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The effect of different modes of communication for the deaf student on verbal achievement

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THE EFFECT OF DIFFERENT MODES OF COMMUNICATION
FOR THE DEAF STUDENT ON VERBAL ACHIEVEMENT

By
Maureen A. Dugan

A Thesis
Submitted in partial fulfillment of the requirements of the
Master of Arts Degree
Of
The Graduate School
At
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Approved by
Professor
Date Approved 5/1/02
This investigation compared hearing-impaired populations that have been educated with and primarily communicated with either the use of Sign Language, Cued Speech, or the Oral Method. The purpose of the study is to give an overall picture of how each method impacts the hearing-impaired learner.

The sample of this study was hearing impaired males and females over the age of 18 who have taken either the Scholastic Aptitude Test (SAT) or the American College Test (ACT). All had a significant hearing loss labeled as profound and none were considered mild losses.

A sixteen-question survey was given to the participants consisting of marking all answers that applied in their individual case. The key questions were pertaining to the scores on the verbal section of the SAT I/ACT, the final grade point average in high school, and the primary mode of communication used throughout their learning years.

An Independent One-Way Analysis of Variance (ANOVA) was the model used to test the hypotheses. The means of each group were compared in this test.
It was concluded that there were no main effects and no interaction between the groups. The alternate hypothesis was rejected, in that the Cued Speech subjects would score higher and perform better in academic subjects than the oral and sign language participants although the results are very closely related in number.
MINI-ABSTRACT

Maureen A. Dugan
THE EFFECT OF DIFFERENT MODES OF COMMUNICATION
FOR THE DEAF STUDENT ON VERBAL ACHIEVEMENT
2001/02
Dr. Roberta DiHoff and Dr. John Klanderman
Master of Arts in School Psychology

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impaired learner.

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My daughter, Alexa, who gave up her Mommy many weekends and weeknights in the past year and a half and gave back support and love in return.
# TABLE OF CONTENTS

## CHAPTER I: THE PROBLEM

- Purpose .............................................................. 1
- Hypothesis .......................................................... 2
- History ............................................................... 2
- Definitions .......................................................... 7
- Overview ............................................................ 11
- Summary ............................................................ 12

## CHAPTER II: REVIEW OF LITERATURE

- Related Studies .................................................. 13
- Areas of Related Investigation ............................... 20
- Discussion of Previous Research ............................ 26
- Summary ............................................................ 27

## CHAPTER III: DESIGN OF STUDY

- Measures .......................................................... 32
- Design .............................................................. 34
- Testable Hypothesis ............................................. 34
- Analysis ............................................................ 35
- Summary ............................................................ 35

## CHAPTER IV: ANALYSIS OF RESULTS

- Order of Presentation .......................................... 37
- Restatement of Hypothesis .................................... 41
- Interpretation of Results ....................................... 41
- Summary ............................................................ 43

## CHAPTER V: SUMMARY AND CONCLUSIONS

- Conclusions ....................................................... 44
- Discussion ........................................................ 46
- Implications For Future Research .......................... 49

## REFERENCES

................................................................. 50

## APPPENDIX

................................................................. 54
# LIST OF TABLES AND CHARTS

Table 2.1 ............................................................................................. 28  
Table 2.2 ............................................................................................. 29  
Table 2.3 ............................................................................................. 30  
Table 2.4 ............................................................................................. 31  
Table 2.5 ............................................................................................. 31  
Figure 4.1 ............................................................................................ 38  
Figure 4.2 ............................................................................................ 39  
Figure 4.3 ............................................................................................ 39  
Figure 4.4 ............................................................................................ 40  
Figure 4.5 ............................................................................................ 41  
Figure 4.6 ............................................................................................ 42
Chapter I: The Problem

This investigation is being conducted to give parents, caregivers, and the entire educational community a direction in the education of hearing impaired children. There is a need for an updated compilation of facts and a history of results in order for parents and professionals to make intelligent decisions for the training in and presentation of language and information to a child with this sensory loss. There is also a need to analyze academic skills of deaf students who have completed their secondary education after the use of a specific communication mode for the majority of two decades.

The first educator of the deaf child, in most cases, is the parent(s). When first faced with this “loss”, there can be an overwhelming and intimidating amount of materials, methods, and techniques of communicating with, and subsequently, educating their child. The questions parents may be are faced with are:

1. Is this the most appropriate communication tool for our family to use?
2. How long will it take us to learn and where can we learn it?
3. Will we be committed to using it as much as possible as we interact?
4. Is support available and, if not, are we determined enough to do it on our own?
5. What results can we expect from using this communication tool?

The majority of people with profound hearing impairments use one of the following modes to communicate: American Sign Language, manually coded English (Signed Exact English), and/or spoken language (Oral). A relatively small percentage use Cued Speech.
Purpose

This investigation will be comparing hearing-impaired populations that have been educated with and primarily communicated with either the use of Sign Language, Cued Speech, or Orally. Their academic achievements will be measured through the use of standardized tests indicating their verbal abilities and the use of their high school final grade point average. The purpose of this study is to give an overall picture of how each method impacts the hearing-impaired learner.

Hypothesis

It is hypothesized that pre-college hearing-impaired persons who communicate and receive their education through the use of Cued Speech will achieve higher academic levels than students who communicate and are educated through the use of Sign Language or Oral Methods.

This study will investigate this hypothesis, in that “Cueing” (Cued Speech) students produce higher standardized test scores than “Signing” (Sign Language) or Oral Method students and hopefully help parents and professionals in the choice of Cued Speech as the premium method in educating Deaf students.

History

The first deaf person to teach other deaf people in the United States was a Frenchman, Laurent Clerc. In 1816, he came to the United States to help set up the first American school for the deaf along with Thomas Gallaudet, which opened in Hartford,
Connecticut in 1817. The standards for American Sign Language began to take form and were then spread throughout the United States and Canada.

American Sign Language, which is currently the language used primarily by deaf communities of the U.S. and Canada, comprises hand signs, facial expressions, and finger spelling. Developed in the early 19th century by Thomas Gallaudet, American Sign Language was based on French Sign Language and was designated a foreign language with grammar and syntax distinct from English which also includes many regional differences and slang. While Sign Language was a magnificent tool for communicating with the deaf, it had its limitations specifically pertaining to deaf children and/or adults reading written English.

The highest median scaled score for deaf and hard of hearing students on the 8th Edition Stanford Achievement Test (SAT-8) Reading Comprehension subtest is 619 for 17-year olds, a grade equivalency of 4.5 (Holt, 1993). For 18-year olds, the score is 610 and a grade equivalency of 3.8. These scores support the frequently quoted statistic that most deaf children graduate from high school reading at the third or fourth grade level. Even though a median score is just a middle score, and many deaf children read at higher levels, as many read at alarmingly lower levels. (Schimmel, 1999)

In 1966, exhorting these unsatisfactory literacy levels, R. Orin Cornett, Ph.D. researched on how to improve literacy among the deaf. He theorized that deaf people cannot read without language base. His idea was that if the phonemes of speech looked clearly different from each other on the speaker’s mouth, just as they sound different from each other to normal ears, a profoundly deaf child could learn language via vision easily. He understood that since deaf children cannot hear nor can acquire a language
through lip reading due to so many similar lip movements, he developed Cued Speech, which is a phonemically-based hand supplement to speech reading comprised of eight hand shapes to represent consonant sounds placed in four positions about the face that represent vowel sounds. Combinations of these hand configurations and placements show the pronunciation of words in connected speech that are clearly visible and understandable to the Cued Speech recipient.

Cued Speech is not a language, in the same way that speaking, writing, and signing aren't languages. They are all ways to express a language. A deaf child can learn Cued Speech because cueing is not based on speech. Speech is noise and hot air; it is a way to express a language. It is 100% accessible through the ears. However, you cannot see it. In essence, it is not very useful to a person who cannot hear. Cueing is also a way to express a language. Since cueing is made up of hand shapes, placements, and mouth movements, it is 100% accessible through the eyes (Klossner, 2001).

Cued Speech is neither a method nor a philosophy but a tool. When you cue, you are cueing English (if you live in the United States). It has been adapted to more than 60 languages and dialects and is in use in countries around the world.

Cued Speech was originally developed for use by hearing parents of deaf children to expedite the development of language and the achievement of literacy and for the purposes of speech training. Cued Speech can reinforce the work of the speech therapist, showing pronunciation, accent, duration, and the rhythm of speech. Since Cued Speech is presented with natural, running speech, it has been shown to improve speechreading even when the cues are not in use (Neef & Iwata,1985). Cued Speech enables the parents to continue to build their deaf child's verbal language base at home.
The first goal of Cued Speech is to increase the student’s receptive and expressive vocabulary. There are thousands of words that have no standard signs. With Cued Speech, these words can be clearly represented by hand movements and locations.

Once the person has mastered the locations, hand shapes, and rules of Cued Speech, it is possible to say any word without having to ask, "What’s the sign for _______?" because in many cases, there is no sign. Or there may be a general sign but no specific sign for a proper name. For instance, the sign for doll is by placing the fingers in a bent position and rubbing the tip of the nose of the signer’s face. But what if one wants to convey “Barbie” doll and not “Cabbage Patch” doll. In sign language, this must be finger spelled out. Cuing “Barbie” directly would necessitate no further explanation of what is meant, the same way one would just verbally say “Barbie”.

Professionals working with children with not only deafness, but also those with symptoms of autism, processing deficits, disorders such as Attention Deficit Hyperactive Disorder (ADHD) have used Cued Speech due to the fact that they tend to process visually better than auditorally. It also helps these children focus and begin to relate to peoples’ faces in addition to using multi-sensory techniques for learning quickly and effectively. Families of individuals with physical disabilities that make them unable to speak use Cued Speech through a vision board that tracks eye movements on a grid. This aid is known as Nu-Vue-Cue (Clark, 1984).

Sign Language was first introduced to persons who were mentally retarded in the early 1970s and continues to be very instrumental in aiding their general adaptive behavior. When Cued Speech was first introduced to individuals with mental retardation,
its purpose was to focus on lip-reading and improvement on the non-cued conversation of others (Voycheck, 1983).

Cued Speech has been used by regular education for phonics instruction, by speech therapists for speech therapy (Schilp, 1986), and by deafened adults to re-establish communication with their friends and families. Cued Speech is also being used to advantage normally hearing persons with a wide variety of communication and learning needs, such as teaching phonemes of other spoken languages to new learners, and assisting persons with learning disabilities, disfluencies in speech, auditory processing deficiencies, apraxia and other communication disorders.

Another goal of the Cued Speech program is to increase lip reading skills. Only 40% of English is visible on the lips. Cued Speech makes very clear the sounds and words that look the same on the lips by using a different cue for each sound.

Cued Speech can be used in conjunction with aural/oral and/or signing approaches, but improvement in literacy is directly related to increasing exposure to the target spoken language through Cued Speech. Cued Speech is also effective in developing phonics and reading skills in hearing children and adults with and without special needs.

Some limitations of Cued Speech are that cuers must make lip movement and be within 20 feet of the cue-reader. The upper body and face need to be adequately lighted. Although the Cued Speech system is more than 30 years old, the number of cuers and support groups vary throughout the United States, but Cued Speech is not available everywhere. Parents of children who are deaf sometimes meet with resistance from their
local school administration when they choose to use a system not usually offered in that
district (Bernstein, Martin 1992).

Also, the number available Cued Speech transliterators (proficient cuers who cue
what instructors say) are growing but are insufficient for the demand. The reason for this
is that Cued Speech students are usually not placed in programs where one transliterator
can serve several students, but are mainstreamed in their neighborhood schools. Lastly,
unless students learn American Sign Language as a second language, they grow up using
Cued Speech and are not able to communicate with the larger community of Deaf adults
who use sign language.

There is much controversy when dealing with the Deaf Culture and their views of
Cued Speech because they see Cued Speech as an assault on deaf pride and identity.
Some people see it as a system designed by hearing people that are too lazy to learn ASL
fluently. Many fear that ASL may eventually be nonexistent if oral-centered forms of
communication such as Cued Speech are embraced (Feeny, 2000).

Definitions

American Sign Language is a manual system of communication used by
members of the Deaf Culture in the United States (Murray, 1998). American Sign
Language is based on ideas rather than words. Each gesture expresses a particular idea or
concept. For example, one gesture can be used to express the idea that something has
been used up, such as money, time, or patience.

National sign languages, such as American Sign Language, have more in common
with one another than with the spoken languages of their country of origin, since their
signs represent concepts and not words. Each sign language has its own grammar and syntax structure. It is a rule-governed language much different from spoken English. One sign in American Sign Language can represent many different spoken English words. Both body language and facial expressions can give different meanings to the signs.

When using American Sign Language, a person does not necessarily verbally speak at the same time as they are signing. Likewise signers all have their own unique styles, just as hearing persons have their own styles of speaking. Signed English systems do not have carryover to either reading or vocabulary skills.

When babies are born in a family with a Deaf parent, that parent will be signing to that child like we use our voices. The baby will begin to babble in sign language at the same rate that a child in the hearing community will learn voice language. If that child were a hearing child, they would learn voice language also and be considered Bi-lingual (Knoors & Renting, 2000).

The National Cued Speech Association defines Cued Speech as a sound-based visual communication system, which, in English, uses eight hand shapes in four different locations ("cues") in combination with the natural mouth movements of speech, to make all the sounds of spoken language look different (Beck, 1996). The hand signs represent only sounds (not concepts) and are used in conjunction with lip-reading.

These eight consonant hand shapes are combined with four different locations on the face and neck that represent the vowel sounds. Any combination of a hand shape and a location together cue a syllable of a word. Cued Speech users must also pay close attention to the lips and face of a person making a sound.
This visual component combined with a cue, aids the communication partner in determining the correct message being conveyed. It is imperative that a person time the cue and the syllable perfectly so that a hearing impaired person can visualize the cue while lip reading at the same time. Cued Speech is a multi-sensory integrated approach. Voice and visual cues are synchronized and complementary. The person receiving Cued Speech sees and hears the message as a unit. When those individuals use Cued Speech themselves, the hand cues provide a motoric reminder of the sounds and sound patterns to be expressed (Beck, 1998).

Since Cued Speech involves no interpretation, the hearing impaired individual gets exactly what a person is saying, in the same accent, and without modification. For example, if a person says, “balance the chemical equation ‘stoichiometrically’”, the transliterator does not need to know what the last word means or even how to spell it. They just cue the sounds and the hearing-impaired person makes the same closure (or lack thereof) as everyone else in the class (Osmond, 1996).

**Deafness** is usually defined as the inability to hear and understand speech. There is no legal definition of deafness, however, and experts do not completely agree on when to use the term. Hearing specialists generally distinguish between a person who is deaf and a person who is **hard of hearing**. People who are hard of hearing can usually hear and understand at least some speech, especially when it is loud enough. However, they may be unable to hear some other sounds, such as doorbells or high musical notes. The reason for this is that these sounds are made of high frequencies, which are harder for impaired persons to pick up. Sounds of low frequencies, such as motors and drums are,
in most cases, more discernible. In addition, the quality of any sounds they do hear may be distorted.

Deaf children and children who are severely hard of hearing have tremendous difficulty learning to speak. Normally, children learn to speak by imitating the speech of others. However, deaf children cannot hear speech. A large number of deaf people never learn to speak well enough to be understood.

**Hearing loss** is the most common physical disability in the United States. At least 15 million Americans have a noticeable hearing loss, and about 2 million of these people are deaf. More than 90% of all deaf children have hearing parents.

**Interpretation** is the act of translating one language into a second language. The difference between transliteration and interpretation is that in transliteration, only one language is involved.

**Phonemes** are sounds or closely related speech sounds regarded as a single sound such as /f/ and /ph/, which in Cued Speech would be represented by the same hand shape.

**Sign language** is a means of communicating through body movements, especially through the hands and arms. It encompasses communication with the **manual alphabet**, used to spell out each letter of a word by either a one-hand or two-hand system and "signing," the expression of whole concepts with a delicately nuanced combination of coded manual signals reinforced by facial expressions and sometimes augmented with the manual alphabet.

**Total Communication** can be defined as communication that includes American Sign Language, lip reading, and oral speech, is used as needed to express information and ideas. In the **oral method**, children are taught to speak and to lip-read.
Transliteration is the act of cueing while talking or mouthing the words.

Overview

One of the most difficult and controversial decisions to make when dealing with a hearing impairment is what mode of communication should be implemented. Selection of a communication mode is an area in which there are no clear answers to which may be the best way to go. However, some evidence has shown that children education with an aural/oral program achieve better speech and language performance and literacy development than children who use sign language (Murray, 1998).

An assumption must be made within this study that there are no confounding variables. For example, a learning disability combined with deafness, may not produce high achievement scores and the low scores may be related more to the learning impairment than the hearing impairment (Catts, 1993). Or, a student that may perform well in school but experiences test anxiety when placed in a timed standardized test environment, which knowingly is used for placement thereby creating a high stress situation. Also, for the purposes of this study, it must be assumed that all groups of students (SL, CS, O) are of comparable intelligence.

A limitation of the present study is the question of consistency of the particular communication mode that was used during the majority of the individuals’ school-aged years. A hearing impaired child may be started in their education program with Sign Language but with their parents only using an Oral method due to the amount of training and time needed to become proficient in signing. As the student becomes more proficient in signing, the parents may fall behind and ultimately, the student uses Sign Language
only in school and communicates orally at home. Therefore, when the subjects are
surveyed as to what communication mode they have used, the answers may be multiple
or dependent on the situation in which they need to communicate.

In addition, the study may be limited by the reliance on hearing aids for
understanding speech. Hearing aids, auditory trainers, and cochlear implants may have
been present but it is assumed that the subjects in this study, however, continued to rely
on visual signs or cues for communication in addition to being aided by amplification
devices.

Summary

There is a great need for this study to present the levels of academics that have
been achieved by deaf students using one of three methods of communication in
education: Sign Language, Oral, and Cued Speech. This information is valuable to
parents and teachers faced with the task of communicating with and educating hearing
impaired children. The purpose is to show, through standardized tests scores and high
school grade-point-average, if there is a “better, more effective” mode of communication
that would produce a higher rate of literacy. It is hypothesized that the use of Cued
Speech (hand cues to aid speech reading) will produce higher scores and grade average in
levels in reading and writing than the use of Sign Language (hand signs representing
symbols of words and ideas) in hearing impaired individuals or the use of Oral means of
communication (lip-reading only).
Chapter II: Review of Literature

Chapter II reviews the previous literature on the subject of the present study. It will be categorized into the headings of: Related Studies (closely related research discussed in depth), Areas of Related Investigation, a Discussion of the Previous Research, and a Chapter Summary.

**Related Studies**

The most closely related research that pertains to the present study is findings by Jean E. Wandel, Ed.D. From LeMoyne College in Syracuse, New York, entitled “Use of Internal Speech in Reading by Hearing and Hearing Impaired Students in Oral, Total Communication, and Cued Speech Programs” (1990). This research presents just one aspect, that of reading achievement levels, of a larger study on phonetic encoding strategies (Wandel, 1990) that was conducted at Teachers College, Columbia University.

The research design was that of experimental method with independent variables of three communication modes (oral, total communication, Cued Speech), two-decibel categories (severe and profound losses), and a hearing comparison group. The dependent variables were: scaled score on reading comprehension test of 1982 Stanford Achievement Test (7th edition, Form E), errors on Conrad (1979) reading test, and internal speech ratio.
The blocking factors (limitations) were decibel loss, age, general cognitive ability, years in manual communication mode, sex, and parent education level.

The subject criteria was age (7-16); attendance at a regular public school in which the SAT test was administered annually; no evidence of secondary handicapping condition as determined by school records; parents with hearing level within the normal range; English as the primary language spoken at home; record of parental level of education; bilateral hearing loss of 65 dB or more in better ear; prelingual hearing loss (before age two); attendance in a district offering a three-track communication option; use of a particular communication mode for at least three years.

The results were as follows:

1) Hearing impaired subjects, as a group, attained significantly lower scores than did hearing age mates.

2) Total Communication group attained significantly lower reading scores than Oral or Cued Speech.

3) No significant differences were noted between: 1) decibel category groups and 2) Hearing and Cued Speech profound groups.

4) Reading achievement was correlated with:
   • Years in manual communication mode (Total Communication and Cued Speech)
   • Age
   • General cognitive ability
   • Educational placement (mainstream)
   • Parent education level (Oral and Hearing)
The study stated in the discussion that it is impossible to ascertain whether the differences noted among groups are due to program effects or to student-parent-educator selection effects. Furthermore, the variable of school district was not a blocking factor, although every effort was made to select a representative sample of each communication mode population from each of the targeted school districts. (Wandel, 1990)

Another important research study was done to investigate the discourse comprehension abilities of a group of profoundly deaf children who had used Cued Speech for at least four years (Musgrave, 1987). This study was done because of the previous study at this school by the same author showing a high proficiency (95%) in speech reception of key words in sentences when using Cued Speech. The question asked in this study was, "What effect does this level of information reception have on language processing in the context of understanding and recalling connected discourse?"

Three texts were presented to the children on videotape: a story in dialogue form involving a problem and solution, a folktale in narrative form, and an explanatory, descriptive passage. These were done orally for the hearing students, and orally with cues for the hearing impaired (HI) students. The children viewed a videotape and then reported what they had seen.

The results were the HI students were found to be more competent at understanding conversationally organized text than narrative or explanatory text. The hearing students focused on the story's problem when retelling it, while the HI group focused instead on events leading up to the problem and on dialogue. Generally, the discourse abilities of HI children are extremely limited; they are unfamiliar with literary forms of expression. Reading research theorists say that children need to be introduced
to literate forms of expressing in oral situations before these more complex and objective language forms are met in reading. Hearing children learn these forms of language from conversation with adults. (Musgrave, 1987)

A related study comes from Stephen Powers (1999) in which data was gathered on educational outcomes of deaf students in England in 1995 and 1996. Powers reports findings of an investigation into educational outcomes of 16-year olds with varying degrees of hearing losses (moderate, severe, and profound). They were not in deaf schools nor were they in self-contained classrooms (all deaf students) but were mainstreamed in educational programs with hearing students.

Data on examination results, communication competence, and social acceptance were collected by questionnaire and analyzed against several background factors. These were family socioeconomic status, presence of any additional learning difficulty, whether English was used as a main language in the home, age at onset of deafness, and parents’ hearing status.

An outcome reported in Powers’ study that was significant to the present study was the results of the General Certificate of Secondary Education (GCSE) examination (England). “...It was clear that in recent years deaf students in mainstream programs have achieved greater success in GCSE examinations than deaf students in special schools” (Powers, 1999).

An area of strength in the Powers study is that the findings provide evidence of the performance of deaf students relative to their hearing peers and it also enlightens what background factors may influence academic success.
A limitation of Powers’ study is that it has included only 16-year old deaf students in mainstream programs and has focused primarily on examination results. The study is also weak because there were some factors that could not be included on Powers’ research. One of these factors was student intelligence, which was impossible to collect by his method of collection of data by postal questionnaire. The other factor, which was not measured, was mode of communication used in instruction due to the problem of gathering accurate information. From research by Bloor (in Lynas, 1994, p.93) and Powers (1990), it is possible for many deaf students not to have a consistent communication approach throughout their school careers.

Another weakness is that some factors were not provided on all the submitted questionnaires such as: age at onset of deafness, age at diagnosis, and hearing status of parents.

A third important related study is one, which investigated achievement levels associated with attending a residential school, which offers a deaf community or being mainstreamed in a regular education class with the same academic requirements. This study was conducted by Thomas N. Kluwin (1999). The study sample consists of the deaf and hard of hearing students at one elementary school on the West Coast with extensive experience with co-teaching, plus a random selection of their hearing peers. “Under a co-teaching arrangement (also known as team teaching), deaf or hard of hearing students can share a deaf peer group while being exposed to the social contact and academic requirements of a mainstream class.” (Kluwin, 1999)

Students were administered the Piers Harris Children’s Self-Concept Scale (Franklin, 1981) to focus on social or psychosocial issues; My Class Inventory (Fisher &
Barry, 1985) to measure aspects of the learning environment or social climate related to educational objectives; and the Childhood Loneliness Scale (Asher, Hymel, & Renshaw, 1984) measuring loneliness and social dissatisfaction.

The prediction of the study was that “co-teaching offers a genuine alternative to the residential school, which offers a deaf community but sometimes a poor record of achievement, and inclusion [mainstreaming], which promises better achievement but results in increased social isolation.” (Kluwin, 1999) Consistent results indicated that while age differences appeared, there were no negative social consequences of co-teaching for deaf students. The study actually showed that “deaf or hard of hearing children who are team taught over a long period are neither socially isolated, lonely, or possessed of self-images poorer than those of their hearing age peers.” (Kluwin, 1999)

A limitation of Kluwin’s study is the absence of supporting evidence from other sites. Only one school with a number of co-teaching classrooms was reported. Confounding variables include differences in grade levels and ages (preschool through 8th grade) and the influences of a variety of teacher effects. The study indicates that on the basis of social benefits, co-teaching warrants further research by stating that it is “impossible to dismiss the need for further study of co-teaching” (Kluwin, 1999), which resolves many problems of social isolation for the deaf student in regular education.

A study by J. Len Roberson & Thomas S. Serwatka (2000) examined the views of deaf and hard of hearing secondary-level students when asked about their preferences for deaf vs. hearing teachers. It also compared elementary and secondary-level students’ achievement scores based on the hearing status of their teachers. Included in the study were students from two different residential schools (Florida and Pennsylvania). Classes
were matched together in which one was taught by a deaf teacher and the other by a hearing teacher. The classes were matched by grade level, subject-area content, and student ability level (as closely as possible).

The Stanford Achievement Test (9th ed., 1995), or S.A.T., was used to measure student achievement. This was a hearing impaired edition providing a protocol for use with deaf and hard of hearing students. Student surveys were administered by classroom teachers who explained that they were to compare deaf teachers and hearing teachers in general. A sample item on the survey was to select one of the following to be true: “Deaf teachers hear better.” “Hearing teachers hear better.” “Deaf and hearing teachers hear the same.”

Deaf and hard of hearing secondary-level students showed greater preference for deaf teachers, with deaf students showing greater preference for deaf teachers than hard of hearing students did. No significant differences were found in the achievement levels of students based on differences in teacher hearing status. “These results are consistent with previous findings in which hearing status did not define the effectiveness or ineffectiveness of a teacher’s behavior.” (Roberson, Serwatka, 2000).

The results suggest that good teaching is neither dependent upon nor limited by a teacher’s hearing status. However, there do appear to be differences in students' attitudes toward deaf and hearing teachers. Deaf students are likely to show greater preference for deaf teachers.

A limitation of the Roberson/Serwatka study was that the certification examination required of the teachers did not “address issues related to deaf individuals” (Roberson, Serwatka, 2000). Their certification was determined by a knowledge base not
on what methods and materials to utilize in deaf education. A strength is that the results regarding student perceptions of teachers are consistent with prior studies, in that, deaf students “more frequently identified deaf teachers with better teaching and generally felt more favorable about these teachers” (Roberson, Serwatka, 2000).

An implication of Roberson & Serwatka’s important to the present study is the presumption that deaf teachers will only use sign language with deaf students. There is no current information on deaf persons using Cued Speech as their mode of communication, going back to teach other deaf students by way of Cued Speech in a self-contained deaf educational setting. Since Cued Speech was invented in the relatively recent year of 1967, many deaf cuers (who have grown up using Cued Speech) are presently in their late teens and 20s and have not chosen this field OR there are not enough deaf students that use Cued Speech in a specific region of the country for them to teach. So the presumption is being made that deaf teachers are communicating by way of sign language to their deaf students creating a comfortable environment but not high standards of achievement.

**Areas of Related Investigation**

Research has shown those children who have used Cued Speech for two years or more speak correct sentences with essentially the same frequency as hearing children and these children score at the same level for reading achievement as normally hearing children. Carefully matched oral and total communication students scored significantly low (Wandel, 1989).
Research on speech understanding have shown children who are deaf and have used Cued Speech for three years receive spoken information clearly with Cued Speech (Nicholls, 1979). If a Sign Language interpreter did not understand material that was being presented, the information would be interpreted inaccurately or incompletely. Cued Speech transliterators do not need to understand the information being presented. They cue material based on the sounds of the lecture, giving deaf cuers a clear advantage.

Studies conducted on lip reading have concluded that children who are deaf improve in lip reading when they are exposed continually to Cued Speech (Clark & Ling, 1976). Deaf Cuers have been found to have better English skills than deaf signers and oralists since deaf cuers see spoken English clearly and they acquire spoken language exactly the same way as a hearing individual. Unlike deaf signers that have to be taught to understand English, deaf cuers do not need to be taught English since they learn it the same way as hearing people.

Unlike deaf signers that learn foreign languages by reading first, deaf cuers learn foreign languages by “seeing” spoken languages first. Deaf cuers can pick up on different accents of a language much faster and easier than deaf signers (Cued Speech Advantages, 2001). Although Sign Language does have signs depicting the presence of an accent, it still is not clear what the accent sounds like.

The research of Holly Coryell and Eileen Sarett-Cuasay (Gallaudet University Research Institute) examines the effect of phonological processing abilities and verbal-sequential memory on the reading abilities of deaf young adults. Two groups of deaf individuals were compared: One group using American Sign Language-based communication as their primary mode of communication and the other using Cued
Speech as their primary mode. These groups were also compared to a control group of hearing peers.

Sixty subjects were administered a variety of measures meant to assess their skills in verbal-sequential memory, reading, and phonological processing. They were also administered two screening measures to ensure that the subject qualified for participation: one non-verbal intelligence test, and one test of communication familiarity in their primary communication mode. While deaf subjects were found to perform more poorly than their hearing counterparts in verbal-sequential memory span (confirming previous research results), subjects who used Cued Speech were found to have longer memory spans for this material, and encoded such material according to the phonemic information of the stimulus words.

Regardless of communication mode, those subjects most able to use phonological processing skills scored higher on the reading measure. These results confirm the importance of teaching phonological procession skills to deaf children in order to foster good development of verbal-sequential memory and reading skills.

The Gallaudet Research Institute conducts large educational test standardization studies to obtain norms (percentile scores) for deaf and hard of hearing students; the data collected are used to describe students' achievement. In the last norming of a widely used achievement test, the Stanford Achievement Test, 9th Edition (Harcourt Educational Measurement, 1996), deaf and hard of hearing students aged 8 through 18 were given the test, including the Reading Comprehension subtest. The measure of reading achievement used is the Reading Comprehension subtest, a multiple-choice test.
It is important to note that the reading achievement is of deaf and hard of hearing students who are in school. There is no data available on adults or high school graduates. For the 17-year-olds and the 18-year-olds in the deaf and hard of hearing student norming sample, the median Reading Comprehension subtest score corresponds to about a 4.0 grade level for hearing students.

That means that half of the deaf and hard of hearing students at that age scored above the typical hearing student at the beginning of fourth grade, and half scored below. The "median" is the 50th percentile, and is one of the ways to express an average, or typical, score. (A "mean" score, or arithmetic average, is not the same as the median.)


Judith A. Holt has reported median scaled scores and corresponding grade equivalents from the 8th Edition Stanford Achievement Test (SAT-8) for various groups of deaf and hearing-impaired children ages 8 to 17. The samples were without reported mental retardation and who were receiving special education services throughout the United States. The median scores used in these graphs were extracted from a series of special norms computed for the population of deaf and hard of hearing students in the United States during a special achievement test project conducted by the Center for Assessment and Demographics Studies (CADS) (Holt, 1993).
The SAT-8 norming sample was randomly selected from the Annual Survey of Hearing-Impaired Children and Youth for the 1989-90 school year. The group norms that are relevant to the present study are the comparison of hearing students to deaf and hard of hearing and comparison of deaf students in three types of school settings: special residential and day schools for deaf students, local schools (minimal or no classroom integration with hearing students), and local schools (integrated with hearing students).

In the comparison to hearing students, there is a lag in the reading achievement of deaf students. Their highest median scaled score is 619 at age 17 (with a corresponding grade equivalent of 4.5) (Holt 1993). The highest median scaled score for the hearing students is 680 and the highest age level tested was 15 years (grade equivalent of 9.9). The test was not designed for age 16 and older hearing students because their grade level would be beyond the test.

Students in special school programs (both residential and day) scored significantly lower than students in integrated local school programs, but significantly higher than those in non-integrated local school programs. The highest median scaled scores are: 743 (grade equivalent of 5.7) for integrated local school program, 609 (grade equivalent of 3.8) for special school programs, and 584 (grade equivalent of 2.8) for non-integrated local school programs. Caution must be observed what drawing conclusions from these results. It is not known whether students achieve more due to integration or whether students are selected for integration based on their high achievement levels. (Holt, 1993)

Among other related studies is a study on the reading comprehension and mathematic Speech computation achievement of deaf and hard of hearing students in a variety of school settings that indicates that scores, when adjusted for demographic
factors, are higher for the deaf and hard of hearing students in regular classrooms, as opposed to those in special classrooms (Holt, 1994).

Studies have found that Montessori schools have incorporated Cued Speech into their curriculum. Montessori schools originate from the philosophy of the Italian physician Maria Montessori. In these types of schools, the classroom materials and activities are designed to help children learn by doing, observing others, and by teaching others. Every Montessori class consists of mixed age groups where younger children are free to watch the older ones and the older children may teach the younger ones (The Chesapeake Montessori School, 2000).

A Montessori teacher in Maryland named Hamill, participated in a Cued Speech workshop and then began to teach it to her students as a way to visualize language. She used Cued Speech to teach short vowel sounds and her students showed immediate success. For reading readiness, Hamill used Cued Speech to teach phonograms (two letters grouped together to make a sound), group activities, rhymes, animal sounds, and everyday phrases. She felt Cued Speech was not only a useful way for her younger students to learn a good finger play activity, but also a great way for them to learn and become aware of another form of communication with others (Hamill, 1982).

Carol Schilp, a Speech/Language Pathologist in Albany, New York, noticed her hearing impaired students articulated more clearly when they cued as they spoke. Upon this discovery, she designed a program using Cued Speech to help her normally hearing cases to remediate articulation errors and fluency issues. Under this program, rate of speech was controlled and the occurrence of disfluencies decreased. This double stimulus of speech and use of finger cues resulted in the inspiration to improve effort and
memory. Cued Speech also provided more opportunities per session to produce the target sound or goal correctly.

**Discussion of Previous Research**

Jane Wandel (1990) investigated the use of internal speech in reading by hearing and hearing-impaired students (in different modes of communication) and found Total Communication students to be the lowest of all groups. Gaye Musgrave (1987) researched the discourse comprehension abilities of profoundly deaf children using Cued Speech and found a high proficiency in speech reception but a deficiency in oral and literate comprehensive abilities. Stephen Powers (1999) investigated deaf students having higher successful achievements in mainstream programs than special schools. These findings will be improved upon in the present research by examining the mode of communication used in instruction, which is assumed by some people to be the key factor in determining deaf students’ academic attainments.

Thomas N. Kluwin (1999) showed that deaf children who are team taught in a regular classroom are neither socially isolated, lonely, or had poorer self-images than their hearing age peers. These findings may be incorporated in the present study in that a large percentage of communication is by way of spoken language, either from classmates or by either or both of the co-teachers. It takes many years to be proficient in a language, foreign or native, just as it would for sign language.

Since a cuer, who is accustomed to being hand “cued” the phonetic sounds of a language (any language), is more apt to understand spoken language by reading lips without cues than a signer, who is reading hand signals. The findings of Kluwin’s study
will support this study’s prediction that use of Cued Speech over Sign Language will increase academic achievement. The present study will improve upon the Kluwin study results by reporting academic achievement scores of deaf students who were educated in either mainstreamed or self-contained settings.

J. Len Roberson & Thomas S. Serwatka (2000) researched that deaf students felt more favorable toward deaf teachers but no significant differences were found in the achievement levels of students based on differences in teacher hearing status. Questions need to be explored before the results of the study can be fully understood. For example, do deaf students with deaf teachers have higher aspirations for themselves after they complete school?

The direction taken in the next chapter will be to identify a group of cuers and a group of signers from the ages of 14 and older, survey their academic achievement through a questionnaire including standardized test scores and grade point average, and to display confounding variables to need to be considered when viewing the results. These variables may include length of time using their primary communication mode, age of commencement of primary mode, mode of communication at home, and the presence of any other disabilities (including learning, visual, motor, or ADHD).

Summary

In Wandel’s (1990) comparison of Hearing students and Hearing Impaired students using Cued Speech, Total Communication, and Oral Methods of communication, the results presented in Table 2.1 show that there is no significant difference in reading achievement between the Cued Speech group and the Hearing
The reading comprehension correlation for the Total Communication group was significantly lower than all other groups.

**TABLE 2.1 Pearson Correlations for Dependent Variables by All Groups**

<table>
<thead>
<tr>
<th>FACTOR</th>
<th>IS RATIO</th>
<th>READCOMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORAL</td>
<td>-0.44</td>
<td>-0.69</td>
</tr>
<tr>
<td>TOTAL COMMUNICATION</td>
<td>-0.45</td>
<td>-0.54</td>
</tr>
<tr>
<td>CUED SPEECH</td>
<td>-0.35</td>
<td>-0.62</td>
</tr>
<tr>
<td>HEARING</td>
<td>0.03</td>
<td>-6.89</td>
</tr>
</tbody>
</table>

To answer the question of whether students achieve differently in deaf and hearing teachers’ classes, the proportion of classes where deaf teachers’ students had the greater gains. The results of the analysis using a binomial distribution were not significant (z = .60; p = .27).

The results displayed in Table 2.2 show that for seven of the matched sets, the class that began with the higher achievement levels ended up with the greater achievement gains. However, the class that began with the lower achievement levels realized the greater achievement gains. In three of these cases, it was a hearing teacher’s class that made the greater gains, and in one it was the deaf teacher’s class (Roberson, Serwatka, 2000).
Table 2.3 displays the results of the student survey of deaf and hard of hearing students. Seventy-two percent of the students indicate a preference for one or both of the groups on one or more items. Twelve percent of deaf students indicated no preference for deaf teachers on any of the items. Ten deaf students indicated no preference for deaf teachers on any item. This represented 16% of this group (Roberson, Serwatka, 2000).
Table 2.3  Student Perceptions of Deaf and Hearing Teachers

<table>
<thead>
<tr>
<th>Survey Item</th>
<th>Number of Deaf Students (N=61)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deaf teachers teach reading better.</td>
<td>10</td>
</tr>
<tr>
<td>Hearing teachers teach reading better.</td>
<td>10</td>
</tr>
<tr>
<td>Deaf and hearing teachers teach reading the same.</td>
<td>41</td>
</tr>
<tr>
<td>Deaf teachers teach English better.</td>
<td>18</td>
</tr>
<tr>
<td>Hearing teachers teach English better.</td>
<td>12</td>
</tr>
<tr>
<td>Deaf and hearing teachers teach English the same.</td>
<td>31</td>
</tr>
<tr>
<td>Deaf teachers teach math better.</td>
<td>26</td>
</tr>
<tr>
<td>Hearing teachers teach math better.</td>
<td>5</td>
</tr>
<tr>
<td>Deaf and hearing teachers teach math the same.</td>
<td>30</td>
</tr>
<tr>
<td>Deaf teachers teach art better</td>
<td>24</td>
</tr>
<tr>
<td>Hearing teachers teach art better.</td>
<td>4</td>
</tr>
<tr>
<td>Deaf and hearing teachers teach art the same.</td>
<td>33</td>
</tr>
<tr>
<td>Deaf teachers teach physical education better.</td>
<td>17</td>
</tr>
<tr>
<td>Hearing teachers teach physical education better.</td>
<td>8</td>
</tr>
<tr>
<td>Deaf and hearing teachers teach physical education the same.</td>
<td>36</td>
</tr>
<tr>
<td>I am more comfortable with deaf teachers.</td>
<td>27</td>
</tr>
<tr>
<td>I am more comfortable with hearing teacher.</td>
<td>1</td>
</tr>
<tr>
<td>I am comfortable with deaf and hearing teachers.</td>
<td>33</td>
</tr>
<tr>
<td>I like deaf teachers better.</td>
<td>22</td>
</tr>
<tr>
<td>I like hearing teachers better.</td>
<td>0</td>
</tr>
<tr>
<td>I like deaf and hearing teachers the same.</td>
<td>39</td>
</tr>
</tbody>
</table>

Table 2.4 shows the GCSE examination results of the deaf sample against results for all students in England according to these codings. It is difficult to comment on the results shown in Table 2.4 when there are no previous data on the relevant population of deaf students. However, the results for deaf students in 1996 show a slight improvement over the results for 1995 (Powers, 1999).
Table 2.4  GCSE Examination Results (1995, N=344; 1996, N=473)

<table>
<thead>
<tr>
<th>Study samples of deaf students</th>
<th>Achieving 5 or more A-C grades 1995</th>
<th>Achieving 5 or more A-C grades 1996</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>14%</td>
<td>18%</td>
</tr>
<tr>
<td>Average for all schools in England*</td>
<td>44%</td>
<td>45%</td>
</tr>
<tr>
<td>*Department for Education and Employment, 1995</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Although the figures in Tables 2.4 and 2.5 are for different years, it is clear that in recent years deaf student in mainstream program have achieved greater success in GCSE examinations that deaf students in special schools (Powers, 1999).

Table 2.5  GCSE Examination Results:

Deaf Students in Special Schools 1993 and 1994 Combined (N=471)

<table>
<thead>
<tr>
<th>Deaf students in special schools*</th>
<th>Achieving 5 or more A-C grades</th>
<th>Achieving 5 or more A-C grades</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8%</td>
<td>29%</td>
</tr>
<tr>
<td>Average for all schools in England, 1994**</td>
<td>43%</td>
<td>86%</td>
</tr>
<tr>
<td>*Powell, 1995</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The students’ attitudes toward the classroom environment did show a difference between the deaf and the hearing children ($F = 5.29; p = .93; df = 3,59$) and a difference among grade levels ($F = 8.20; p = .001; df = 3,59$). Overall, the deaf students were more favorably disposed toward their classroom situation than the hearing students. In fact, the eighth-grade hearing students actively dislike their class, while the deaf students were positive to neutral in their attitude toward the class (Kluwin, 1999).
Chapter III: Design of Study

The sample of this study was hearing impaired males and females over the age of 18 who have taken either the Scholastic Aptitude Test (SAT) or the American College Test (ACT). All were United States residents and many were attending or had attended a college or university. All had a significant hearing loss labeled as profound and none were considered mild losses.

Gender was not considered as a determining factor in this sample. The participants had lost their hearing pre-lingually and at some point in their life made the use of hearing aids, cochlear implants, and/or auditory trainers. All subjects communicated through the use of one or more of the following modes: American Sign Language (12), Cued Speech (9), and Oral Method (5).

Measures

An informed consent form (Appendix A) and a sixteen-question survey was given to the participants consisting of marking all answers that applied in their individual case (Appendix B). The survey consisted of some informational questions such as, geographical location or most recent college grade point average. These are for descriptive purposes and not pivotal to the study results.

The key questions were pertaining to the scores on the verbal section of the
SAT I/ACT, the final grade point average in high school, and the primary mode of communication used throughout their learning years. Other important factors were when the hearing loss was detected, what primary mode of communication was used with their parents, and what form of hearing aids was used.

The reliability estimate of the sample is good because all the subjects took college entrance exams (SAT I or ACT) and so are presumed to be of relatively equal intellectual potential, in that, their goals are to attend college. The ratio of different modes of communication in the sample correlates to real life ratios of communication modes. The majority of the United States’ deaf population uses sign language (Sneden, 2001) with Cued Speech ranking second in use and totally oral methods (without the use of signs) are comparatively the least in use. This is true for the profoundly deaf, who cannot rely on residual hearing to receive language. The more hearing ability present in an individual, the more apt one is to rely on oral communication. This sample’s hearing losses were entirely in the profound range providing reliability for the sample, thus, accounting for the small sample of oral subjects (5).

In order to estimate the reliability for the instrument, or survey, the subjects were split with the highest SAT score and the lowest SAT scores using a split-half procedure. Reliability of the survey is questionable due to the fact that, of the subjects who scored high on the SAT, only 8 of 26 were in the highest half of the grade point averages.

The independent variable in the study is the mode of communication (ASL, CS, Oral). The dependent variables are the reading achievement scores on the SAT/ACT standardized tests and the high school grade point averages.
Finger spelling, for the purposes of this study, is considered a supplement to ASL and to the Oral Method in cases when there is no other way to communicate a word, term, or idea. Finger spelling is not a necessary supplement to CS unless an individual is not totally proficient in cueing. Therefore, finger spelling will be left out as a mode of communication variable.

Design

The design of this study is predictive in nature. The three groups of different communication methods will be compared according to the verbal scores on college placement exams which are the Scholastic Aptitude Test (SAT) and the American College Test (ACT). The three groups that will be compared are the American Sign Language (ASL) group, the Oral group, and the Cued Speech (CS) group. The other variable will be the high school grade point average.

The mean scores of each group will predict the most successful mode of communication in developing verbal skills. The mean grade point average of each group will predict which mode of communication will produce success in school subjects.

Testable Hypotheses

The null hypothesis is that there will be no difference in each mode of communication correlating the mean verbal scores from the Scholastic Aptitude Test (SAT) or the equated scores from the American College Test (ACT) and the mean grade point averages with each mode of communication in use.
An alternate hypothesis states that the verbal scores will be higher in deaf individuals who have communicated by way of Cued Speech than by communication by Oral means and both methods will produce higher verbal scores than American Sign Language (ASL).

**Analysis**

An Independent One-Way Analysis of Variance (ANOVA) will be the model used to test the hypotheses. The independent variables are the three groups of communication methods (Cued Speech, ASL, Oral) and the dependent variables are the verbal scores from the college placement tests and the grade point averages. The means of each group will be compared in this test.

This model is appropriate to compare the means because of the ability to compare more than two groups. It will analyze the groups independently as the scores are not being compared within the groups but between each group. A Post Hoc test will compare the mean differences between groups (modes) for each variable. A descriptive analysis will compare minimum and maximum scores for each group (mode).

Descriptive charts and tables will represent the findings including a whole pie chart depicting percentages of each method used in the gathered data and bar graphs showing the means for each communication method.

**Summary**

A group of 28 current or former college deaf students were surveyed as to what primary mode of communication they use, how well they performed on the verbal section
of their college placement exams verbally (SAT/ACT) and how well they performed in high school in all subjects.

This was a predictive study in trying to determine which mode of communication (ASL, CS, Oral) produced the highest achievement scores in language and high school grades in all subjects. The independent variable was the mode of communication and the dependent variables were the high school grade point averages and the verbal SAT scores.

The sample had a good reliability due to a consistency in quality of student and level of hearing loss. But the instrument, or survey, was questionable in its reliability due to the low incidence of correlation of verbal scores to grade point averages (GPAs).

The testable hypothesis was that the use of Cued Speech by the deaf subjects for their education produced higher literacy skills than both the Oral group and the sign language group.

The data was analyzed using the Analysis of Variance method measuring mean grade point average and SAT scores, maximum and minimum scores and GPAs, and differences in means for each mode of communication.
Chapter IV: Analysis of Results

In Chapter IV, findings will be presented from the gathered data, which will be interpreted and analyzed, by which hypotheses will be accepted or rejected.

Order of Presentation

The percentages of the communication mode groups from the sample were calculated (Figure 4.1 - 1=Cued Speech, 2=Sign Language, 3=Oral Method). An Independent One-Way Analysis of Variance (ANOVA) was performed to compare the means of the Verbal SAT scores (Figure 4.2) and the high school grade point averages (GPAs) (Figure 4.3) on each of the three groups. A descriptive analysis was done on both dependent variables (SAT scores and GPAs) comparing the means, the standard deviations, and the maximum and minimum scores in each mode (Figure 4.4).
Figure 4.1 Percent of Modes of Communication in the Sample
Figure 4.2 Means of SAT Scores For Each Mode of Communication

Figure 4.3 Means of GPAs For Each Mode of Communication
### Figure 4.4 Comparison of Means, Standard Deviations, and Minimum & Maximum Scores

#### Descriptives

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAT</td>
<td>1.00</td>
<td>9</td>
<td>500.5556</td>
<td>123.8559</td>
<td>405.3515</td>
<td>595.7596</td>
<td>280.00</td>
<td>700.00</td>
</tr>
<tr>
<td></td>
<td>2.00</td>
<td>12</td>
<td>535.0000</td>
<td>85.1202</td>
<td>480.9172</td>
<td>589.0828</td>
<td>390.00</td>
<td>680.00</td>
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<td>3.00</td>
<td>5</td>
<td>516.0000</td>
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<td>616.7203</td>
<td>470.00</td>
<td>660.00</td>
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<td>519.4231</td>
<td>96.9363</td>
<td>480.2696</td>
<td>558.5765</td>
<td>280.00</td>
<td>700.00</td>
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<tr>
<td>GPAHS</td>
<td>1.00</td>
<td>9</td>
<td>3.4056</td>
<td>.3747</td>
<td>3.1715</td>
<td>3.6936</td>
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<td>11</td>
<td>3.5227</td>
<td>.3573</td>
<td>3.2827</td>
<td>3.7628</td>
<td>2.70</td>
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<td></td>
<td>3.00</td>
<td>5</td>
<td>3.5120</td>
<td>.3251</td>
<td>3.1083</td>
<td>3.9157</td>
<td>3.10</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>25</td>
<td>3.4784</td>
<td>.3475</td>
<td>3.3350</td>
<td>3.6218</td>
<td>2.70</td>
<td>4.00</td>
</tr>
</tbody>
</table>

#### ANOVA

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAT</td>
<td>Between Groups</td>
<td>6174.124</td>
<td>2</td>
<td>3087.062</td>
<td>.310</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
<td>228742.22</td>
<td>23</td>
<td>9945.314</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>234916.35</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPAHS</td>
<td>Between Groups</td>
<td>7.502E-02</td>
<td>2</td>
<td>3.751E-02</td>
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<td></td>
<td>Within Groups</td>
<td>2.823</td>
<td>22</td>
<td>.128</td>
<td></td>
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<tr>
<td></td>
<td>Total</td>
<td>2.898</td>
<td>24</td>
<td></td>
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</tbody>
</table>
Restatement of Hypothesis

The hypothesis restated was as follows: Deaf individuals that have used Cued Speech as a primary mode of communication throughout their lives will show higher verbal scores and grade averages in all academic subjects than individuals that have communicated orally primarily and individuals who have used sign language primarily throughout their lives to communicate will show the lowest scores and grade averages in academic subjects.

The mean verbal SAT score for the 12 sign language participants was 535, was 516 for 5 oral method participants, and was 500 for 9 Cued Speech participants (Figure 4.2). The mean GPA for the sign language group was 3.5227, 3.5120 for the oral group, and 3.4056 for the Cued Speech group (Figure 4.3).

The alternate hypothesis of Cued Speech participants having higher scores and averages than oral and sign language participants was tested using the data collected from the 16-question survey administered to the sample of 26 deaf college students. The students provided their highest SAT/ACT verbal score and their final GPA from high school.

Interpretation of Results

The null hypothesis, stated as, there will be no difference in the verbal scores and GPA of the three modes of communication: Cued Speech, sign language, and oral method has been accepted. There is not a statistical difference between groups in this study’s sample as shown in mean for the SAT scores (significance .781) and the mean for the GPAs (significance .804). The alternate hypothesis, stated as, Cued Speech will have
higher scores and grade average than oral and sign language has been rejected. The main communication mode percentages of the sample were as follows: sign language 46.6%, Cued Speech 34.2%, and Oral 19.2% (Figure 4.1). The standard deviation (SD) in the SAT scores for the Cued Speech group was the largest at 123.9, sign language group’s SD was 85.1 and the oral group’s SD was 81.1. For the GPAs, the SD was also largest for the Cued Speech group (.3747), then the sign language group (.3573), and the least was in the oral group (.3251) (Figure 4.4).

Summary

In this study, it is concluded that there were no main effects and no interaction between the groups. The null hypothesis was accepted, in that there was no significant difference between the groups (modes of communication). The alternate hypothesis was rejected, in that the Cued Speech subjects would score higher and perform better in academic subjects that the oral and sign language participants. The sign language group had the highest mean verbal SAT score (535) and also had the highest GPA (3.5227). The oral group was second in both mean SAT (516) and mean GPA (3.5120) and the Cued Speech group was third (mean SAT, 500 and mean GPA, 3.4056). These results are very closely related in number with the mean SAT scores being separated by an average of 26.5 points between groups and the mean GPA being separated by an average of .5951 points.

There were 27 participants in the survey but one participant had to be excluded due to submitting the full scale SAT score and not the verbal score only. One participant did not answer the GPA question, therefore lowering the GPA total to 25.
A trend that was evident was the sample ranged from above average to excellent in verbal scores and GPA. Another trend was that the high verbal scores did not tend to match the high GPAs. The Cued Speech group had the largest standard deviation of the three groups indicating the widest range of score and grades.
Chapter IV: Summary and Conclusions

There was a great need for a study to present the levels of academics that have been achieved by deaf students using one of three methods of communication in education: Sign Language (SL), Oral (O), and Cued Speech (CS). This information is valuable to parents and teachers faced with the task of communicating with and educating hearing impaired children. There is a need to reveal if there is a “better, more effective” mode of communication that would produce a higher rate of literacy.

In previous research, there was a comparison of Hearing students and Hearing Impaired students using Cued Speech, Total Communication, and Oral Methods of communication, the results presented in Table 2.1 show that there is no significant difference in reading achievement between the Cued Speech group and the Hearing group. The reading comprehension correlation for the Total Communication group was significantly lower than all other groups (Wandel, 1990).

In the current research, this predictive study was attempting to determine which mode of communication (SL, CS, O) produced the highest achievement scores in language and high school grades in all subjects. A group of 26 current or former college deaf students were surveyed as to what primary mode of communication they use, how well they performed on the verbal section of their college placement exams verbally (SAT/ACT) and how well they performed in all high school subjects.

The testable hypothesis was that the use of Cued Speech by the deaf subjects for their education produced higher literacy skills than both the oral group and the sign
language group. It was concluded that there were no main effects and no interaction between the groups. The null hypothesis was accepted because there was no significant difference between the groups (modes of communication). The alternate hypothesis was rejected, in that the Cued Speech subjects would score higher and perform better in academic subjects than the oral and sign language participants although the results are very closely related in number.

A trend that was evident was the range of the participants in the sample from above average to excellent in verbal scores and GPA. Another trend was that the high verbal scores did not tend to match the high GPAs. The Cued Speech group had the largest standard deviation of the three groups indicating the widest range of score and grades.

Conclusions

The conclusions of the study are stated with the following findings:

The number and percent of each mode of communication in the study sample are:

1. Sign Language (SL) 12 participants (46.6%)
2. Cued Speech (CS) 9 participants (34.2%)
3. Oral Method (O) 5 participants (19.2%)

The means of the SAT I and converted ACT verbal scores for each mode are as follows:

1. SL 535
2. O 516
3. CS 500

The means of the high school GPA for each mode are:
Discussion

The alternate hypothesis of Cued Speech producing the highest literacy skills over sign language and the oral method was not accepted based on the data results of this study. The three modes of communication showed little difference in SAT scores and GPA between groups. Since it differs from previous research conducted, the reasons for this contradiction are discussed here.

The sample was considerably small and specific. The sample was targeted toward the National Technical Institute for the Deaf (NTID, part of Rochester Institute for Technology, NY) and the Cued Speech Association, targeting Cuers who have taken the SAT/ACT college entrance exams. The Cued Speech participants were from universities from all over the country except for two, who were from NTID. All the sign language and oral participants were from NTID.

All the participants were current or former college students and the sample did not represent all deaf individuals in this age group. The reason for the high scores and averages could have been high intelligence considering they are all college-oriented. Another factor that could have skewed the results is test anxiety causing a low score on the standardized test. Or vice versa, the participant may have score fairly well on the standardized test, but does not fully apply their self to academic subjects (low grade point
average) for a number of reasons, like lack of proper interpretation, excessive
distractions, or poor implementation of the Individualized Education Plan (IEP).

Many of the sign language group indicated on their survey the use of Signed
Exact English (SEE). This may have helped them in their literacy skills rather than with
American Sign Language alone. The oral group achieved high scores which could be
explained by having more residual hearing and benefiting from the use of hearing aids,
thus, being able to function communicatively through the use of oral means.

A large number of participants indicated that they did not use either sign language
or Cued Speech with their parents, but just used oral means to communicate at home.
This is very common when a deaf individual has hearing parents. Unless the parents are
dedicated to becoming proficient at a particular method and uses it in every day
situations, there is a tendency for no method to be used at home and most of the
communication growth takes place at school.

Another confounding variable possible in the present study is that all the
information gathered was voluntary and not a matter of record. It is quite possible that
the participants could have modified their scores knowing that it was being used for a
study in communication modes and there was no possible confirmation since original
records were not a requirement in order to participate.

On the questionnaire, the participants were asked for the verbal scores on the
Scholastic Aptitude Test (SAT) or the American College Test (ACT). It should be noted
here that relating ACT Assessment and SAT I scores is a difficult problem. The
fundamental difficulty is that the two test batteries measure somewhat different
psychological constructs. The ACT Assessment tests are curriculum-based test of
education development. Their content is intended to be representative of knowledge and high-order thinking skills that are explicitly taught in typical college-preparatory programs and that are essential for success in college. The SAT I, in contrast, measures general verbal and quantitative reasoning, and is less closely linked to high school and college curricula. Because the ACT Assessment and SAT I are not parallel in content, there can be different definitions of equivalent performance on the two tests. The scores were converted using concordance tables, which were developed from statistical relationship observed between the two tests. An important characteristic of these tables is that they do not yield the same results across institutions. One reason for this result may be that different groups of students have different high school education experiences with respect to the different constructs measured by the two batteries.

The SAT I was first administered to students in April 1994. Then, starting in April 1995, students’ SAT I scores were reported in a “recentered” score scale. A large-scale study was conducted in 1997 to examine relationships between scores on the ACT Assessment and recentered SAT I scores. ACT conducted this study in cooperation with the College Board and the Educational Testing Service (the agencies that develop and administer the SAT I).

Concordant scores are defined as those having the same percentile rank with respect to the group of students used in the study. The tables are useful for determining the cutoff score on one test that results in approximately the same proportion of students selected by the other test (although not necessarily the same students).
Implications for Future Research

New investigations need to be taken in a larger sample (different age groups) to ascertain whether the differences noted among groups are due to program effects or to student-parent-educator effects. There is a need to compile a voluntary central registry for the deaf with achievement scores at different age levels, modes of communication used, and educational settings. This could be anonymous—no names or pertinent information that would invade privacy but identity by number or password. With the explosion of internet technology, a web-site would be an appropriate base for this registry. Parents and deaf educators who seek results of the best mode or educational setting would be cooperative in volunteering the child’s information so that further research can be done.
References

ACT, Inc. (No date). Relating ACT Assessment and SAT I scores. Concordance between ACT English score and SAT I recentered verbal score [Online]. Available E-mail: CoxJ/ACTinc@act.org [2002, March 13]


Appendix A

Informed Consent Form

I agree to participate in a study entitled “The Effect of Different Modes of Communication for the Deaf on Verbal Achievement”, which is being conducted by Maureen Dugan, Graduate Student in School Psychology at Rowan University, Glassboro, New Jersey. The purpose of the study is to measure reading and language achievement in hearing impaired adults over the age of 18 and the data collected in this study will be submitted for publication in a Master’s Thesis.

I understand that I will be required to complete a 3-page questionnaire, including measures of reading achievement, method(s) of communication, and level of hearing loss, a task that will take a total of 10-15 minutes.

I understand that my responses will be anonymous and that all the data gathered will be confidential. I agree that any information obtained from this study may be used in any way thought best for publication or education provided that I am in no way identified and my name is not used.

I understand that there are no physical or psychological risks involved in this study, and I am free to withdraw my participation at any time without penalty.

I understand that my participation does not imply employment with the state of New Jersey, Rowan University, the principal investigator, or any other project facilitator.

If I have any questions or problems concerning my participation in this study, I may contact Maureen Dugan at (856) 863-1477; e-mail: partyonent@hotmail.com; fax (856) 881-6304.

(Signature of Participant) (Date)
Maureen Dugan 4/15/01
(Signature of Investigator) (Date)
Appendix B

DIRECTIONS: Read each statement and then place an X by the appropriate letter, which indicates all that apply.

1. Place of home residence:
   - ( ) Northeast US
   - ( ) Southeast US
   - ( ) Midwest US
   - ( ) Northwestern US
   - ( ) Southwestern US
   - ( ) Other ____________________________ (name)

2. Present age:
   - ( ) Under 18 years
   - ( ) 18-22 years
   - ( ) Above 22 years

3. Current Method of Communication (check all that apply):
   - ( ) American Sign Language
   - ( ) Signed Exact English
   - ( ) Cued Speech
   - ( ) Finger Spelling
   - ( ) Oral
   - ( ) Other ____________________________ (name)

4. Level of hearing loss:
   - ( ) Mild
   - ( ) Severe
   - ( ) Profound
   - ( ) Other ____________________________ (name)

5. Onset age of hearing loss:
   - ( ) Congenital/Present at Birth
   - ( ) Age 1-3 years
   - ( ) Age 3-5 years
   - ( ) Age 5-7 years
   - ( ) Age 7-12 years
   - ( ) Over 12 years
6. Types of aids used:

( ) Hearing aid
( ) Cochlear implant
( ) Auditory trainer
( ) None
( ) Other __________________ (name)

7. Age hearing aids were added:

( ) Before Age 1
( ) Age 1-3 years
( ) After Age 3 years
( ) Not applicable

8. Age cochlear implant was added:

( ) Before Age 1
( ) Age 1-3 years
( ) After Age 3
( ) Not applicable

9. I have the most knowledge of the following:

( ) American Sign Language
( ) Signed Exact English
( ) Cued Speech
( ) Finger Spelling
( ) Other __________________ (name)

10. I have some knowledge of the following (check all that apply):

( ) American Sign Language
( ) Signed Exact English
( ) Cued Speech
( ) Finger Spelling
( ) Other __________________ (name)

11. Highest year of education achieved: ____________________________

12. Primary method of communication with parents:

( ) American Sign Language
( ) Signed Exact English
( ) Cued Speech
( ) Finger spelling
13. Highest Verbal Score on Scholastic Aptitude Test (SAT): __________

14. Highest Verbal Score on the American College Test (ACT): __________

15. Most recent Grade Point Average (GPA) in high school: __________

16. Most recent Grade Point Average (GPA) in college: __________