

The procedures employed above involve substantial behavior changes on the part of the teacher. To minimize this the student might be trained to solicit teacher attention for appropriate academic behavior. Usually teachers already respond to such cues as a child raising her/his hand. The problem is to teach the child to complete assigned work, evaluate that work, and then to verbally cue the teacher to respond positively to any work so far completed.

When praise and immediate feedback were delivered by the experimenter to seventh grade students who approached the experimenter and indicated that a set number of multiplication problems had been worked,
two dependent measures, the number of correct answers per minute and percent attending behavior, showed improvement, although neither was directly consequated (Kirby & Shields, 1972). In another study, children were reinforced for soliciting a trainer for positive evaluations concerning their work (Stokes, Fowler, & Baer, 1978). Generalization programming consisted of instructing the children to do the same with their teachers. If the children cued the teachers for attention to their work and reported they had done so later during post-session periods, they earned a small toy. The rationale for this approach was that a chain of behaviors was established. Doing good work was followed by self-evaluation of the work. If the work was of sufficient quality, the self-evaluation was followed by cueing the teacher to evaluate the work and the teacher then backed the chain with praise. The authors report that approximately 90% of all cues were followed by teacher praise during the generalization sessions. Although the rates of soliciting teacher praise and the percentage of items worked correctly increased for all subjects, two of the four subjects attempted considerably fewer items. A measure of subject performance relative to the performance of non-subject children doing the same tasks was not presented. The study shows that preschool children can be reinforced for soliciting attention and suggests this may lead to improved academic performance.

If this procedure does improve academic performance, it has several advantages. It keeps the child, who is doing poorly, in the regular classroom. This is consistent with recent legal trends which suggest that if a student is placed in a special group within the school, the goal of this special attention must be the ultimate return of the student to the regular classroom (Martin, 1975). Also, it is a
relatively cost effective procedure in terms of teacher time and is potentially more beneficial to the child to change his own soliciting behavior than to have the teacher change his own praise giving behavior. Finally, children who learn the procedure in one setting may be able to use it in other settings.

The purposes of the current study are to replicate those studies in which students were praised contingent on soliciting attention for their work, measuring academic improvements in relation to a reference group's performance, and to demonstrate maintenance of behavior in the mainstream environment.
Chapter II

METHOD

Students and Setting

Subjects for this study were selected from a second grade class at an elementary school in a small town in Iowa. The percent of correct items on all reading and math assignments was computed for each child for several days. The four students who consistently scored lowest on daily assignments were selected as subjects and parental consent for inclusion was then obtained. Students who had been labeled as having developmental problems were not considered as potential subjects. In addition, three students were selected as a reference group against which the subject children's performance could be compared. In order to control for a ceiling effect and to control for possible improvement over time within the reference group, the four highest scoring students in the class were not considered as potential reference group students.

The teacher had not had formal behavioral training but was aware of the basic principles. A thorough explanation of the project was provided before the study was begun.

The classroom was large and colorful with posters and student projects attached to the walls. Students were not required to remain seated unless an assignment was being explained.

Soliciting Behaviors

Solicited attention was defined as any episode of subject-teacher interaction which was initiated by the subject. Episodes of solicited
attention were classified into one of four categories, attention to correct items, to incorrect items, to both correct and incorrect items, and to non-academic performance. At the end of each episode the time to the nearest minute was recorded. Episodes were recorded during the period after the teacher announced a math or reading assignment until each subject turned in his or her assignment. Unsolicited attention was defined as any episode of subject-teacher interaction which was initiated by the teacher. Episodes of unsolicited attention were classified into the same four categories and recorded in the same manner.

An example of solicitation of attention to correct items is as follows: The child approaches the teacher and says, "See how well I've done?" with the teacher responding, "You've got all of these problems correct! Keep up the good work." Solicitation of attention to correct items would be recorded in this instance since the teacher attended to the correct items even if the child had initiated the episode by saying "I'm not doing too well, am I?" Asking for further instructions on an assignment or asking how to spell a word were recorded as solicitation of attention to non-academic performance as were asking to be allowed to leave the classroom or sharpen a pencil.

The frequency of solicited and unsolicited attention to correct, incorrect, and correct and incorrect items was recorded during reading and math periods for all subjects. Attention to non-academic performance was recorded during the later part of the study only and was recorded both for subjects and members of the reference group.

**Permanent product academic measures.** The percent of correct items on each reading and math assignment was calculated for all subjects and members of the reference group using the following formula:
The mean of the scores for the three reference students for each assignment was calculated and each subject's score subtracted from this mean. The resulting difference score had a potential range of from +100% to -100% with zero difference indicating equivalent performance of the subject and the reference group. The difference score was used instead of the percent correct in order to control for fluctuation due to assignment difficulty, length of working time, and improvements that would have occurred over time in the absence of treatment. This measure is conceptually similar to an analysis of variance with correlated measures.

**Conditions**

**Baseline.** During baseline conditions, the observer entered the classroom before the morning assignment was given. Since the classroom structure was casual (the students were free to talk and move about), the observer was able to interact with any of the students regarding any topic except his purpose for being in the classroom. The observer moved about the room as needed to collect soliciting data. No instructions were given any subject, reference student, or to the teacher. Permanent product data were collected during the noontime recess each day.

**Trained solicitation.** During this condition subjects met with the trainer in a small room adjoining the cafeteria for approximately 20 minutes each afternoon. The subjects were given a worksheet of simple
reading skills problems and instructed to work on the problems until about half of the problems were completed. At that time they were to raise their hands to gain the trainer's attention, or if they were unable to get the trainer's attention, they were to approach the trainer and show her their work. They were further instructed on several means of directing the trainer's positive attention to the problems completed. For example, they were instructed to point to their work and say, "I think I have these right." or "Look how many I have done." The trainer then corrected the problems, praised the child for any correctly worked items, and suggested that the child complete his work and show it to the trainer again. Incorrect items were ignored. Subjects were given a small toy or a piece of sugar-free gum at the end of each training session if they had worked on all items for that day and had solicited praise for their work from the trainer.

Beginning the first day of trained solicitation, the teacher was instructed to look at the subject's work, if requested, and to make positive comments only about those items that were correctly worked. If the child requested feedback for an incorrect item, the teacher was instructed to direct as little attention to it as possible, or to point to a similar correct problem and tell the child both problems were to be done similarly. She was also told to have the child return to his/her seat with as little interaction as possible if the work did not meet her expectations.

Trained and instructed solicitation. This condition was identical to trained solicitation except that subjects were instructed to solicit praise from the teacher for their good work on the morning
reading assignment and the training setting was moved to a desk in the school library where there were fewer distractions.

**Trained, instructed and programmed solicitation.** This condition was identical to the previous condition except that to receive the toy or gum, the subjects were required to solicit and receive attention both from the trainer during the training sessions and twice from the teacher in class for their work on the morning reading assignment. Several exceptions were made when a subject first entered a treatment phase and are noted in the results section.

One subject, Tommy, was given tags with suggested solicitations printed on them. He was to hand the tag to the teacher instead of vocally soliciting attention for good work. The teacher was instructed to respond to the tags just as if Tommy had emitted the solicitation vocally.

**Reliability**

Reliability was assessed for solicitation of attention to correct reading and math items at least once during each condition across subject children. Reliability of solicitation to correct reading and math items was assessed using the following formula:

\[
\frac{\text{number of agreements of occurrences} \times 100}{\text{number of agreements plus disagreements of occurrences}}
\]

An agreement was defined as the recording of an episode with a discrepancy in time between observers of no greater than 60 seconds. Data for one reliability session were recorded for all episodes of attention to academic and non-academic behaviors across subject and reference children,
excluding solicitation of attention to correct reading and math items for subject children, during reading and math periods using the same formula and definition as above.
Mean reliability for solicitation to correct reading and math items across conditions and subject children was 88% with a range of zero to 100%. The data are based upon nine reliability sessions, seven of which resulted in reliability figures of 100%. One session resulted in a reliability score of 0%. For this session, the regular observer recorded only one instance of the behavior with the reliability observer recording zero instances. Reliability data for one session was recorded for all episodes of attention to academic and non-academic behaviors excluding attention to correct reading and math items for subject children during reading and math assignments. This one session resulted in a figure of 79% reliability between observers. There was a total of 42 independent observations used in calculating this datum.

Solicited attention to correct reading items. Figure one shows that with the exception of Tommy, all subjects solicited attention to correct reading items infrequently during baseline conditions. The frequency of soliciting attention remained stable for Angie during trained solicitation and trained and instructed solicitation; however, with the onset of trained, instructed, and programmed solicitation, all four children increased their frequencies of solicitation to correct items.

Angie solicited attention from the teacher to correct items twice during 32 days of baseline, trained solicitation and trained and instructed solicitation. During 32 days of trained, instructed and
programmed solicitation, there were 32 solicitations. Using the following formula:

\[
\frac{\text{# of solicitations during treatment}}{\text{# of days of treatment}} \times \frac{\text{# of solicitations during baseline}}{\text{# of days of baseline}} \times 100
\]

an increase of 94% in the frequency of solicitations to correct reading items was obtained.

During 32 days of baseline, Tommy emitted 16 instances of solicitation which resulted in attention to correct reading items. During the 34 days of trained, instructed and programmed solicitation (20 with tag and 14 without), Tommy solicited a total of 27 times. These figures represent a 29% increase in the frequency of soliciting attention to correct reading items.

Bonnie was in baseline conditions for 48 days. During that period, she solicited attention to correct reading items only three times as opposed to 15 times during 16 days of trained, instructed and programmed solicitation. This is an increase in frequency of 88%.

Alan had 30 days of baseline observations. During baseline, Alan solicited five times; equal to the number of solicitations during the following seven days of trained, instructed and programmed solicitation. There was a 54% increase in Alan's frequency of soliciting attention to correct reading items.
Figure 1. Solicitation of attention to correct reading items as a result of baseline, trained solicitation (TS), trained and instructed solicitation (TIS), and trained, instructed and programmed solicitation (TIPS).
During trained, instructed, and programmed solicitation, 89% of all attempted solicitations were followed by teacher attention.

Solicitation of attention to correct math items. The children were instructed to solicit teacher attention for both reading and math items but received their prize only for solicitations to correct reading items. However, collateral data were collected on the number of solicitations resulting in attention to correct math items. These data are similar to those obtained during reading assignments.
Figure 2. Solicitation of attention to correct math items as a result of baseline, trained solicitation (TS), trained and instructed solicitation (TIS), and trained, instructed and programmed solicitation (TIPS) of attention to correct reading items.
Angie increased her rate of soliciting attention to correct math items during trained, instructed and programmed solicitation by 38% while Tommy's data resulted in an increase of 40% for this condition. Bonnie increased her frequency of soliciting to correct math items during trained, instructed and programmed solicitation by 56%. The data representing Alan's performance during baseline is completely stable with no instances of soliciting for attention to correct math items. During the following five days of trained, instructed and programmed solicitation, Alan solicited attention to correct math items five times, resulting in a 100% increase in the frequency of this behavior.

Permanent product measures. Figure three shows the difference between percent accuracy on each reading assignment for the four subjects and the reference group. A difference score of zero indicates that the subject's percent accuracy on a given assignment was identical to the mean percent accuracy of the reference group. A positive difference score indicates the subject did less well than the reference group. A negative difference score indicates that the subject did better than the reference group.
Figure 3. The difference between percent correct for subject children and reference children as a result of baseline, trained solicitation (TIPS), trained and instructed solicitation (TIS), and trained, instructed and programmed solicitation (TIPS). The shaded portion indicates minimum possible difference.
The shaded portion of the graph is the difference between the mean reference group score and a score of 100%. It would have been impossible for the subjects to achieve scores within the shaded area.

The median difference score for the last 11 days of baseline (trained and instructed solicitation for Angie) and the last 7 days of trained, instructed and programmed solicitation are presented in Table 1. As can be seen in Table 1, the median difference scores between baseline and trained, instructed, and programmed solicitation for three of the four subjects were in the predicted direction. Angie showed the most improvement by reducing her difference score by over 50 percentage points. Tommy improved by 24 percentage points, while Bonnie decreased her difference score by 10 percentage points. Alan's difference score increased by 1 percentage point.

Table 1

Median difference scores for the last 11 days of baseline (trained and instructed solicitation for Angie) and the last seven days of trained, instructed and programmed solicitation.

<table>
<thead>
<tr>
<th>Subject Children</th>
<th>Baseline*</th>
<th>Trained, instructed and programmed solicitation*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angie</td>
<td>52.5</td>
<td>0.0</td>
</tr>
<tr>
<td>Tommy</td>
<td>23.0</td>
<td>-1.0</td>
</tr>
<tr>
<td>Bonnie</td>
<td>34.0</td>
<td>24.0</td>
</tr>
<tr>
<td>Alan</td>
<td>20.0</td>
<td>21.0</td>
</tr>
</tbody>
</table>

*Figures represent the difference between subject children's percent accuracy on reading assignments and the mean percent accuracy for the reference group reading assignment.
Total episodes of attention. Because of the gradual nature of improvement in difference scores for reading assignments, data were collected on all solicited and unsolicited episodes of teacher attention during reading periods. These data are presented in figure four.
Figure 4. A comparison of the total number of episodes of teacher attention received by subject and reference children during the last ten reading assignment periods.
The open circles represent the mean number of episodes of teacher attention for the reference group; the solid horizontal lines encompass the range for that day. The closed circles show the number of episodes of teacher attention to each subject. Tommy was usually within the range of the reference group. Angie was above the range of the reference group six out of nine days. Out of ten days, Bonnie never scored within or below the range of the reference group and often was two or three points above the highest range point. Alan scored the highest of any of the subject children. For three consecutive reading assignments, Alan scored 10 or more episodes of teacher attention for non-academic performance. It is readily apparent from Alan's and Bonnie's data that they received considerably more episodes of teacher attention for non-academic behavior than any of the reference children.

Rates of solicited attention to incorrect items and to both correct and incorrect items remained low throughout the study as did unsolicited attention to correct items, to incorrect items, and to both correct and incorrect items.
Chapter IV

DISCUSSION

The multiple baseline design showed an increase in the frequency of soliciting attention to correct items during reading periods which was consistent with previous studies (Stokes, Fowler, & Baer, 1978; Kirby & Shields, 1972). It is more interesting that subjects also increased the frequency of solicitations during math, when prizes were contingent on solicitations in reading, even though they never received a prize for doing so. Keeping in mind that training and training plus instructions were not sufficient to elevate the number of solicitations in either reading or math prior to trained, instructed and programmed solicitation, it seems likely that teacher attention alone controlled increased soliciting during math assignments. This might suggest that no reversal of behavior would have occurred in reading if prizes had been discontinued. When the observer was away at a convention, the teacher collected data on the number of solicitations to correct reading and math items for two days although the children had been told that no prizes would be delivered during this time. Angie approached the teacher on one of these days and solicited attention for a reading assignment saying, "I don't know why I'm doing this since I don't have to." This anecdote supports the hypothesis that the teacher's attention was a reinforcing stimulus maintaining solicitation. Once the behavior of soliciting attention for acceptable work is instated, it apparently can be maintained by the reinforcers naturally available in the classroom.
Not only did students increase solicitations during trained, instructed, and programmed solicitation, but three student's median academic performance moved in the predicted direction, although slowly. Alan, the one child whose median performance did not move in the predicted direction, was in trained, instructed, and programmed solicitation for only seven days, thus biasing this measure against the predicted outcome. One explanation for the slow improvement is the indirectness of the contingency, i.e. the contingency is on soliciting rather than on percent correct. Another is that these children may already receive a high density of attention for competing behaviors (in comparison to other students doing acceptable work). Three of the four subject children received more attention for incorrect items and non-academic behaviors than children in the reference group. These data suggest if attention for non-academic behaviors during times when children were working on assignments was reduced, the effects of teacher attention on soliciting and on permanent product measures might be facilitated.

One of the most important aspects of this study was developing a way to measure student academic progress which would not be influenced by fluctuations in the difficulty of assignments from day to day, the daily length of time to work on assignments, and improvement over time that would be expected in the absence of treatment. Not only did the subject children in this study improve their academic performance, but they improved relative to other children doing the same tasks.

The intention of this study was to establish a treatment package to improve the performance of students traditionally labelled as under-achievers with a minimum of intrusion on the teacher's and student's time. Other points of consideration were the establishment of reasonable
measures of student academic progress and arranging contingencies so that any improvement could be maintained once the treatment was removed.
REFERENCES


