Programmed Articulation Therapy Administered by Supportive Personnel

Leona B. Smook

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PROGRAMMED ARTICULATION THERAPY
ADMINISTERED BY SUPPORTIVE PERSONNEL

by
Leona B. Smook

A Thesis in Partial Fulfillment
of the Requirements for the Degree
Master of Science in the Field
of Speech Pathology

August 1974
Each person whose signature appears below certifies that this thesis in his opinion is adequate, in scope and quality, as a thesis for the degree Master of Science.

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Janice D. Dunn, Assistant Professor of Speech Pathology

Grover C. Mathewson, Assistant Professor of Education
ACKNOWLEDGMENTS

Sincere appreciation for their help is expressed to the Director of Nursing at the United Church Care Center, Riverside Community Hospital and Knollwood Hospital, and Mr. K. Butler, principal at the La Sierra Elementary School and parents for making subjects available; to the nursing attendants, and children for their participation in the study; to Melvin Cohen, Ph.D., Betty Vine, M.S., and Vern Jones for giving generously of their time and skill in serving as judges; to Brian Jacques, Ph.D., for making available the equipment at the Speech and Hearing Laboratory; Janice Dunn, M.A., for making student clinicians accessible; to Dr. Grover Mathewson for his help in designing the study and his suggestions in analyzing and interpreting the data.

Special appreciation is expressed to Dr. Evelyn Britt for her guidance, encouragement, and friendship throughout all phases of this study.
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CHAPTER I

INTRODUCTION

Statement of the Problem

In recent years speech pathology has been forced to review and redefine its role within the framework of rehabilitation services.

It has been proposed by Marge (1972, pp. 297-298) that the services and training provided by the speech pathologist should meet the following criteria:

"1. Comprehensiveness of services. Every effort should be made to provide the handicapped individual with all the services and training necessary to his specific needs.

2. Continuity of services. From the time the handicapped individual is entered into a program of service and training to the time he is successfully released, he should be provided with a consistently effective program.

3. Co-ordination of services. Related to points one and two, there should be a mechanism for assuring that the individual benefits from the combined
efforts of all pertinent agencies and persons in a given community throughout the period of his program of services and training."

Thus, there is a recognition of the growing need for increased services to the handicapped person. A parallelism has been noted in the growth of the communication disorders population and the need for increased services. According to a report (ASHA, 1969) on manpower needs and manpower utilization there are "20 million persons in this country who have communicative handicaps worthy of concern". It is estimated that 8.5 million Americans have auditory problems which impair communication, 10 million who have speech disorders, and 2.1 million persons who have communicative disorders resulting from neurological impairment.

An increasing awareness and concern on the part of parents, the medical profession and its related services, as well as federal and state agencies, have been responsible for early identification of communication disorders. According to Wood (1964) there has been an increase in the number of children, especially those between the ages of two and five who are being referred to speech pathologists for diagnostic services as the children do not communicate effectively. These potential communication problems become a reality in the public school setting.
Population growth, increased longevity, and early identification of communication problems are all factors which have placed a strain on services. Health and welfare programs created at the federal and state level have until very recently made services of the speech pathologist readily accessible. With spiraling inflation, funds are not as available to such programs as Project Head Start, Job Corp, and Vocational Rehabilitation. Government agencies which are responsible for payment of services have been directed to reduce expenditures and have expressed concern about the frequency and type of sessions provided to its clients. It is not unusual for therapists to be asked to justify the frequency of sessions and if possible to reduce the number of sessions and/or enroll clients in group therapy.

Programs such as Medicare have increased premiums that its members must pay in order to help cover the rising cost of medical and related services. Not only has inflation been responsible for rising costs of services, but it has also reduced the value of the dollar and consequently the buying power of the individual. This situation has made it increasingly more difficult for persons to pay for therapy.

Both government and private agencies have experienced cutbacks in budgets resulting in few positions being created or filled as well as fewer new programs being instituted. Consequently, the manpower shortage that had been recognized as being a serious problem has, at
this time, become a problem of insufficient funding to meet the needs of existing programs. Logical consequence would seem to be the spreading of responsibilities of existing personnel over a wider spectrum. Consequently, the speech pathologist is finding it increasingly difficult to effectively perform and provide services, especially for the more severely handicapped children. Direct therapy cannot and does not meet the needs of the increasing caseload of the speech pathologist. The comprehensiveness and continuity of therapy services are further weakened and hampered when consideration is given to such factors as accessibility to the services provided by the speech pathologist, size and location of physical facilities, funding, training of the staff, and staff size.

In an effort to provide more effective services auxiliary personnel have been utilized to assist in the remediation process. The person most frequently chosen to participate has been the parent. Situations can arise which make the utilization of parents unfeasible. Lack of interest and objectivity of parents as well as institutionalization of children are factors which have forced the therapists to explore other avenues. In many instances therapy aides have been used most satisfactorily in speech therapy programs.

A variety of methods such as observation of therapy sessions, role playing, lectures, reading materials, and demonstrations have
been used to train these personnel. It is, however, often difficult to assess the effectiveness of such methods.

One method of instruction which has proven successful and efficient in other fields is that of programmed instruction. It has been utilized by educators, those in health related professions and private enterprise, to teach needed skills.

**Purpose**

The purpose of this study was to extend the use of programmed instruction into the field of speech pathology to assist in the remediation process of speech articulation problems. The objective was to develop a set of programmed materials to teach the aide a skill and accomplish the same goal as a professionally trained therapist.

An articulation program was selected for several reasons. The program would be imparting specific skills and knowledge for a particular task. Secondly, a high percentage of articulation errors are found in the elementary school population. If this method of instruction were found to be effective and efficient, it would help to control the quality and content of the therapy session. This would act as a safeguard against mismanagement on the part of the aide. If an aide could adequately perform and were able to administer a therapy program, it would free the speech pathologist to deal with more involved communication disorders.
Hypothesis

It is well known that programmed instruction has been successful in imparting technical and complex information in cognitive areas. In the field of motor skills it has been shown (McDaniel, Britt, Piorkowski, 1971) that programmed instruction is a successful and efficient method of teaching a specific motor skill to physical therapy aides. It was felt that this method of instruction also could be utilized in the field of speech pathology to teach an aide how to perform specific skills under clearly defined conditions. It seems a reasonable hypothesis that an aide so trained could perform such specific skills as well as a speech therapist. One aspect of an articulation program was selected for testing the hypothesis—that of evoking the phoneme /θ/ in isolation. The phonetic symbol for /th/ voiceless is /θ/ and will be used to indicate this particular sound throughout the remainder of this study. The testing of this hypothesis would of necessity involve developing and refining a program to teach a specific skill and testing the program to see whether such a hypothesis would be supported.
CHAPTER II

REVIEW OF THE LITERATURE

The use of supportive personnel in the profession of speech pathology has been a controversial topic.

West, Ansberry, and Carr (1957) believe that parents should be given considerable responsibility in the program. The responsibility would include "setting apart a few minutes each day to help the child in his assignments".

Wood (1964, pp. 297-298) views the parent's role as that of an assistant and not a therapist.

Therapy becomes more cohesive if the therapist plans some activity which can be continued at home by the child's parents with the full realization that the child's mother cannot act in the capacity of therapist or teacher for her own child, regardless of how objective she might be.

Lillywhite (1948), on the other hand, is of the opinion that only mothers trained in speech and language rehabilitation or someone else in the immediate family "can provide enough time for adequate rehabilitation, and optimum results would be obtained if the mother is made the therapist."

Other professionals holding the opinion that parents are able to assume the role of therapist when trained are Van Riper and Irwin (1958),
Scott and Milisen (1954), and Montague (1949). They believe that parental assistance is not only helpful in the rehabilitation of children, but if trained, parents are able to perform certain types of therapy.

In a study conducted by Tufts (1959) it was shown that there was no significant difference in results when therapy was administered by parents versus professional speech therapists.

Parents who understand the process and methods of functional articulation therapy can correct the functional articulation errors of moderate severity exhibited by their preschool children to the same degree to which a trained speech therapist is able.

Carrier (1970) found that mothers are able to effectively administer articulation therapy when provided with a clearly defined program of articulation therapy. Prior to parent participation in the therapy program the child was required to imitate the speech sound in isolation.

Descriptions of methods used to train parents either as therapists or assistants are limited and essentially contain little detail.

Sommers, Shilling, Paul, Copetas, Bowster, and McClintock (1959) describe training methods for utilizing parents as adjuncts. While children received therapy, parents attended 30 minute lecture sessions. Topics discussed included "What is a speech problem? How do children develop speech? What materials are needed to help children learn to correct speech problems? What is ear training? What are some placements used? How can a child be stimulated to better speech
production at home without accompanying tension?" The speech therapist met with the parents "for a short time after each session to give specific advice and daily assignments, the latter being written by the therapist".

In another articulation therapy program designed by Carrier (1970) children were required to produce the desired speech sound in isolation before being assigned to their mothers. Mothers were provided with materials and specific instructions concerning the administration of the program. Correct articulation of the sound in words as tested by a battery of articulation tests indicated success.

Commercial articulation therapy programs based on behavior modification principles are now available. The SWRL Speech Articulation Kit (1973) was designed to be used by both the speech therapist and supportive personnel. The speech therapist, however, is responsible for evoking the desired sound in isolation prior to the aide's involvement in the program.

In the past the profession has studiously avoided exploring other avenues of teaching. Marge (1967) calls this another crisis in our profession.

The second crisis we may face is the utilization of modern technology and discoveries of other disciplines by our profession. There appears to be resistance to the utilization of teaching machines, programmed instruction, and the findings of modern linguistics. If we don't take
steps now to revamp what we do, to incorporate greater utilization of the contributions of other disciplines, our profession will be bypassed.

One method of instruction which has received little, if any, recognition in the area of speech pathology is that of programmed instruction. Garret (1969) in a speech made to the manpower conference mentioned that programmed instruction has been used to teach syntax. No other information is available to this author concerning that study. A medline search did not show any published studies that dealt with the use and effectiveness of programmed instruction in speech pathology.

This method of instruction has been found to be highly successful in teaching specific skills in many professions. Of particular interest are skills taught to members of the medical and related professions. McDaniel et al (1971) reviewed several published programmed instructional materials and indicated that this is a highly successful method of improving an individual's performance in the field of medicine.

Podshadley (1965) demonstrated the effectiveness of this method in teaching public health topics to dental and dental hygiene students. A comparison of traditional methods of teaching and programmed instruction showed that (1) 84% of the students thought they learned more with the program than with conventional textbooks; (2) 86% of the students felt they learned more with the program than with lectures; (3) 90% of the students expressed a preference that programmed books be used in the course.
Skiff (1965) in evaluating programmed instruction as a means of teaching diabetics within a pretest situation found that 77% of those who completed the program showed a gain in information.

The dull and bright individual, the old and the young person, and the low level and the advanced reader learned an equal amount from the teaching machine, if given the opportunity. The illiterate, seriously visually handicapped, and infirm were unable to use this device.

Programmed instruction as defined by Shindell (1964) is a method of presenting a specific body of information which contains all of the below mentioned elements.

1. The subject matter is broken down into small discrete pretested steps.

2. The steps are arranged in a carefully organized sequence leading to a specific objective.

3. The sequence is offered in such a way that the student must progress through it and arrive at the objective.

4. Progress through a sequence is at the speed of the individual student.

5. Motivation for progress is given by immediate reward and reinforcement.
CHAPTER III

METHOD

Sample

A total of 72 subjects were used in the study (12 pretest subjects and 15 clinicians, 15 nursing attendants and 30 children in the experimental phase).

In the pretest phase 12 subjects ranging in age from 15 to 53 served as a pretest sample in the development of the cognitive and motor skill programs.

In the second phase, the performance of 15 aides was compared to that of 15 clinicians in evaluating the effectiveness of the programmed instruction. Fifteen students in the speech pathology program of the Department of Communication, Loma Linda University, served as the control group. Four of the students (all female) were senior undergraduates, and 11 (three male and eight female) were graduate students. All students had taken appropriate coursework in the area of speech pathology and had a minimum of one quarter in clinical practicum.

Fifteen nursing attendants (aides) served as the experimental group. There were four male and 11 female attendants within an age range of 18 to 53 years, with the mean age being 25. Attendants were
selected from the United Church Care Center, Knollwood Community Hospital, and the Riverside Community Hospital, all located in Riverside, California. All subjects were free of any speech defect and had at least a grade eight education, with the mean educational level being the twelfth grade.

Thirty children, enrolled at La Sierra Elementary School, Riverside, California, in regular classes, served as subjects for both the control and experimental groups. Randomly selected, the children ranged in age from 10 to 13 years and were pupils in the intermediate class (grades five and six). All children had normal hearing and speech.

**Programs**

Established principles of programmed instruction (Brethower, 1963; Calvin, 1962; Garner, 1966; Green, 1962; Hughes, 1963; Lysaught and Williams, 1963; Mager, 1962; Schroeder and Yarbrough, 1972) were closely followed in developing both the motor skill and cognitive programs. These principles involved: (1) breaking the information and activity into small discrete steps; (2) organizing the steps into a specific chronological sequence; (3) requiring a pertinent action of each sequence; (4) including suitable information (words and/or pictures) in each step to allow the aide to make correct responses most of the time; (5) withdrawal of prompts as the program progressed until the aide could respond correctly without any prompts, and (6) using a method of
self-check to determine the correctness of responses, and offering
reinforcement by immediate reward.

**Cognitive Program**

The first requirement in developing the cognitive program was to
state its objectives in behavioral terms. With respect to this objective
it was decided that on completion of the program the aide would show a
significant increase in his knowledge of the speech mechanism and
speech act.

Books giving a description of the speech act were reviewed. Text­
books written for children in the elementary grades as well as speech
pathology texts were selected in order that an accurate yet simple and
easy to read description of the speech act could be written.

Next, a rough draft of the program which would instruct an aide
in the biological processes involved in the speech act was written and
illustrated.

Finally, the program was pretested. This involved trying and
revising the program in order to eliminate gross errors. Revisions were
made on the basis of any errors, questions, and hesitations on the part
of subjects. The pretest was not concluded until subjects could work
through the program with few errors or hesitations.

A test designed to assess the aide's knowledge of the speech act
was administered prior to and upon completion of the program. The test
was revised as changes in the program were made.

Samples of the pre and post test and cognitive program are found in Appendix A.

Motor Skill Program

The objective in the motor skill program was to train an aide how to teach a child to make the phoneme /\theta/ in isolation.

Before writing the program, the production of /\theta/ in isolation was videotaped and analyzed. Several subjects were selected to demonstrate this activity because of individual variation in performance that met the criteria of an acoustically and cosmetically acceptable /\theta/ sound in isolation. Following this task analysis key steps were written down and a normal child of nine performed the skill as the task analysis was read to him.

Finally, a rough draft of the program depicting each key point was written and appropriately illustrated. The program was tested and revised according to mistakes made by the pretest subjects.

The program format was developed to include one practice with specific instructions followed by a second practice with reduced directions, and self check questions. Upon completion of the instructional material the subject was to perform the skill without the aid of the program. Using key points of the activity a check list evaluation form was developed to evaluate the subject's third performance.
A sample program and evaluation form are found in Appendix B.

**Procedures**

Arrangements were made to conduct the study at the Speech and Audiology Laboratory, Department of Communication, Loma Linda University. A Sony video-cassette unit, VO 1600 series, was used to record the performance of both the control and the experimental groups.

A panel of three speech pathologists served as judges for both the experimental and control groups. Judges had at least a Master of Science degree in Speech Pathology with a minimum of one year of clinical experience.

**Control Group**

Students serving as control subjects were instructed to teach the children how to produce the /θ/ in isolation. Any method of instruction was allowed. Only one restriction was imposed, that of not identifying the sound or producing it acoustically.

The performance of both students and children was videotaped and later evaluated.

**Experimental Group**

To assess knowledge of the speech mechanism and the speech act a pretest was administered to the experimental group consisting of nursing attendants. Upon completion of the cognitive program the test was
readministered to determine if any significant learning had taken place.

Following the cognitive program, the aides were paired off and asked to complete the motor skill program. Role playing allowed the aides to serve as both the clinician and subject for two practice sessions. In the third session the aide acting as a clinician taught a child how to produce the /θ/ in isolation following the procedures set forth in the motor skill program. Performance of both the aide and child was videotaped.

The experimental group was evaluated on two counts: (1) performance of both the aide and child, and (2) the ability of the aide and subsequently the child to follow the sequenced steps of the motor skill program.
CHAPTER IV

RESULTS

After all the data were tabulated and analyzed an attempt was made to answer the questions: Can a program utilizing principles of programmed instruction be developed to instruct nonprofessionals how to elicit a speech sound, specifically the phoneme /θ/ in isolation, and if so, is the program effective?

Motor Skill Program

The results on the motor skill program will be discussed in relation to the steps rated by all of the judges as correctly performed for aide and child. For purposes of determining a performance grade, one point was assigned to each substep within a major step that was done correctly, and the average percentage found. Percentage scores for each child and aide are shown on Table 1. Step one was correctly performed by the aides 80% of the time. Both aides and children were given a score of 100% on item 2. In step 3, aides correctly identified their articulators 90% of the time.

It was felt that the larger numbers of substeps within major steps 4, 5, and 6, made judging of these items more difficult thus pulling these percentages down. Using a criterion of two out of three
<table>
<thead>
<tr>
<th>Steps</th>
<th>Performance of Aide</th>
<th>Performance of Child</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>80%</td>
<td>not applicable</td>
</tr>
<tr>
<td>2</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>3</td>
<td>90%</td>
<td>not applicable</td>
</tr>
<tr>
<td>4</td>
<td>not applicable</td>
<td>72%</td>
</tr>
<tr>
<td>5</td>
<td>not applicable</td>
<td>81%</td>
</tr>
<tr>
<td>6</td>
<td>60%</td>
<td>62%</td>
</tr>
</tbody>
</table>
judges agreeing or better, substep percentages were recalculated for steps 4, 5, and 6, and are found on Table 2. The following results were obtained. On step 4, the percentage of children correctly identifying the aides' articulators were:

1. upper teeth - 86.7%
2. lower teeth - 84.4%
3. lips - 83.3%
4. tongue - 86.7%

In step 5, the percentage of children correctly identifying their own articulators were:

1. upper teeth - 93.3%
2. lower teeth - 93.3%
3. lips - 100%
4. tongue - 91.1%

In step 6 the performance of the aides and children in correct articulator placement and production of the /θ/ in isolation were as follows:

<table>
<thead>
<tr>
<th></th>
<th>aides</th>
<th>children</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. mouth open and space between teeth being no more than one-half inch</td>
<td>- 86.7%</td>
<td>86.7%</td>
</tr>
<tr>
<td>2. tongue protrusion between lips</td>
<td>- 93.3%</td>
<td>86.7%</td>
</tr>
<tr>
<td>3. shape of tongue is flat</td>
<td>- 73.3%</td>
<td>80.0%</td>
</tr>
<tr>
<td>4. tongue retracted with tip touching lower edge of front teeth</td>
<td>- 100%</td>
<td>100%</td>
</tr>
</tbody>
</table>
TABLE 2
PERCENTAGE OF CHILDREN AND AIDES CORRECTLY PERFORMING SUBSTEPS ON STEPS 4, 5, 6 ON THE MOTOR SKILLS PROGRAM AS EVALUATED BY THE JUDGES

<table>
<thead>
<tr>
<th>Steps</th>
<th>% of Aides</th>
<th>% of Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. a)</td>
<td>not applicable</td>
<td>86.7%</td>
</tr>
<tr>
<td>b)</td>
<td>not applicable</td>
<td>84.4%</td>
</tr>
<tr>
<td>c)</td>
<td>not applicable</td>
<td>83.3%</td>
</tr>
<tr>
<td>d)</td>
<td>not applicable</td>
<td>86.7%</td>
</tr>
<tr>
<td>5. d 1)</td>
<td>not applicable</td>
<td>93.3%</td>
</tr>
<tr>
<td>2)</td>
<td>not applicable</td>
<td>93.3%</td>
</tr>
<tr>
<td>3)</td>
<td>not applicable</td>
<td>100%</td>
</tr>
<tr>
<td>4)</td>
<td>not applicable</td>
<td>91.1%</td>
</tr>
<tr>
<td>6. a)</td>
<td>86.7%</td>
<td>86.7%</td>
</tr>
<tr>
<td>b)</td>
<td>93.3%</td>
<td>86.6%</td>
</tr>
<tr>
<td>c)</td>
<td>73.3%</td>
<td>80.0%</td>
</tr>
<tr>
<td>d)</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>e)</td>
<td>86.7%</td>
<td>93.3%</td>
</tr>
<tr>
<td>f)</td>
<td>93.3%</td>
<td>80.0%</td>
</tr>
<tr>
<td>g)</td>
<td>93.3%</td>
<td>73.3%</td>
</tr>
</tbody>
</table>
5. tongue tip behind upper front teeth but touching the lower edges of the front teeth

   - 86.7% 93.3%

6. air blown out gently

   - 93.3% 80.0%

7. making the /θ/ sound

   - 93.3% 73.3%

Mean overall performance scores are shown in Table 3. A rating of excellent, good, fair, or poor was given to each of the aides on overall performance. In analyzing the data the excellent and good ratings were grouped together and the fair and poor together. The mean overall performance was 48.1 for the good and excellent group and 42.5 for the fair and poor group. Excellent and good ratings were given to 74.4% of the performances and fair to poor to 25.6%. In 50% of the performances there was total agreement between the judges; in the remaining 50% two out of three judges agreed on the grade. One performance was not included because the grade was omitted by one of the judges on the evaluation form.

Performance of Control and Experimental Groups

The performances of the control and experimental groups, as indicated by the scores obtained on the 1-7 rating scale as shown in appendices A and B were tabulated and analyzed. Judges were requested to rate performances from poor (1) to good (7) relative to correct articulator placement, production of the /θ/ in isolation, and the clarity of the instructions given by the clinicians and aides respectively.
TABLE 3

OVERALL RATINGS OF JUDGES ON THE PERFORMANCE OF AIDES ON THE MOTOR SKILL PROGRAM

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Ratings</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Score</td>
<td>48.1*</td>
<td>42.5</td>
</tr>
<tr>
<td>%</td>
<td>74.4%</td>
<td>25.6%</td>
</tr>
</tbody>
</table>

* Total Possible = 53
Performance between the control and experimental groups was studied using the t test of significance where appropriate. The Mann-Whitney U-test was used as a measure of interjudge reliability.

Table 4 shows the results when the experimental and control groups were compared on successful performance in eliciting the phoneme /θ/ in isolation. A t test showed a significant difference in favor of the experimental group in items one and three. There was no significant difference in performance on items two, four, and five.

A nonparametric test, the Mann-Whitney U-test, was performed on the data to determine the interjudge reliability on each of the five scored items in this study. As shown in Tables 5, 6, 7, 8, and 9, there was no significant differences among the judges on any items for either control or experimental groups. Further, a comparison of frequency of scores between the control and experimental groups given by each judge was made. Again, the U values were not significant in any instance.

Tables 10, 11, and 12 show these comparisons.

Cognitive Program

Scores on the pretest and post-test for the cognitive program can be seen in Table 13. The mean pretest score was 6.87; the mean post-test score was 11.33. With a difference between the mean pretest and post-test scores of 4.47 and 14 degrees of freedom, the resultant t of 6.99 was significant at beyond the .001 level. This finding indicates
that the post-test performance was significantly related to the programmed
instruction which the aides completed prior to the post-test.


<table>
<thead>
<tr>
<th>Item</th>
<th>Statistic</th>
<th>Experimental Group</th>
<th>Control Group</th>
<th>df</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$\bar{x}$</td>
<td>6.67</td>
<td>5.33</td>
<td>28</td>
<td>3.22**</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>.44</td>
<td>1.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>$\bar{x}$</td>
<td>6.36</td>
<td>5.60</td>
<td>28</td>
<td>1.62</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>.98</td>
<td>1.53</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>$\bar{x}$</td>
<td>6.45</td>
<td>5.78</td>
<td>28</td>
<td>2.08*</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>.50</td>
<td>1.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>$\bar{x}$</td>
<td>5.44</td>
<td>5.38</td>
<td>28</td>
<td>.13</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>1.12</td>
<td>1.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>$\bar{x}$</td>
<td>5.27</td>
<td>5.18</td>
<td>28</td>
<td>.16</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>1.52</td>
<td>1.58</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at .05 level
** Significant at .01 level
### TABLE 5

**RELIABILITY BETWEEN JUDGES AS SHOWN BY THE MANN-WHITNEY U-TEST**

Item 1

<table>
<thead>
<tr>
<th>Between Judges</th>
<th>Control Group</th>
<th>Significance</th>
<th>Experimental Group</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 and 2</td>
<td>92.50</td>
<td>NS</td>
<td>103.00</td>
<td>NS</td>
</tr>
<tr>
<td>1 and 3</td>
<td>110.00</td>
<td>NS</td>
<td>107.50</td>
<td>NS</td>
</tr>
<tr>
<td>2 and 3</td>
<td>82.00</td>
<td>NS</td>
<td>96.50</td>
<td>NS</td>
</tr>
<tr>
<td>Between Judges</td>
<td>Control Group</td>
<td>Significance</td>
<td>Experimental Group</td>
<td>Significance</td>
</tr>
<tr>
<td>----------------</td>
<td>---------------</td>
<td>--------------</td>
<td>--------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>1 and 2</td>
<td>102.00</td>
<td>NS</td>
<td>97.00</td>
<td>NS</td>
</tr>
<tr>
<td>1 and 3</td>
<td>72.00</td>
<td>NS</td>
<td>107.00</td>
<td>NS</td>
</tr>
<tr>
<td>2 and 3</td>
<td>77.00</td>
<td>NS</td>
<td>103.50</td>
<td>NS</td>
</tr>
</tbody>
</table>
## TABLE 7

RELIABILITY BETWEEN JUDGES AS SHOWN BY THE MANN-WHITNEY U-TEST

**Item 3**

<table>
<thead>
<tr>
<th>Between Judges</th>
<th>Control Group</th>
<th>Significance</th>
<th>U Values</th>
<th>Experimental Group</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 and 2</td>
<td>83.00</td>
<td>NS</td>
<td></td>
<td>85.00</td>
<td>NS</td>
</tr>
<tr>
<td>1 and 3</td>
<td>58.50</td>
<td>NS</td>
<td></td>
<td>82.50</td>
<td>NS</td>
</tr>
<tr>
<td>2 and 3</td>
<td>91.50</td>
<td>NS</td>
<td></td>
<td>110.50</td>
<td>NS</td>
</tr>
</tbody>
</table>
TABLE 8

RELIABILITY BETWEEN JUDGES AS SHOWN BY THE MANN-WHITNEY U-TEST

Item 4

<table>
<thead>
<tr>
<th>Between Judges</th>
<th>Control Group</th>
<th>Significance</th>
<th>Experimental Group</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 and 2</td>
<td>43.00</td>
<td>NS</td>
<td>85.50</td>
<td>NS</td>
</tr>
<tr>
<td>1 and 3</td>
<td>57.00</td>
<td>NS</td>
<td>101.00</td>
<td>NS</td>
</tr>
<tr>
<td>2 and 3</td>
<td>88.00</td>
<td>NS</td>
<td>80.00</td>
<td>NS</td>
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<td>Between Judges</td>
<td>Control Group</td>
<td>Significance</td>
<td>Experimental Group</td>
<td>Significance</td>
</tr>
<tr>
<td>----------------</td>
<td>---------------</td>
<td>--------------</td>
<td>-------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>1 and 2</td>
<td>112.50</td>
<td>NS</td>
<td>96.00</td>
<td>NS</td>
</tr>
<tr>
<td>1 and 3</td>
<td>89.50</td>
<td>NS</td>
<td>79.00</td>
<td>NS</td>
</tr>
<tr>
<td>2 and 3</td>
<td>79.50</td>
<td>NS</td>
<td>95.00</td>
<td>NS</td>
</tr>
</tbody>
</table>
### TABLE 10

**COMPARISON OF FREQUENCY OF SCORES BETWEEN THE CONTROL AND EXPERIMENTAL GROUPS GIVEN BY EACH JUDGE**

*Items 1 through 5 Combined*

<table>
<thead>
<tr>
<th>Judge</th>
<th>U</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>24.50</td>
<td>None</td>
</tr>
<tr>
<td>2</td>
<td>17.00</td>
<td>None</td>
</tr>
<tr>
<td>3</td>
<td>18.50</td>
<td>None</td>
</tr>
</tbody>
</table>

### TABLE 11

**COMPARISON BETWEEN JUDGES OF FREQUENCY OF SCORES GIVEN TO THE CONTROL GROUP**

<table>
<thead>
<tr>
<th>Judges</th>
<th>U</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 and 2</td>
<td>15.00</td>
<td>None</td>
</tr>
<tr>
<td>1 and 3</td>
<td>13.50</td>
<td>None</td>
</tr>
<tr>
<td>2 and 3</td>
<td>22.50</td>
<td>None</td>
</tr>
</tbody>
</table>

### TABLE 12

**COMPARISON BETWEEN JUDGES OF FREQUENCY OF SCORES GIVEN TO THE EXPERIMENTAL GROUP**

<table>
<thead>
<tr>
<th>Judges</th>
<th>U</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 and 2</td>
<td>23.50</td>
<td>None</td>
</tr>
<tr>
<td>1 and 3</td>
<td>21.50</td>
<td>None</td>
</tr>
<tr>
<td>2 and 3</td>
<td>21.00</td>
<td>None</td>
</tr>
<tr>
<td>Statistic</td>
<td>Pretest</td>
<td>Post-Test</td>
</tr>
<tr>
<td>-------------------</td>
<td>---------------</td>
<td>---------------</td>
</tr>
<tr>
<td>N</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>$\bar{x}$</td>
<td>6.87*</td>
<td>11.33*</td>
</tr>
<tr>
<td>SD</td>
<td>2.75</td>
<td>2.50</td>
</tr>
<tr>
<td>Range of Scores</td>
<td>2-12</td>
<td>7-15</td>
</tr>
<tr>
<td>df</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>t</td>
<td></td>
<td>6.99**</td>
</tr>
</tbody>
</table>

* Out of a Possible Score of 53  
** Significant at .001 Level
CHAPTER V

DISCUSSION

The data obtained in this study supports the hypothesis that programmed instruction is a successful tool for instructing a non-professional in teaching a child how to make a speech sound, in particular the /θ/ in isolation.

The t tests of significance comparing success between the experimental and control groups in eliciting the phoneme /θ/ in isolation showed no significant difference between the two groups on the five items scored on a 1-7 rating scale by the judges, except for a significant difference in items one and three in favor of the experimental group. This difference supports the hypothesis. A possible underlying reason was the longer time taken by the aides in the experimental group. For the control group, the session time was as short as fifteen seconds compared to the five to seven minutes an aide might have taken. The time taken for performing the steps in the motor skill program allowed for longer videotaping and consequently more time for the judges to observe and rate the performance. There was great variability among the control group in the method because they were allowed to use any method they chose whereas a certain amount of consistency was imposed on the
experimental group by their earlier programmed instruction.

It is felt that a cognitive program is a useful tool for the speech therapist to use in orientating an aide in the area of speech. This is especially true if the aide or nonprofessional is to function specifically within a speech therapy program.

Errors made by aide and/or child during the execution of the motor skill program are reflected in the percentages of these groups correctly performing steps within the program. Since the goal of programmed instruction is to minimize errors it should be interesting to look at these scores with the view of possible further revision and additional trials before validation with field testing.

One can only speculate how to account for errors made by the aides and children. Although the problem did not manifest itself in the pretest phase of developing the motor skill program, the terminology used to describe the articulators at times seemed to be confusing. Such terms were upper edges of lower teeth and lower edges of upper teeth. Whether a simpler description such as edge of top teeth and edge of bottom teeth would have been better is not known.

Another possible problem was pointed out by one of the judges regarding whether both aide and child might experience difficulty in determining the dimension, one-half inch. This question was prompted by the fact that the program required the aide to instruct the child to
open his mouth no more than one-half inch and also the aide to demonstrate this.

Interestingly, during the practice sessions, the aides arrived at an agreement as to how much a distance one-half inch would be. This step did work as described in the program since aides automatically demonstrated the above mentioned step.

Although confusion in terminology regarding teeth edges and ability to judge the dimension, one-half inch, did not affect overall performance, the questions raised on these two aspects of the program are valid ones and deserve serious consideration for revision and trial of these new sections before field testing.

In some instances, step four, requiring the child to identify the aide's articulators, was entirely omitted. This did not appear to detract from the performance of both the aide and child. The question then may be raised as to whether this step is needed in the program. It might be that for a child of normal intelligence this step could be omitted whereas a child having intellectual deficiencies or difficulties in the area of kinesthetic awareness would need this step in order to correctly identify his own articulators. In order to determine if this step is necessary, and under what conditions, it would be necessary to revise and retest this portion of the program.

Lowered scores for both the motor skill program and performance
evaluation of the experimental group also were affected by a time factor. Although programmed instruction is designed to allow participants to proceed at their own rate and go through the program until they feel secure in doing the task, the scheduling of four individuals - two aides and two children - for one session did not allow for this. An hour and a half was allowed for two practice sessions by each aide and their performing the task with a child. Secondly, aides participated in the program after a full work day, with such factors as hunger and fatigue affecting their performance.

Comments regarding the difficulty of evaluating the performance of both the control and experimental groups were made by all judges. Although an individual had been videotaped in the task analysis and this method of recording the motor skill was found to be satisfactory, it was found that recording the actual sessions during the study presented some unanticipated problems. In the task analysis the individual faced the camera directly, no more than two feet away from the camera. Secondly, he held the microphone directly under his chin. In the study, however, the aides and clinicians sat directly across from the child, at a forty-five degree angle with the camera. The camera was no less than three feet away. The microphone was placed between the child and the aide or clinician. Thus, it was difficult at times to view the fine motor movements of the articulators as made by the children and aides. In
certain instances the child did make the sound which was audible to this writer but it was not audible upon replay of the performance. In two instances the performances were inadvertently cut short for the experimental group.

Despite the problems encountered, 74.4% of the performances were given a rating of good or excellent. It will be recalled that criteria for aide participation in this study were: (1) a minimum age of 18; (2) at least an eighth grade education and (3) no speech defects. In a situation where an aide might be utilized by the speech therapist, a more selective screening process could be instituted to ensure maximum performance on the part of the aide.

Even so, it will be recalled that there was no significant difference between aides trained with programmed instruction and trained clinicians in their ability to elicit the phoneme /θ/ in isolation.

On the basis of the programmed instruction developed in this study it has been found that this method of instruction can be used in the field of speech pathology.

It would seem, however, that there is a need for further study. This implies the need for revision, testing, and field testing the program using different populations with respect to age, intelligence, and speech handicap.

Further implication would include the development of other
programs instructing supportive personnel how to teach other speech sounds. It must be remembered that a motor skill program is designed to teach a specific skill which sometimes may be a disadvantage. A certain amount of periodic monitoring would be essential to maintain quality performance within a speech therapy setting. A program can fall into disrepute if it is not adhered to exactly.

It must be emphasized that programmed instruction is not to be used solely as a method of instruction. Rather, its use is envisioned as being that of an integral part of a total therapy program under the supervision of the speech pathologist.
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APPENDICES
APPENDIX A

1. Cognitive Program
2. Pre- and Post Test
THE SPEECH MECHANISM

Leona Smook
THE PURPOSE OF THIS PROGRAM IS TO HAVE YOU LEARN ABOUT THE MECHANISMS WE USE FOR SPEECH.
INSTRUCTIONS:

YOU WILL NOTICE IN THIS PROGRAM THAT EACH PAGE HAS TWO COLUMNS. ON THE RIGHT HAND SIDE IS THE PROGRAM. AS YOU GO THROUGH IT YOU WILL BE GIVEN INFORMATION AND THEN ASKED QUESTIONS ABOUT THE INFORMATION.

THE COLUMN TO THE LEFT PROVIDES THE ANSWERS TO THE QUESTIONS. A CARDBOARD STRIP IS PROVIDED. YOU WILL COVER THE LEFT HAND COLUMN WITH IT. WHEN YOU HAVE ANSWERED A QUESTION REMOVE THE CARDBOARD TO COMPARE YOUR ANSWER WITH THE CORRECT ONE.
SPEECH IS A COMPLICATED PROCESS. YOU WILL LEARN ABOUT FOUR ASPECTS OF THIS PROCESS:

1. ARTICULATION
   (PRONOUNCED ARE-TIK-U-LAY-SHUN)

2. RESONATION
   (PRONOUNCED RES-ON-A-SHUN)

3. PHONATION
   (PRONOUNCED FO-NAY-SHUN)

4. RESPIRATION
   (PRONOUNCED RES-PER-A-SHUN)

LIST THE FOUR ASPECTS OF SPEECH:

1. ARTICULATION
2. RESONATION
3. PHONATION
4. RESPIRATION
RESPIRATION

BREATHING AND RESPIRATION (PRONOUNCED RES-PER-A-SHUN) ARE TWO WORDS MEANING THE SAME THING.

ANOTHER NAME FOR THE PROCESS OF BREATHING IS ____________________________.
RESPIRATION (OR BREATHING) INCLUDES TAKING AIR INTO THE LUNGS AND PASSING IT OUT OF THE LUNGS.

TWO WORDS MAY BE USED TO DESCRIBE THE PROCESS OF TAKING AIR INTO THE LUNGS AND PASSING IT OUT OF THE LUNGS. THEY ARE:

1. BREATHING
2. RESPIRATION
RESPIRATION (OR BREATHING) INCLUDES INHALATION AND EXHALATION.

WHEN AIR FILLS THE LUNGS WE BREATHE IN.

THIS IS CALLED IN----------------.
EXHALATION (OR BREATHING OUT) PROVIDES US WITH THE ENERGY WE NEED TO MAKE A SOUND.

MATCH THE WORDS THAT MEAN THE SAME

1. INHALATION ------ A. BREATHING
2. RESPIRATION ------ B. BREATHING OUT
3. EXHALATION ------ C. BREATHING IN

1 - C
2 - A
3 - B
AIR THAT LEAVES THE LUNGS IS FORCED OUT OF THE LUNGS BY MUSCLES. IT TRAVELS UP A SMALL TUBE CALLED THE TRACHEA (PRONOUNCED TRAY-KEY-AH).

AIR THAT TRAVELS UP THE TRACHEA (PRONOUNCED TRAY-KEY-AH) PROVIDES THE ENERGY WE NEED TO MAKE A SOUND.
Air is forced out of the lungs by the muscles of (inhalation, exhalation).

Underline the correct answer.

The air travels up the [underline] and builds up pressure.
AT THE UPPER END OF THE TUBE OR

________________________ IS THE VOICE BOX.

1. PUT MICROPHONE THROUGH THE

2. PUT MIC THROUGH TUBE TO

3. PUT MIC THROUGH TUBE TO

4. PUT MIC THROUGH TUBE TO

ANOTHER NAME FOR VOICE BOX IS THE

LARYNX (PRONOUNCED LAR-INKS).
LET'S REVIEW:

CHECK THE STATEMENTS THAT ARE TRUE.

1. TRUE

2. TRUE

3. FALSE

4. TRUE

5. TRUE

6. FALSE

1. IN ORDER TO MAKE A SOUND WE MUST EXHALE.

2. THE AIR EXHALED PROVIDES THE ENERGY WE NEED TO MAKE A SOUND.

3. RESPIRATION IS PASSING AIR OUT OF THE LUNGS.

4. THE AIR PASSING FROM THE LUNGS IS FORCED UP THE TRACHEA.

5. AT THE END OF THE TRACHEA IS THE VOICE BOX.

6. LARYNX IS PRONOUNCED LEARN-X.
ON EACH SIDE OF THE LARYNX ARE TWO BANDS CALLED VOCAL CORDS.

IN THE LARYNX ARE LOCATED TWO VOCAL CORDS.
WHEN AT REST THE TWO VOCAL CORDS LIE SIDE BY SIDE.

WHEN THE AIR PASSING UP THE TRACHEA REACHES THE LARYNX IT FORCES THE TWO VOCAL CORDS APART.
THE SPACE BETWEEN THE VOCAL CORDS IS CALLED THE GLOTTIS (PRONOUNCED GLAW-TIS).

AIR FORCED INTO THE LARYNX (OR VOICE BOX) CAUSES THE TWO VOCAL CORDS TO SEPARATE LEAVING A SPACE CALLED A
LET'S REVIEW:

YOU WILL REMEMBER THAT AIR PASSED OUT FROM THE LUNGS TRAVELS UP THE TRACHEA, BUILDING UP PRESSURE. THE AIR PRESSURE FORCES OPEN THE VOCAL CORDS AND CAUSES THE GLOTTIS TO OPEN.

LABEL THE ABOVE DIAGRAM TO SHOW THE PASSAGE OF AIR.
ANOTHER REQUIREMENT FOR SPEECH IS A VIBRATING ELEMENT. AS THE AIR PRESSURE FORCES OPEN THE GLOTTIS IT CAUSES THE EDGES OF THE VOCAL CORDS TO MOVE BACK AND FORTH QUICKLY.

THE RAPID MOVEMENT OF THE ______ IS KNOWN AS VIBRATION.
VIBRATE

SOUND WAVES ARE SET UP WHEN THE VOCAL CORDS VIBRATE.

THE SOUND THAT IS MADE WHEN THE VOCAL CORDS VIBRATE IS CALLED A TONE.
The quality and loudness of a tone are affected by reinforcers or resonators (pronounced res-on-a-tors).

A tone is affected by reinforcers or

A tone is affected by reinforcers or

A tone is affected by reinforcers or

A tone is affected by reinforcers or
1. BUILD UP LOUDNESS

2. CHANGE THE QUALITY OF THE TONE

RESONATORS AFFECT A TONE BY DOING TWO THINGS:

1. BUILDING UP LOUDNESS

2. CHANGING THE QUALITY OF A TONE

TWO THINGS THAT RESONATORS (OR REINFORCERS)
MAY DO TO A TONE ARE:

1. BUILD UP LOUDNESS

2. CHANGE THE QUALITY OF THE TONE
THERE ARE FOUR RESONATORS:

1. THE PHARYNX (OR THROAT)
2. THE LARYNX (OR VOICE BOX)
3. THE MOUTH
4. THE NOSE

LOOK AT THE DIAGRAM.

NAME THE RESONATORS LOCATED BESIDE EACH ARROW.
A TONE IS AFFECTED BY RESONATORS AND ARTICULATORS (PRONOUNCED ARE-TIK-U-LAY-TORS).

ARTICULATORS THAT CHANGE A TONE ARE THE LIPS, TEETH, TONGUE, JAWS, AND SOFT PALATE (OR ROOF OF THE MOUTH).

LIST THE ARTICULATORS WHICH CAN CHANGE A TONE:

1. Lips
2. Teeth
3. Tongue
4. Jaws
5. Soft Palate (Roof of the Mouth)
I. CHANGING THE SHAPE OF THE ARTICULATORS

II. CHANGING THE POSITION OF THE ARTICULATORS

CHANGING THE SHAPE OR POSITION OF THE ARTICULATORS ALLOWS YOU TO MAKE DIFFERENT SPEECH SOUNDS.

YOU MAKE DIFFERENT SPEECH SOUNDS BY:

1. CHANGING THE SHAPE OF THE ARTICULATORS

2. CHANGING THE POSITION OF THE ARTICULATORS
LET'S REVIEW:

BEGINNING WITH NUMBER 1, PUT THE FOLLOWING STATEMENTS IN THE CORRECT ORDER.

1. WE INHALE AIR.

2. AIR PASSING OUT OF THE LUNGS PASSES UP THE TRACHEA.

3. THE VOCAL CORDS OF THE LARYNX ARE FORCED APART BY THE AIR TRAVELING UP THE TRACHEA.

4. VOCAL CORDS VIBRATE WHEN THEY ARE FORCED OPEN.

5. A SOUND IS PRODUCED WHEN THE VOCAL CORDS VIBRATE.


7. BY PLACING THE LIPS, SOFT PALATE, TEETH AND TONGUE IN DIFFERENT SHAPES OR POSITIONS WE CAN MAKE SPEECH SOUNDS.
APPENDIX B

1. Motor Skills Program

2. Evaluation Forms
   (Experimental Group)
TEACHING THE "TH" SOUND

Leona Smook

Illustrated by Norman Flashe
INTRODUCTION

THE SOUND "Th" AS IN THE WORD THIN IS ONE WHICH CHILDREN
IN GRADES ONE THROUGH SIX HAVE DIFFICULTY MAKING. THEY
MAY EITHER USE ANOTHER SOUND IN PLACE OF THE "Th" SOUND,
LEAVE THE SOUND OUT OF THE WORD, OR DISTORT THE "Th"
SOUND MAKING IT UNCLEAR.
THIS PROGRAM WILL TEACH YOU AND YOUR PARTNER HOW TO INSTRUCT A CHILD TO PRODUCE THE "Th" SOUND CORRECTLY.

THEN USING THE METHOD OF TEACHING YOU HAVE LEARNED IN THIS PROGRAM YOU WILL BE ASKED TO TEACH A CHILD HOW TO MAKE THE "Th" SOUND WITHOUT THE AID OF THIS BOOKLET.
READ EACH PAGE CAREFULLY AND COMPLETELY. STUDY THE PICTURES AND THEN DO ONLY WHAT THE INSTRUCTIONS TELL YOU TO DO. WHEN YOU HAVE FINISHED, TURN TO THE NEXT PAGE. AT INTERVALS, YOU WILL BE ASKED IF YOU DID THE STEPS IN A CERTAIN WAY. IF YOU DID NOT, YOU WILL BE ASKED TO REPEAT PART OR ALL OF A STEP.

TURN THE PAGE.
SEAT YOURSELF AT THE TABLE SO THAT YOU ARE 
SITTING DIRECTLY ACROSS FROM YOUR PARTNER, 
FACING HIM.

ON THE TABLE YOU WILL FIND A HAND MIRROR 
AND TWO TONGUE BLADES.

TURN THE PAGE.
GREET YOUR PARTNER. TELL HIM HE IS GOING TO LEARN HOW TO MAKE A SPEECH SOUND BY WATCHING YOU AND FOLLOWING YOUR DIRECTIONS.
TELL YOUR PARTNER TO WATCH YOU CAREFULLY, AS YOU ARE POINTING TO PARTS OF THE MOUTH USED TO MAKE A SPEECH SOUND. NAME EACH PART AS YOU POINT TO IT.
HOLD THE MIRROR A LITTLE TO THE SIDE.
PICK UP THE TONGUE BLADE AND POINT TO YOUR

1. UPPER TEETH - FRONT TEETH
   SIDE TEETH
   LOWER EDGES OF TEETH
2. LOWER TEETH - FRONT TEETH
   SIDE TEETH
   UPPER EDGE OF FRONT TEETH

3. LIPS - UPPER
   LOWER

4. TONGUE - TIP

PLACE THE TONGUE BLADE ON THE TABLE.
TELL YOUR PARTNER TO PICK UP THE TONGUE BLADE YOU HAVE JUST USED. ASK HIM TO POINT TO THOSE PARTS OF YOUR MOUTH ONE AT A TIME AS YOU SAY THEIR NAMES.

1. UPPER TEETH - FRONT TEETH

   SIDE TEETH

   LOWER EDGES OF TEETH
2. LOWER TEETH - FRONT TEETH

SIDE TEETH

UPPER EDGE OF FRONT TEETH

3. LIPS - UPPER

LOWER

4. TONGUE - TIP

HE IS TO PLACE THE TONGUE BLADE ON THE TABLE.
DID YOUR PARTNER CORRECTLY POINT TO THE PARTS OF YOUR MOUTH
AS YOU HAD ASKED HIM TO?

YES - GOOD. TURN THE PAGE.

NO - YOU PROBABLY WENT TOO FAST. REPEAT THIS STEP
MORE SLOWLY AND CAREFULLY.
TELL YOUR PARTNER TO PICK UP THE HAND MIRROR AND UNUSED TONGUE BLADE. ASK HIM TO HOLD THE MIRROR SO THAT YOU CAN WATCH HIM POINT TO THE PARTS OF HIS MOUTH AS YOU NAME THEM:

1. **UPPER TEETH** - FRONT TEETH
   SIDE TEETH
   LOWER EDGES OF TEETH

2. **LOWER TEETH** - FRONT TEETH
   SIDE TEETH
   UPPER EDGE OF FRONT TEETH
3. LIPS - UPPER
   LOWER
4. TONGUE - TIP

HAVE HIM PLACE THE TONGUE BLADE ON THE TABLE.
DID YOUR PARTNER POINT TO ALL PARTS OF HIS MOUTH CORRECTLY?

YES – GOOD. TURN THE PAGE.

NO – WHICH ONES DID HE INCORRECTLY POINT TO? HAVE YOUR PARTNER PICK UP THE MIRROR AND WATCH WHILE YOU POINT OUT THE PARTS HE INCORRECTLY POINTED TO. HAVE HIM POINT TO ALL THE PARTS LISTED ON PAGES 86 AND 87.
TELL YOUR PARTNER THAT YOU WILL OPEN YOUR LIPS AND TEETH, LEAVING A SMALL SPACE BETWEEN THE TEETH THAT IS NO MORE THAN 1/2 INCH BIG.

DEMONSTRATE THIS POSITION.

NOW ASK HIM TO IMITATE WHAT YOU JUST DID.
DID YOUR PARTNER CORRECTLY PLACE HIS LIPS AND TEETH IN THE POSITION YOU ASKED HIM TO?

YES - GOOD. TURN THE PAGE.

NO - DEMONSTRATE THE POSITION AGAIN AND HAVE HIM IMITATE YOU.
TELL YOUR PARTNER THAT YOU WILL REPEAT THE
LAST STEP AND THEN YOU WILL SLOWLY STICK
OUT YOUR TONGUE BETWEEN YOUR TEETH. THE
TONGUE IS TO BE FLAT IN SHAPE. NO MORE THAN
1/2 INCH OF THE TONGUE IS TO STICK OUT.

DEMONSTRATE THIS POSITION.

NOW ASK HIM TO IMITATE WHAT YOU JUST DID.
DID YOUR PARTNER IMITATE EXACTLY WHAT YOU DID?

YES - GOOD. TURN THE PAGE.

NO - DEMONSTRATE THE POSITION AGAIN AND HAVE HIM IMITATE YOU. TURN THE PAGE WHEN HE HAS IMITATED YOU CORRECTLY.
TELL YOUR PARTNER THAT YOU WILL REPEAT THE LAST STEP AND THEN YOU WILL PULL IN THE TONGUE UNTIL THE TIP OF THE TONGUE TOUCHES THE LOWER EDGE OF THE UPPER FRONT TEETH. IT IS TO TOUCH THESE TEETH LIGHTLY.

DEMONSTRATE THIS ACTION.

NOW ASK HIM TO IMITATE WHAT YOU JUST DID.
DID YOUR PARTNER IMITATE EXACTLY WHAT YOU DID?

YES - GOOD. TURN THE PAGE.

NO - DEMONSTRATE THIS ACTION AGAIN AND HAVE HIM IMITATE YOU. TURN THE PAGE WHEN HE HAS IMITATED YOU EXACTLY.
TELL YOUR PARTNER THAT YOU ARE GOING TO REPEAT THE LAST STEP. THEN YOU WILL MOVE YOUR TONGUE TIP SO THAT IT IS BEHIND THE FRONT UPPER TEETH, BUT TOUCHING LIGHTLY THE LOWER EDGE OF THE FRONT TEETH.

DEMONSTRATE THIS POSITION.

NOW ASK HIM TO IMITATE WHAT YOU JUST DID.
DID YOUR PARTNER IMITATE EXACTLY WHAT YOU DID?

YES - GOOD. TURN THE PAGE.

NO - DID HE PLACE THE TONGUE TIP BEHIND THE UPPER FRONT
TEETH?

DID HE TOUCH THE TONGUE TIP LIGHTLY AGAINST THE LOWER
EDGE OF THE FRONT TEETH?

DEMONSTRATE THE POSITION AGAIN AND HAVE HIM IMITATE
YOU. TURN THE PAGE WHEN HE HAS CORRECTLY IMITATED YOU.
TELL YOUR PARTNER THAT YOU WILL REPEAT THE
LAST STEP AND THAT YOU WILL BLOW AIR OUT OF
YOUR MOUTH GENTLY AS YOU REPEAT THE LAST STEP.

DEMONSTRATE THIS.

NOW ASK HIM TO IMITATE WHAT YOU JUST DID.
DID YOUR PARTNER IMITATE EXACTLY WHAT YOU DID?

YES - GOOD. TURN THE PAGE.

NO - REPEAT THE STEP UNTIL HE IS ABLE TO MAKE THE SAME SOUND YOU DID WHEN YOU BLEW OUT THE AIR.
NOW YOU WILL TEACH YOUR PARTNER HOW TO MAKE THE SOUND AGAIN.

THE FOLLOWING FRAMES WILL GIVE YOU THE PICTURE AND THE STEP NAME ONLY.

LOOK AT THE PICTURES, READ THE STEP NAME, THEN DO THAT STEP.

AT INTERVALS YOU WILL BE ASKED HOW YOU DID EACH STEP. IF YOU DID ONE INCORRECTLY, YOU WILL REPEAT PART OR ALL OF THE STEP.
PREPARE FOR THE SECOND PRACTICE.

PLACE TWO CLEAN TONGUE BLADES ON THE TABLE.

ASK YOUR PARTNER TO ASSUME A SITTING POSITION.
1. ARE THE TWO TONGUE BLADES AND MIRROR SITTING ON THE TABLE?

2. IS YOUR PARTNER SITTING DIRECTLY ACROSS FROM YOU, FACING YOU?

    YES - GOOD. TURN THE PAGE.

    NO - ASK HIM TO DO SO NOW. TURN THE PAGE.
GREET YOUR PARTNER.
1. DID YOU IDENTIFY YOURSELF?

2. DID YOU TELL HIM WHAT YOU WERE GOING TO DO?

   YES – TURN THE PAGE.
   NO – CORRECT THE STEP AS NECESSARY.
IDENTIFY THE PARTS OF YOUR MOUTH USED TO MAKE A SOUND.
1. DID YOU TELL YOUR PARTNER YOU WERE GOING TO IDENTIFY THE
PARTS OF YOUR MOUTH USED TO MAKE A SPEECH SOUND?

2. DID HE WATCH AS YOU POINTED TO YOUR ARTICULATORS?

3. DID YOU POINT TO:

   UPPER TEETH - FRONT, SIDE, LOWER EDGES
   LOWER TEETH - FRONT, SIDE, UPPER EDGES
   LIPS - UPPER, LOWER
   TONGUE - TIP

   YES - TURN THE PAGE.

   NO - CORRECT THE STEP AS NECESSARY. THEN TURN THE PAGE.
TELL YOUR PARTNER TO IDENTIFY THE PARTS OF YOUR MOUTH USED TO MAKE SPEECH SOUNDS.
1. DID YOUR PARTNER USE A TONGUE BLADE TO POINT TO PARTS OF
   YOUR MOUTH?

2. DID HE CORRECTLY IDENTIFY THE FOLLOWING PARTS:
   
   UPPER TEETH - FRONT, SIDE, LOWER EDGES
   LOWER TEETH - FRONT, SIDE, UPPER EDGES
   LIPS - UPPER AND LOWER
   TONGUE - TIP

   YES - TURN THE PAGE.
   NO - CORRECT THE STEP AS NECESSARY. THEN TURN THE PAGE.
TELL YOUR PARTNER TO IDENTIFY PARTS OF HIS OWN MOUTH USED TO MAKE A SPEECH SOUND.
1. DID YOUR PARTNER USE THE TONGUE BLADE TO POINT TO PARTS OF HIS MOUTH?

2. DID HE REMEMBER AND CORRECTLY POINT TO THE PARTS OF THE MOUTH LISTED BELOW?

   UPPER TEETH - FRONT, SIDE, LOWER EDGES
   LOWER TEETH - FRONT, SIDE, LOWER EDGES
   LIPS - UPPER AND LOWER
   TONGUE - TIP

   YES - TURN THE PAGE.
   NO - CORRECT AS NECESSARY AND THEN TURN THE PAGE.
HAVE YOUR PARTNER OPEN HIS MOUTH.
1. DID YOU TELL YOUR PARTNER WHAT YOU EXPECT HIM TO DO?

2. DID YOU DEMONSTRATE CORRECT MOUTH OPENING WITH BOTH LIPS AND TEETH OPEN?

3. IS THE SPACE BETWEEN THE TEETH SMALL – NO MORE THAN ONE-HALF INCH?

4. DID YOUR PARTNER IMITATE YOU EXACTLY?
   
   YES – TURN THE PAGE.

   NO – CORRECT AS NECESSARY AND THEN TURN THE PAGE.
TELL YOUR PARTNER THAT HE IS TO STICK OUT HIS TONGUE.
1. DID YOU TELL YOUR PARTNER EXACTLY WHAT TO DO WHEN HE
STICKS OUT HIS TONGUE?

2. DID YOU DEMONSTRATE EXACTLY WHAT YOU WANTED HIM TO DO?

3. IS HIS TONGUE BETWEEN HIS TEETH?

4. IS HIS TONGUE FLAT IN SHAPE?
   
   YES - TURN THE PAGE.
   
   NO - CORRECT AS NECESSARY AND THEN TURN THE PAGE.
TELL YOUR PARTNER TO POSITION HIS TONGUE BEHIND HIS TEETH.
1. DID YOU GIVE EXACT INSTRUCTIONS AS TO HOW TO POSITION THE TONGUE?

2. DID YOU DEMONSTRATE WHAT YOU EXPECTED HIM TO DO?

3. DOES HIS TONGUE TIP TOUCH THE LOWER EDGES OF THE UPPER FRONT TEETH?

4. IS THE TONGUE TIP TOUCHING THE EDGES LIGHTLY?

5. DID HE VIEW HIMSELF IN THE MIRROR AS HE IMITATED YOU?
   
   YES - TURN THE PAGE.

   NO - CORRECT AS NECESSARY AND THEN TURN THE PAGE.
TELL YOUR PARTNER TO PLACE HIS TONGUE BEHIND HIS UPPER FRONT TEETH.
1. **DID YOU GIVE EXACT INSTRUCTIONS AS TO WHAT YOU WANTED HIM TO DO?**

2. **DID YOU DEMONSTRATE WHAT YOU EXPECTED HIM TO DO?**

3. **DID HE OBSERVE HIMSELF IN THE MIRROR AS HE IMITATED YOU?**

4. **DID HIS TONGUE TIP MOVE BEHIND HIS FRONT UPPER TEETH?**

5. **DID THE TONGUE TIP ALSO TOUCH THE LOWER EDGE OF HIS FRONT UPPER TEETH?**

6. **IS THE TONGUE TIP TOUCHING THE TEETH LIGHTLY?**
   
   **YES** - **TURN THE PAGE.**
   
   **NO** - **CORRECT AS NECESSARY AND THEN TURN THE PAGE.**
TELL YOUR PARTNER TO PLACE HIS TONGUE IN
THE CORRECT POSITION AND BLOW LIGHTLY.
1. DID YOU GIVE EXACT INSTRUCTIONS AS TO WHAT YOU WANTED HIM TO DO?
2. DID YOU DEMONSTRATE WHAT YOU EXPECTED HIM TO DO?
3. DID HE OBSERVE HIMSELF IN THE MIRROR AS HE IMITATED YOU?
4. WAS THE TONGUE TIP PLACEMENT CORRECT?
5. DID HE BLOW LIGHTLY WHILE KEEPING THE TONGUE POSITION?
   YES - TURN THE PAGE.
   NO - CORRECT AS NECESSARY AND THEN TURN THE PAGE.
YOU HAVE COMPLETED THIS PROGRAM.

CHANGE PARTNERS.

WHEN BOTH HAVE COMPLETED THE PROGRAM REPORT TO YOUR INSTRUCTOR.
## TEACHING THE "Th" SOUND

### Person 1
- **Name:**
- **Age:**
- **Yrs. of Schooling:**

### Person 2
- **Name:**
- **Age:**
- **Yrs. of Schooling:**

### TO THE INSTRUCTOR:
Check each point omitted or not performed as described in the program.

<table>
<thead>
<tr>
<th>Person 1</th>
<th>Person 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>1. EXPLAINS ACTIVITY</strong></td>
<td><strong>b. Lower teeth</strong></td>
</tr>
<tr>
<td>a. identifies self</td>
<td>front teeth</td>
</tr>
<tr>
<td>b. tells what will be done</td>
<td>side teeth</td>
</tr>
<tr>
<td><strong>2. ASSUMES POSITION</strong></td>
<td>upper</td>
</tr>
<tr>
<td>a. sits down at table</td>
<td>lower</td>
</tr>
<tr>
<td>b. faces partner</td>
<td><strong>d. Tongue</strong></td>
</tr>
<tr>
<td><strong>3. LOCATES ARTICULATORS</strong></td>
<td>tip</td>
</tr>
<tr>
<td>a. tells what will be done</td>
<td><strong>5. PARTNER #2 IDENTIFIES HIS ARTICULATORS</strong></td>
</tr>
<tr>
<td>b. with tongue blade</td>
<td><strong>a. uses a clean tongue blade</strong></td>
</tr>
<tr>
<td>points to:</td>
<td><strong>b. watches himself in mirror</strong></td>
</tr>
<tr>
<td>1) Upper teeth -</td>
<td><strong>c. instructor (#1) watches his performance</strong></td>
</tr>
<tr>
<td>front teeth</td>
<td><strong>d. identifies</strong></td>
</tr>
<tr>
<td>side teeth</td>
<td><strong>1) Upper teeth</strong></td>
</tr>
<tr>
<td>lower edges</td>
<td><strong>front teeth</strong></td>
</tr>
<tr>
<td><strong>2) Lower teeth -</strong></td>
<td><strong>side teeth</strong></td>
</tr>
<tr>
<td>front teeth</td>
<td><strong>upper edges of</strong></td>
</tr>
<tr>
<td>side teeth</td>
<td><strong>front teeth</strong></td>
</tr>
<tr>
<td>upper edges</td>
<td><strong>3) Lips</strong></td>
</tr>
<tr>
<td><strong>3) Lips -</strong></td>
<td>upper</td>
</tr>
<tr>
<td>upper</td>
<td>lower</td>
</tr>
<tr>
<td>lower</td>
<td><strong>4) Tongue -</strong></td>
</tr>
<tr>
<td><strong>4. PARTNER IDENTIFIES INSTRUCTOR'S ARTICULATORS</strong></td>
<td>tip</td>
</tr>
<tr>
<td>a. Upper teeth -</td>
<td><strong>front teeth</strong></td>
</tr>
<tr>
<td>front teeth</td>
<td><strong>side teeth</strong></td>
</tr>
<tr>
<td>side teeth</td>
<td><strong>lower edges of</strong></td>
</tr>
<tr>
<td>lower edges of</td>
<td><strong>front teeth</strong></td>
</tr>
<tr>
<td><strong>front teeth</strong></td>
<td><strong>2) Lower teeth</strong></td>
</tr>
<tr>
<td><strong>3) Lips</strong></td>
<td>upper</td>
</tr>
<tr>
<td><strong>upper</strong></td>
<td>lower</td>
</tr>
<tr>
<td><strong>lower</strong></td>
<td><strong>4) Tongue -</strong></td>
</tr>
<tr>
<td><strong>tip</strong></td>
<td><strong>tip</strong></td>
</tr>
</tbody>
</table>
### Persons

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.</td>
<td>ASSUMES ARTICULATOR POSITIONS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. opens mouth &amp; leaves a space between the teeth no bigger than one-half inch</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. tongue protrudes between teeth no more than one-half inch</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. tongue is flat in shape when it is protruded</td>
<td></td>
</tr>
<tr>
<td></td>
<td>d. tongue is retracted with its tip touching the lower edge of front teeth</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e. tongue tip is behind the front upper teeth but still touching the lower edge of front teeth</td>
<td></td>
</tr>
<tr>
<td></td>
<td>f. blows air out gently</td>
<td></td>
</tr>
<tr>
<td></td>
<td>g. makes &quot;th&quot; sound</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>STEPS OUT OF ORDER</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OVERALL QUALITY</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. Excellent</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. Good</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. Fair</td>
<td></td>
</tr>
<tr>
<td></td>
<td>d. Poor</td>
<td></td>
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</tbody>
</table>
EVALUATION FORM

Subject Number ________________ Judge ________________

TO THE JUDGE: Rate the subject's performance on the scale. A space is provided to make any comments.

ARTICULATOR PLACEMENT:

1. Lips are slightly parted and relaxed.

<table>
<thead>
<tr>
<th>Poor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td>1</td>
</tr>
</tbody>
</table>

Comments:

2. Tongue protrudes between the teeth no more than one-half inch.

<table>
<thead>
<tr>
<th>Poor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<td></td>
<td></td>
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<td></td>
<td>1</td>
</tr>
</tbody>
</table>

Comments:

3. Tongue is retracted with its tip touching the lower edge of front teeth.

<table>
<thead>
<tr>
<th>Poor</th>
<th>1</th>
<th>2</th>
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<td></td>
<td>1</td>
</tr>
</tbody>
</table>

Comments:
4. Blows air out gently and produces an acceptable th.

<table>
<thead>
<tr>
<th>Poor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>Good</th>
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</thead>
</table>

Comments:

5. Clarity of instructions.

<table>
<thead>
<tr>
<th>Poor</th>
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<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>Good</th>
</tr>
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</table>

Comments:
APPENDIX C

1. Evaluation Form
   (Control Group)

2. Instructions for Evaluating
Subject Number ___________________ Judge ___________________

TO THE JUDGE: Rate the subject's performance on the scale. A space is provided to make any comments.

ARTICULATOR PLACEMENT:

1. Lips are slightly parted and relaxed.

<table>
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<tr>
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<th>2</th>
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Comments:

2. Tongue protrudes between the teeth no more than one-half inch.

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Comments:

3. Tongue is retracted with its tip touching the lower edge of front teeth.

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Comments:
4. Blows air out gently and produces an acceptable th.

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<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>Good</td>
</tr>
</tbody>
</table>

Comments:
INSTRUCTIONS:

You are to evaluate the performance of 15 subjects who instructed children how to produce the /th/ voiceless sound in isolation. Methods of teaching vary. Any method was acceptable except that of telling the child what sound he was to produce, e.g., "Today you are going to learn how to say /th/".

As you review the performance of the subjects you are asked to judge their performance according to the following criteria:

1. Clarity of instructions given
2. Articulator placement made by the child
3. Acoustic production of the /th/ voiceless

According to Nemoy and Davis (1970), the formation of /th/ (voiceless) is as follows:

The tip of the tongue, wide and thin, and with an exceedingly small central aperture, is placed lightly against the inner edges of the upper teeth. The lower front teeth lightly touch the under surface of the tongue. The main body of the tongue is flat and fills in the space between the upper and lower side teeth. The lips are slightly parted and relaxed. The soft palate is raised closing the nasal passage.

The breath is emitted in a continuous stream and with a fricative sound through the narrow aperture between the tongue tip and
the upper front teeth and between the interstices of the teeth. The vocal cords do not vibrate.

The following table lists common errors made in producing the voiceless /th/ through faulty positioning of the articulators:

**COMMON ERRORS**

<table>
<thead>
<tr>
<th>Articulator Placement</th>
<th>Production</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lips:</strong></td>
<td></td>
</tr>
<tr>
<td>Lips opened too wide</td>
<td></td>
</tr>
<tr>
<td><strong>Tongue:</strong></td>
<td></td>
</tr>
<tr>
<td>Tongue makes contact with teeth ridge. Excessive pressure may be used.</td>
<td>Breath is released explosively.</td>
</tr>
<tr>
<td>Tip of the tongue narrowed and thickened.</td>
<td>Breath is emitted entirely over sides of the tongue and escapes into the cavity of cheeks and out of corners of mouth.</td>
</tr>
<tr>
<td>Tip drops and aperture is formed.</td>
<td>Breath is released and /s/ made.</td>
</tr>
<tr>
<td>Faulty tongue position with the tip of the tongue being protruded, marring the appearance of the sound.</td>
<td></td>
</tr>
</tbody>
</table>
LOMA LINDA UNIVERSITY
Graduate School

PROGRAMMED ARTICULATION THERAPY
ADMINISTERED BY SUPPORTIVE PERSONNEL
by
Leona B. Smook

An Abstract of a Thesis
in Partial Fulfillment of the Requirements
for the Degree Master of Science
in the Field of Speech Pathology

August 1974
ABSTRACT

Using the principles of programmed instruction, a motor skill program was designed to instruct a nonprofessional how to teach a child to make a speech sound, specifically the phoneme /th/ (voiceless) in isolation.

A cognitive program describing the speech mechanism and act was also developed to be used in conjunction with the motor skill program.

These programs were pretested, then tested using 15 nursing attendants (aides) as subjects. Their presentation was compared to methods used by professionally trained clinicians. Three fully trained and qualified judges rated the performance of both groups. Analysis of the ratings showed that the performance of the aides was comparable to that of the professionally trained clinicians.