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THE ROLE OF THE MANUAL ALPHABET IN LETTER
RECOGNITION BY KINDERGARTEN CHILDREN

Submitted to the Graduate Committee of the
Department of Education and Human Development
State University of New York
College at Brockport
in Partial Fulfillment of the
Requirements for the degree of
Master of Science in Education

by

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Abstract

The purpose of this study was to determine if there was a difference between recall of sounds and symbols of the alphabet by students who were taught the letters of the alphabet using a manual alphabet (fingerspelling), versus recall of the sounds and symbols of the alphabet by students who were taught without fingerspelling.

Using a population of 20 regular education kindergarten students from a rural, upstate New York school district, the researcher found whether or not the manual alphabet played a role in kindergarten students' sight and symbol recognition of the alphabet.

For three consecutive weeks, the researcher taught a treatment group (N=10) a letter a day. The sessions lasted 30 minutes and included the instruction of the manual alphabet for each letter taught, along with enrichment activities. For the same three weeks, the researcher taught a control group (N=10) the same letters of the alphabet, with the same enrichment activities, in the same fashion, without the use of the manual alphabet.

At the end of the instruction time, the researcher administered an "ABC" inventory to the entire population. The "ABC" inventory was designed by the researcher. The subjects recalled the sounds and symbols of the letters they were taught. The number of correct identifications were calculated for both of

the groups. The group mean data from the measure was analyzed using an independent t-test.

After testing the null hypotheses at the .05 level of significance by the independent t-test, the results showed that there was no statistically significant difference between the mean score of the treatment group and the control group on their ability to recognize the alphabet visually. There also was no statistically significant difference between the mean score of the treatment group and the control group on the ability to recall the alphabet auditorally. Further research was recommended.

Dedication

This thesis, and all of the love that went into it, is dedicated to my husband, Michael. I am grateful for all of the efforts he made to bring this to completion. There are many chapters in life. Because of my husband's ability to put up with my every day chapters, I was able to put these five sections together.

In the midst of this project, our daughter, Michaela Therese, was born. Thanks goes to her for her patience in taking so many naps and allowing me the time to finish!

Table of Contents

	Page
Chapter I	
Statement of the Problem	1
Purpose	1
Hypotheses	2
Need for the Study	2
Definition of Terms	4
Limitations of the Study	4
Chapter II	
Review of the Literature	6
Related Research	6
Summary of the Chapter	13
Chapter III	
Design of the Study	15
Hypotheses	15
Methodology	15
Chapter IV	
Statistical Analysis	19
Findings	19
Analysis and Interpretation of Hypotheses	20
Summary of the Chapter	21

Chapter V

Conclusions and Implications	22
Conclusions	22
Implications for Research	23
Implications for Classroom Practice	24
References	25

CHAPTER I

Statement of the Problem

In the regular kindergarten classroom, there are many approaches to teaching children the letters of the alphabet. A kindergarten student may be four-, five-, or six-years-old. This age group's successful learning experience depends heavily on the use of their perceptual motor systems.

Therefore, when learning such a highly abstract concept as the sounds and symbols of the alphabet, it is necessary that a teacher use as many means possible to teach to the children's learning abilities.

The manual alphabet, developed for non-hearing individuals, employs a tactile-kinesthetic modality of learning. This emphasis on the movement of hand with sight and in conjunction with students who have the ability to hear can provide a successful learning experience for kindergarten students engaged in learning the traditional alphabet.

Purpose

One expectation of many kindergarten programs is that the children have a mastery or exposure level of the letters of the alphabet both visually and phonetically. Some children are able to master this expectation by the end of the school year. Others have been exposed but have not yet been able to recall with

consistency all of the letters of the alphabet by the end of the school year.

The purpose of this study was to determine if there is a difference between recall of sounds and symbols of the alphabet by students who were taught the letters of the alphabet using a manual alphabet (fingerspelling), versus recall of the sounds and symbols of the alphabet by students who were taught without fingerspelling.

Null Hypotheses

1. There will be no statistically significant difference between the mean square of the treatment group and the control group on their ability to recognize the alphabet visually.
2. There will be no statistically significant difference between the mean score of the treatment group and the control group on their ability to recall the alphabet auditorally.

Need for the Study

If a kindergarten student is expected to identify and to have phonemic awareness of the letters of the alphabet, it should be appropriate that the formal instruction of the letters include tactile-kinesthetic learning. As children advance through the developmental stages of growth, their perceptual-motor systems play a key role in their development of learning skills.

According to Kephart (1971), the earliest behavioral responses of the human organism are the early motor, or muscular responses. Through early motor explorations, the child learns about his surrounding environment. When a child's exploring hand touches something, the eye, watching the hand, correlates the visual information with the tactual. The eye learns to see what the hand feels. As the child learns visually, the eye takes the lead because of its greater efficiency. As the eye explores, the hand moves along, to confirm what the eye is experiencing.

Tactile-kinesthetic learning is abundant in the regular kindergarten classroom. For example, when formally introducing or teaching a letter of the alphabet, a common practice of many kindergarten teachers is to have a group of children form the letter with their bodies. This is done with the intention of promoting the child's awareness of their bodies in space. This is a level of development that most kindergarten children are in, and through which much learning is completed. Another example is to use letters that are made of sand and have the child trace those letters so that they literally have a "feeling" for the shape of the letters.

Blackburn, Bonvillian and Ashby (1984) state that current theory ascribes many reading difficulties to deficits in auditory-visual processing. Auditorally, children often have improved in their reading skills through a structured program of tactile-kinesthetic training. Recently, a few programs for

children with severe reading disabilities have begun to include training in manual communication, using one of the sign languages of the deaf, or the manual alphabet as the additional processing mode. Early results of these training programs have been encouraging.

Boder (1973) states that a teacher should begin teaching to the particular abilities rather than to the disabilities of each child, thus ensuring success and positive reinforcement at the outset.

Therefore, the use of the manual alphabet, called fingerspelling, should play an important role in the acquisition of the letters of the alphabet both visually and auditorally in kindergarten children.

Definition of Terms

FINGERSPELLING -- the use of the manual alphabet in which a system of separate hand positions are used for each letter of the alphabet.

Limitations of the Study

One of the limitations of the study is that the children in the treatment group might have "shared" their fingerspelling knowledge with the children in the control group. However, the two groups were not in view of each other as the formal instruction took place and the entire group was under the

assumption that they were all doing the same thing. This ensured to some degree that "sharing" information was not a major limitation.

A second limitation to the study was that because a small number of subjects (N=20) was being used, results could vary with a larger population. Any conclusions drawn from this study should not be applied generally until further research is conducted.

Chapter II

Review of the Literature

Purpose

The purpose of this study was to determine if there was a difference between recall of sounds and symbols of the alphabet by students who were taught the letters of the alphabet using a manual alphabet (fingerspelling), versus recall of the sounds and symbols of the alphabet by students who were taught without fingerspelling.

Related Research

Fingerspelling uses representative alphabet letters. It provides a visual cue, involves the child motorically, and when used while speaking, it shows the separate letter-sounds without auditory distortion.

According to Lloyd and Karlan (1984), in a noisy environment, it is easier to attend to visual symbols than to auditory symbols. There appears to be greater consistency in representation of visual/manual symbols than auditory/vocal symbols. The temporal duration of visual symbols can be adjusted with less distortion than auditory symbols. Visual/manual signs are more easily associated with visual referents than are spoken symbols.

In a study by Bradley and Bryant (1983), children (N=403) with poor phonological awareness skills were identified and then trained. The lower-achieving children were assigned to one of four groups (two experimental and two control groups). The second experimental group, using plastic alphabet letters with their training, performed significantly better ($p < 0.001$) than the other three groups in the school's final spelling test, and better than both control groups in two reading tests ($p < 0.05$).

Elkonin (1973) found that tasks supported with visual aids and motor involvement greatly improved children's performance. Elkonin used a stimulus that was a picture with a row of squares beneath it. Each square corresponded to a speech sound. The children were told to place a token in each as they came to the phoneme. The visual presence of the squares seemed to help the children focus on the separate sounds, as did the motoric act of setting the token down.

Lewkowicz (1980) modified Elkonin's study and found that it was just as beneficial to tap each square while saying each phoneme.

Gierut (1984) states there is superior word retention for both learning disabled and regular students when signs are presented with printed words.

In a study by Stall and Marshall (1981), a treatment group of prelingually deaf students (N=24) were instructed to use fingerspelling and finger numeration in learning eight pairs of

number-word combinations, while the control group was prohibited from using any manual encoding. It was found that the group utilizing fingerspelling as a means of encoding showed better recall and learned at a faster rate ($p < 0.001$). In a study conducted by Blackburn, Bonvillian and Ashby (1984), two severely reading-disabled adolescent boys were given reading instruction with the aid of fingerspelling and sign language. Over a five-month training period, the two boys demonstrated considerable improvement in reading ability. The subjects had 35-minute sessions of sign-language instruction a week for five months. As the subjects became comfortable with signing, signs were introduced to reinforce the phonetic decoding of words, using key word analysis. "The boys were taught signs for the key words they regularly used in their phonetics and reading classes, and were instructed to cue themselves whenever they encountered an unknown word." (p. 27) At the end of the five-month period, each subject had the knowledge and use of eighty (80) to ninety (90) signs. Results of the Gates-MacGinney Test of Reading Ability, given before and after the study, showed that subject "F" had an increased grade equivalent of 2.9 to 3.6 on vocabulary and 4.1 to 4.5 on comprehension. Subject "G" showed improvement in that his grade level equivalent went from 4.5 to 5.4 on vocabulary and 3.6 to 4.7 on comprehension.

Kotkin, Simpson and Desanto (1977) found that "... simultaneous sign/verbal presentation was more effective

than verbal training alone in facilitating the retarded child's ability to verbally label pictures." (p. 25)

In a study by Sensenig, Mazeika, and Topf (1989), it was investigated whether or not the use of sign language was effective to facilitate reading achievement in students classified as trainable mentally-handicapped (N=15). The subjects were randomly assigned to one of two groups (Sign or Nonsign). The Sign group was presented with words on individually printed flash cards and then they were asked to read the word. Whether correct or not, the word was pronounced, spelled and signed by the experimenter. The Nonsign group was asked to do the same thing with the exception that the word was not signed. The results showed that the subjects learning to read words with an accompanying sign identified and retained significantly more vocabulary (M=11.13) than did students learning to read in a traditional manner (M=7.9), ($p < .01$ two tail). In addition, a six week follow-up test revealed that significantly more words were retained when subjects used a sign response (M=13.4) than when subjects responded without a sign (M=3.63) ($p < .01$ two tail).

The use of manual communication to teach reading to hearing children dates back at least as far as 1852 when David Bartlett enrolled deaf children and their hearing siblings in a "family" school. Both deaf and hearing children were taught to sign and fingerspell. As cited in Gordon (1885), Bartlett concluded the

following:

We find this beneficial to both classes, to the deaf mutes in enlarging their scope of thought by bringing their minds into contact with those of their more favored companions; beneficial yet more variously to those who hear and speak, quickening their perception and improving their mental development by presenting to their mind language under entirely new forms; by the use of the manual alphabet in spelling words; and also by no means inconsiderable advantage of improved ease and expressiveness of manner, induced by practice in the use of gesture language. (p. 249)

According to by Vernon and Coley (1980), an experimental project was set up using the manual alphabet with learning-disabled second grade children to improve their spelling skills. All the subjects met three criteria: they were classified as haptic learners (those who learn by touch), they were poor spellers, and they were assigned to a second grade spelling book in the regular classroom. Their teachers were instructed to introduce new spelling words by fingerspelling the word while saying it aloud. All three teachers reported that after only three, 10-minute instructional periods, the children were able to read and fingerspell most of their spelling words. During the fifth instructional period, two types of spelling tests were administered: the children fingerspelled each word individually to the teacher, and took a group written test. All children scored 100% on the fingerspelled test, and all but one scored 100% on the written test. As a result of this study, all of the children learned to fingerspell and learned approximately 25

signs.

In an article by Bonvillian and Nelson (1976), a nine-year old mute, autistic boy was taught the elements of reading through sign language training. The subject showed considerable and increasing ability in the appropriate use of individual signs and of signs in combination, in contrast to a well-documented prior history of no productive language and of highly limited receptive language skills. After six months of daily, half-hour instructional periods, the subject used a total of 56 different signs correctly and spontaneously. Also, if the subject used a sign correctly at least once, he was very likely (in 96% of cases) to produce the sign accurately on two or more additional occasions. He acquired an average of slightly more than two new signs each week. The subject's score on the Peabody Picture Vocabulary Test rose from the three-year, six-month level to the four-year and eleven-month level during the six months of this study.

According to Walker (1977), fingerspelling was used in a remedial reading project. In an effort to reach thirteen "incorrigible" junior high school boys whose reading ability ranged from the second to the fourth grade level, it was reported that visual memory for words was improved with the kinesthetic cues provided by manually forming the letters of each word. It also was noted that the students achieved success in an area in which they had previously failed and, as a result, actually began

to enjoy their reading lessons.

In an article by McKnight (1979), the researcher implemented a reading program involving the manual alphabet from American Sign Language with reading disabled children. Three primary school-age children, who were not learning to read in the traditional manner, were taught to fingerspell words that were spelled phonetically, and to sign sight words and inflections while saying the words aloud. The children spontaneously began to cue themselves with signs whenever they came to unknown words. They discovered new words without outside help. "It was easier to connect the visual letter to a manual sign, and then to a verbal sound, than it was to go directly to the verbal sound" (p. 583).

Creedon (1972), as cited in Offir (1976), developed a day-school program devoted to simultaneous communication: the use of both signed and spoken English. There were thirty (30) children in this program, all functioning at the severely retarded level. All the children were classified as autistic. They ranged in age from four to nine and all had no intelligible speech. All 30 children in this program learned to use signs to make requests and express feelings. After a couple of years of practice, seven children learned to speak with ease. Thirteen (13) others advanced to the point where they could speak single words or could approximate sentences. Twenty-eight (28) of the students in this program were able to enroll in traditional public or

private schools. According to Creedon, "The children feel, hear, and see the language when we use simultaneous communication" (p.78).

According to Cratty (1971), "... if one observes the total child in action as he moves through space, it is apparent that the sensations he depends upon involve a combination of sensory input, visual, kinesthetic as well as tactile. It is apparent that gross bodily movements represent an important learning modality" (p. 19).

According to Carney, Cioffi, and Raymond (1985), "The basis for hypothesizing that sign language might have specific application to reading instruction lies in the fact that sign language is a multimodal medium of communication" (p. 215).

Vernon and Coley (1978) suggested the relationship between sign language and reading this way:

The use of fingerspelling and sign language involves the kinesthetic, multimodal, motivating, classical conditioning, and sensory training principles basic to the learning theory involved in high-quality reading and language instruction... Its full implications have yet to be explored. (pp.299-300)

Summary

Research seemed to indicate that the use of a kinesthetic, tactile method of teaching hearing children the beginning stages of reading was very successful. According to Asher and Price (1967):

By fingerspelling a word, a child gets strong kinesthetic feedback and reinforcement along with added visual input. The whole idea of associating reading with a pleasurable motoric activity has great appeal for young children, who almost universally receive such a motoric activity in school well. (p. 1221)

It has been noted that the method of using a system of manual communication has great benefits in the classroom. However, as Hafer (1984) states, "Though many descriptive accounts of sign signing can be found in literature, few empirical studies exist" (p. 1577-A).

CHAPTER III

Design of the Study

Purpose

The purpose of this study was to determine if there is a difference between recall of sounds and symbols of the alphabet by students who were taught the letters of the alphabet using a manual alphabet (fingerspelling), versus recall of the sounds and symbols of the alphabet by students who were taught without fingerspelling.

Null Hypotheses

1. There will be no statistically significant difference between the mean square of the treatment group and the control group on their ability to recognize the alphabet visually.
2. There will be no statistically significant difference between the mean score of the treatment group and the control group on their ability to recall the alphabet auditorally.

Methodology

Subjects

The subjects in this study were 20 kindergarten students who were five- and six-years old. They were from a regular, self-contained, full-day kindergarten classroom in a rural upstate New

York school district. The researcher was the classroom teacher.

Ten students comprised the treatment group and ten students acted as a control group. A stratified random sample was used for the groups. There was an equal number of boys in each group and an equal number of girls in each group.

Based on a pre-screening device that was developed by the researcher, the subjects did not know the letters of the alphabet in random order phonetically or visually.

Materials

1. Individual cards showing a pictorial representation of the posture of a hand forming the letters of the alphabet.
2. Individual cards with the letters of the alphabet.
3. Individual cards with a picture representing a beginning sound for that picture.

Procedure

The study was conducted for a three-week period in December. The two groups were separated from each other visually as each group received its formalized instruction. Both groups received a thirty-minute session of instruction in the morning.

The letters Bb, Dd, Gg, Pp, Qq, Yy, Ff, Tt, Jj, Ll, Vv and Ww were chosen as the letters the subjects were taught because of their level of difficulty. Of the twenty-six letters of the

alphabet, these letters are the most difficult to learn due to their structural similarities as well as the confusing sound correlation among some of the letters.

On Monday of week one, the researcher introduced the letter "Bb" visually, auditorally, and manually to ten (10) children (experimental group), using stories and activities to enrich the learning of the letter.

On Tuesday of week one, the letter "Bb" was reviewed and the children independently recalled the hand sign for that letter. The children were then introduced to the letter "Dd" visually, auditorally, and manually. Again, stories and enrichment activities were used to aid in the learning process of the letter.

On Wednesday of week one, the letter "Gg" was introduced in the same fashion and a review of all the letters introduced took place with story and enrichment activities pertaining to all of the letters previously taught.

On Thursday of week one, the letter "Pp" was introduced and a review of all the letters took place.

On Friday of week one, the letter "Qq" was introduced and a review of all the letters took place.

The same format continued throughout the second week with the letters "Yy," "Ff," "Tt," "Jj," and "Ll" introduced on Monday through Friday, respectively.

The introduction of letters continued through Tuesday of the

third week with "Vv" and "Ww." On Wednesday through Friday of the third week, a review of all the letters took place.

The researcher introduced the same letters in the same format for the same amount of time without the use of fingerspelling to a control group of ten (10) children.

Each session lasted approximately thirty (30) minutes.

Chapter IV

Statistical Analysis

Purpose

The purpose of this study was to determine if there is a difference between recall of sounds and symbols of the alphabet by students who were taught the letters of the alphabet using a manual alphabet (fingerspelling), versus recall of the sounds and symbols of the alphabet by students who were taught without fingerspelling.

Findings from the Independent t test

The two null hypotheses were tested at the .05 level of significance by the independent t tests. The results are presented in tables 1 and 2.

The first hypothesis states that there will be no statistically significant difference between the mean score of the treatment group and the control group on their ability to recognize the alphabet visually.

The second hypothesis states that there will be no statistically significant difference between the mean score of the treatment group and the control group on their ability to recall the alphabet auditorally. The data pertaining to these hypotheses are presented in tables 1 and 2.

Table 1 Visual empirical data

Visual Recognition of Letters

Group	Mean	s.d.	<u>t</u>
Treatment	6	2.4	
Control	5	1.6	.75 (N.S.)

t _{crit} = ± 2.28; p < .05

Table 2 Auditory empirical data

Auditory Recognition of Letters

Group	Mean	s.d.	<u>t</u>
Treatment	5.3	3.5	
Control	3.5	1.7	1.5 (N.S.)

t _{crit} = ± 2.28; p < .05

Analysis and Interpretation of Hypotheses

In Table 1, since the t required is ±2.28 and the t obtained is .75, the null hypothesis is accepted. There is no

statistically significant difference between the two means.

In Table 2, since the t required is ± 2.28 and the t obtained is 1.5, the null hypothesis is accepted. There is no statistically significant difference between the two means.

Summary

The purpose of this study was to determine if there were any statistically significant differences between using fingerspelling and not using fingerspelling. From the data collected in this study, it was concluded that after teaching one group of 10 children to fingerspell the traditional alphabet and teaching a second group of 10 children without the instruction of fingerspelling, there was no statistically significant difference.

Chapter V

Conclusions and Implications

Purpose

The purpose of this study was to determine if there is a difference between the recall of sounds and symbols of the alphabet by students who were taught the letters of the alphabet using a manual alphabet (fingerspelling), versus recall of the sounds and symbols of the alphabet by students who were taught without fingerspelling.

Conclusion

In recent years, the kindergarten curriculum has been under much examination. Because the grade levels following kindergarten have increased the academics in their classrooms, much more has been expected of the children in kindergarten classrooms by the end of the year. Whether or not the teacher approves of this philosophy, she must prepare, as best she can, the students for the years that lie ahead of them. It is for this reason that kindergarten teachers need to make the academics of kindergarten, mainly the learning of the alphabet by sound and symbol, a fun and easy task to master. The use of the manual alphabet can make this endeavor possible.

Due to the small number of subjects used in this study, the

results do not show considerable evidence that fingerspelling is a useful tool in the recall of sounds and symbols of the letters of the alphabet. However, the literature presented shows abundant evidence that fingerspelling can be a positive influence in children developing knowledge of their beginning reading skills.

Implications for Further Research

Further investigation of the use of the manual alphabet is highly suggested. Longitudinal evidence may be necessary to determine the long-term effects of children's knowledge and further use of the manual alphabet. As children progress through the grade levels, it should be investigated how far they take the manual alphabet with them and how they use it in their academics.

A larger number of subjects should be used to quantify this study further. With a larger testing population and more empirical data, there would be stronger evidence to support or to reject other researchers' findings.

In terms of finding related research, Hafer (1984) states: "Though many descriptive accounts of using signing can be found in literature, few empirical studies exist" (p.1577-A). As Vernon and Coley (1978) state: "Thus far, there have been no published studies of the use of sign language or fingerspelling to aid in the development of reading skills with normal children who can hear" (p. 298). There is a need for more data. This

study can be used as a foundation for further research in the area of the use of the manual alphabet in letter recognition.

Implications for Classroom Practice

Teachers will enjoy using this method of teaching the alphabet because it physically involves the children. For children who are extremely active or identified as hyperactive, this will be quite useful in involving them and keeping their attention, if even for a short while. It involves movement and stimulation of their bodies, something they are looking for. Also, when working in a noisy environment, as is the case in most kindergarten classrooms, it is much easier to attend to a visual task than to an auditory one.

There is much greater similarity in the representation of visual/manual symbols than auditory/vocal symbols. The manual alphabet acts as a self-cueing system and can also help with writing problems like "b" and "d" reversals.

Finally, teachers and administrators alike will highly appreciate the fact that it is inexpensive.

REFERENCES

- Asher, J. J. & Price B.S. (1967). The Learning Strategy of the Total Physical Response: Some Age Differences. Child Development, 38, 1219-1227.
- Blackburn, D. W., Bonvillian, J. D. & Ashby, R. P. (1984). Manual Communication as an Alternative Mode of Language Instruction for Children With Severe Reading Disabilities. Language, Speech and Hearing Services in the Schools, 15(1), 22-31.
- Boder, E. (1973). Developmental Dyslexia: A Diagnostic Approach Based on Three Characteristics of Reading and Spelling. Developmental Medicine and Childhood Neurology, 15, 663-687.
- Bonvillian, J.D., & Nelson, K.E. (1976). Sign Language Acquisition in a Mute Autistic Boy. Journal of Speech and Hearing Disorders, 41, 339-347.
- Bradley, L. & Bryant, P. E. (1983). Categorizing Sounds and Learning to Read: A Causal Connection. Nature, 301, 419-421.
- Carney, J.J., Cioffi, G., & Raymond, M.W. (1985). Using Sign Language for Teaching Sight Words. Teaching Exceptional Children, 17, 214-217.
- Cratty, B. (1969). Perceptual-Motor Behavior and Educational Processes. Springfield, Il., Charles C. Thomas.
- Elkonin, D. D. (1973). In J. Downing (Ed.), Comparative Reading. New York: Macmillan.
- Gierut, M. K. T. (1984). Total Communication Technique Effects On Sight Word Acquisition With Primary Regular and Learning Disabled Students. (Doctoral Dissertation, Northern Illinois University, 1983). Dissertation Abstracts International, 45, 113A.
- Gordon, J. (1885). Hints to Parents. American Annals of the Deaf, 30, 241-250.
- Hafer, J.C. (1985). The Effect of Signing as a Multisensory Technique for Teaching Sight Vocabulary to Learning Disabled Hearing Students. (Doctoral dissertation, University of Maryland, 1984). Dissertation Abstracts International, 46, 1577A.

- Kephart, N. (1971). *The Slow Learner in the Classroom*. Rev. Ed., Charles E. Merrill Publishing Company, Columbus, Ohio.
- Kotkin, R. A., Simpson, S. B. & Desanto, D. (1978). The Effect Of Sign Language On Picture Naming In Two Retarded Girls Possessing Normal Hearing. Journal Of Mental Deficiency Research, 22, 19-25.
- Lewkowicz, N. K. (1980). Phonemic Awareness Training: What To Teach and How To Teach It. Journal Of Educational Psychology, 72(5), 686-700.
- Lloyd, L. L. & Karlan, G. R. (1984). Nonspeech Communication Symbols and Systems: Where Have We Been and Where Are We Going? Journal of Mental Deficiency Research, 28, 3-20.
- McKnight, J.C. (1979). Using the Manual Alphabet in Teaching Reading to Learning Disabled Children. Journal of Learning Disabilities, 12, 581-584.
- Offir, C.W. (1976). Their Fingers do the Talking. Psychology Today, 10, 73-78.
- Sensenig, L.D., Mazeika, E.J., & Topf, B. (1989). Sign Language Facilitation of Reading With Students Classified as Trainable Mentally-Handicapped. Education and Training in Mental Retardation, 24(2), 121-125.
- Stall, H. C. & Marshall, P. H. (1981). The Role Of Manually Encoding In Learning By Prelingually Deaf Subjects: An Initial Investigation. Sign Language Studies, 33, 313-318.
- Vernon, M., & Coley, J.D. (1978). The Sign-Language of the Deaf and Reading-Language Development. The Reading Teacher, 32, 297-301.
- Vernon, M., Coley, J.D., & DuBois, J. (1980). Using Sign Language to Remediate Severe Reading Problems. Journal of Learning Disabilities, 13, 215-218.
- Walker, N.M. (1977). Using the Deaf Alphabet in Language Experience Exercise. Journal of Reading, 21, 7.