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Teaching Deaf Children How To Use
Telecommunication Devices For The Deaf

Independent Study

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Background

According to Bellefleur (1976), the invention of the telephone by Alexander Graham Bell in 1878 "set the progress of the deaf backward by almost a century" (p. 107). Whereas now the hearing population could communicate over long distances at nearly the speed of light, the deaf were still restricted to either face-to-face communication or letter writing. Mortensen (as cited by Castle, 1978), states that "to the deaf person, the telephone is a constant reminder of his handicap and of his dependence upon others for its use" (p. 91).

There are currently 4 approaches to telephone communication used by the deaf, the last of which is the focus of this study. Before discussing the TDD in detail, I thought it necessary to discuss the first 3 approaches. A discussion of these approaches illustrates the great advancement the TDD has been in the lives of many deaf individuals. The 4 approaches to communication are: (1) asking a hearing person to make the call and do both the talking and the listening or have the hearing person do only the listening; (2) the deaf person does all of the talking and listens for a prearranged code response; (3) the deaf person talks and listens for himself; and (4) the deaf person uses a telecommunication device (TDD) (Castle, 1978).

Using a Hearing Person

There are several disadvantages to this approach, the most obvious being the lack of privacy for the two parties involved. In addition to this, the emotional feelings or reactions of the individual on the other line may not be accurately interpreted by the intermediary. Whenever an intermediary is used, there is a high probability that unintentional omissions will occur, leading to misunderstandings between the two parties.

Using a Code System

A frequently used code is a yes-no code (Castle, 1981). The hearing

impaired individual initiates the call and controls the conversation. He is responsible for giving information and asking yes-no types of questions. The hearing individual responds to questions with either "no", "yes-yes", or "please repeat." These responses are perceived by the hearing impaired person as a one-, two-, or three-beat rhythm pattern. There are obvious limitations to the use of such a system. First, the questions must be unambiguous and phrased in such a way as to allow for a yes-no response. Secondly, this system does not permit spontaneous, two-way conversation.

Talking and Listening For Themselves

Several devices are available to aid the hearing impaired individual in direct telephone communication, two of which I will mention here. Many hearing aids have a "T", or telecoil setting, which amplifies only the signal coming from the telephone. This allows the hearing impaired individual to concentrate maximally on the telephone conversation (Castle, 1978). The "T" setting, however, is not standardized. Some users will experience insufficient gain when compared to the "M", or microphone setting. One additional disadvantage to the use of the "T" setting is that the hearing impaired person cannot hear his own voice. He must monitor the volume of his voice through the telephone.

A second device is the built-in amplifier within the telephone handset. It provides additional acoustic gain (25dB to 30dB) for persons with the hearing aid set on "M." For those who have a "T" setting, it provides greater acoustic leakage to be picked up and amplified.

There are disadvantages to the use of a hearing aid and/or a built-in amplifier. The additional gain provided by the amplifier increases the occurrence of feedback, which interferes with conversation. For persons who do not have a "T" setting on their hearing aids, environmental noises can greatly

interfere with communication. Hearing impaired individuals need signal-to-noise ratios of +20 to +30dB for optimal speech reception (Bess and McConnell, 1981).

One obvious disadvantage to this approach is that it cannot be used by deaf persons who have little or no residual hearing. For these individuals, even extremely high levels of amplification will not be able to compensate enough for their hearing losses such that telephone conversation could be possible.

Telecommunication Equipment

In 1964, a profoundly deaf physicist, Dr. Robert Weitbrecht, developed an acoustic coupler, which allowed two teletype machines to communicate over a standard telephone (Bellefleur, 1976). A system of communication was developed which allowed transmission of "word-characters from one geographic location to another" (p. 107). There are two terms used to describe this communication system: TDD and TTY. TDD, which stands for Telecommunication Devices for the Deaf, refers to any equipment designed to send typed messages using the telephone. This is a general term which encompasses all of the different models available today.

TTY, or teletypewriter, originally referred to the large, bulky machines used by Western Union, Associated Press, United Press International and other news agencies. Because there are at least 10 different brands of TDD equipment, some with more than one model, most people refer to the specific model, such as a C-Phone or Model 32. Throughout the remainder of this paper, the term TDD will be used to refer to telecommunication equipment in general, and C-Phone will be used to refer to the specific model I used with the children.

Models

The TDD models most often used are the Am-Com, the C-Phone, the Pocket-Phone, the Porta-Printer II, the SSI Communicator (Porta-Tel), the Teletyrm,

and the VIP. A description of each can be found in Castle, 1980.

Possible features of these TDDs include portability, a paper printout of the conversation, memory and red, blue or green letters (Castle, 1981). Most TDD equipment used today is electronic rather than mechanical, as it once was, and it ranges in price from \$160 to \$1,000. The older, stationary models are bulky but they usually are less expensive than the modern models. The high cost of modern models has prevented many deaf individuals from obtaining them. Less than 5,000 units were sold between the period of 1964 to 1975.

Services Provided

TDDs are now used at emergency facilities, law enforcement agencies, and crisis centers. Some cities have TDDs in churches, libraries, telephone company offices and vocational rehabilitation offices. In June, 1980, Bell Telephone installed a nation-wide toll-free TDD number (1-800-855-1155) which allows deaf persons to get operator assistance. In some cities, deaf persons who have TDD equipment can shop by catalog. Both Sears Roebuck and John Wanamaker in Philadelphia are two department stores which offer such a service. Amtrack and the Internal Revenue Service now have toll-free TDD numbers.

Many TDD numbers are not presently listed in local telephone books. Teletypewriters for the Deaf, Inc., located in Washington, D.C., publishes TDD numbers annually in the International Telephone Directory of the Deaf. TDI also has regional representatives who provide interested persons with information about TDD equipment.

In addition to person-to-person communication using a TDD, a relay-message service exists in some cities. One of the largest, CONTACT, is an agency of the United Methodist Church. If a deaf person wishes to call a hearing person who does not have a TDD, he calls CONTACT, where his call will be received by a hearing volunteer who has a TDD. The volunteer will call the person with

whom the deaf person wishes to speak. The two individuals communicate through the volunteer. The deaf person uses the TDD, the volunteer reads what has been typed to the hearing person, and relays the response back to the deaf person. Hearing persons may also initiate the call to a deaf person, in which case the sequence of events is reversed.

The Future

TDDs have thus far opened up new avenues for members of the deaf community, in their personal and professional lives. The future should continue to do so. The Pennsylvania School For The Deaf plans to open the first Radio TDD news station. It will broadcast local, national and international news to a population of 1,000 hearing impaired families in 5 countries. The extension of the PicturePhone to the general public will permit face-to-face communication. This would allow deaf persons to use speech, speechreading, fingerspelling or sign language to communicate. Also, gestures and facial expressions would not be lost as they are in telephone conversation.

Introduction to the Study

At the present time, TDD instructional courses do not exist for elementary- and secondary-age children. Castle and associates at the National Technical Institute For The Deaf have developed two courses in telecommunication for college students. The first course provides instruction in telephone conversation, and is designed for deaf students who have enough residual hearing to communicate over a standard telephone. The second course is for those students who must use TDD equipment or special codes for telephone communication.

The intention of my study was:

1. to teach deaf children the touch system of typewriting;
2. to teach deaf children how to use the C-Phone;
3. based on my experiences in this study, to develop an instructional plan which is to be used to teach elementary- and secondary-age children how to become effective users of TDD equipment.

Subjects

My subjects for this study were 3 orally educated deaf females, ages 9, 11, and 11, who were in residence at the Central Institute For The Deaf. The children had severe-to-profound hearing losses. One of the subjects was unable to continue participation in the study because she went home every other weekend (instruction took place on consecutive Saturdays).

Procedure

The major portion of instruction was devoted to teaching the children the touch system of typewriting. Due to the high cost of long distance telephone calls, it was deemed necessary by myself to have some facilitation with typing. Each session lasted for approximately 1 hour. An average of 3 letters were introduced and practiced per session. The children were shown which fingers to use for the letters and were given written drill practice to become accustomed to the finger motion. Previously learned letters were practiced along with each new set of letters. Homework included drill practice with all letters which had been learned up to that point. These assignments were typed on a C-Phone located in the children's dormitory. It was thought that this would help the children to make the transition from the typewriter to the C-Phone

easier. Typewriting instruction mainly involved learning letters. The only punctuation marks which were taught were the comma, the period and the question mark.

Upon completion of typewriting instruction, the children were introduced to the C-Phone. Following is a list of telephone signals and their descriptions.

monitor light	the light on the C-Phone that shows you the patterns for the different telephone signals
dial tone	your telephone is working properly; the monitor light stays on continuously
busy signal	someone is on the other telephone; the monitor light will flash on for 1 second and off for 1 second
ringback signal	the telephone is ringing at the number you dialed; the monitor light will flash on for 1 second and off for 4 seconds
ringing	someone is calling you; the monitor light will show the same pattern as the ringback signal

All 4 patterns were demonstrated for the children. Codes commonly used during TDD conversations were described. These include GA, SK and HD. GA, or "go ahead," is typed after each person has finished what they have to say. It is the signal for the other person to begin typing. SK is typed when one party is finished the entire conversation. Both parties must type SK before either hangs up. HD or "hold" is typed when one party must leave the conversation for whatever reason. The other party holds any further conversation until the party who typed HD indicates that he is ready to resume communication.

The procedures for making and receiving a call (See Appendix A) were first demonstrated for the children. They in turn demonstrated that they could follow the same procedures on their own.

After the children understood the procedures for making and receiving a telephone call, they placed a call to me from a separate C-Phone. The conversation went back and forth for about 5 minutes at which time it was terminated.

Results

In the beginning, the children were slow to master correct finger positions for typing. Toward the end of instruction however, they progressed to a point where they could type short sentences from a written guide without looking at their fingers.

The children were able to comprehend and correctly identify the rhythm patterns for the different telephone signals. They were also able to correctly place and receive a call. Both children had difficulty during the actual conversation with me. There were many typographical errors (which was to be expected), and the language used by both children was in some cases incoherent. Responses were labored and I often had to provide the children with appropriate questions to ask and topics to discuss. Neither child appeared to be reading what I was typing. Their responses were often inappropriate. After the conversations were ended, both children related to me their frustration with the typing aspect of the procedure. They also said that they were confused about what to say and do during the conversation.

Sample Conversation

Instructor: This is Adrienne GA

Subject: This is _____ GA

Instructor: _____ after you say this is _____ you are supposed to say something else. Remember, you called me. GA

Subject: I tried to call you (jumbled letters) GA

Instructor: _____ are your fingers on the right keys?GA

Subject: Alex is watching me to type GA

Instructor: What will you do over spring break?GA

Subject: I will go home for spring break (long pause) What will you do over
spring break?GA

(The conversation continued until it appeared that the subject was getting frustrated. I told her not to worry about where to place her fingers. The speed of her typing increased after this).

Instructor: Do you have anything else to say?GA

Subject: GA yes GA

Instructor: You are supposed to type SK. GA

Subject: SK SK SK GA

Instructor: SK

Conclusion

Both children had difficulty trying to remember where to place their fingers and formulate grammatically sentences at the same time. The emphasis on typing appeared to interfere with the conversation. At this age, prior instruction in typing is probably not necessary. It will be more beneficial if instruction is begun once the children have become effective users of the TDD.

Neither child appeared to be responding to what I was typing. At first, I thought that this was due to a problem with pragmatics (the use of language). I concluded that the children didn't understand that the C-Phone was an instrument to be used for conversation. I disregarded this conclusion, however, when I realized that typing messages to another person was even more artificial

than talking through a telephone. These children, because of their hearing loss, hadn't had the experience of using the telephone to converse with other people. The C-Phone bears no resemblance to another human being (obviously!). It is far removed from face-to-face communication.

As a result of this study, I have outlined a TDD instructional guide to be used with hearing impaired children. To overcome the problem of artificiality, I have suggested a progression of activities beginning with face-to-face conversation and ending with conversation using the TDD.

A Program For Teaching Deaf Children How To Use A TDD

Session I

1. Discuss reasons for using the telephone
 - to make travel reservations
 - to talk with friends
 - to make appointments
 - to obtain information
 - for emergency purposes (police, fire department, ambulance)
2. Discuss possible topics of conversation to engage in when talking with friends
 - school
 - an exciting trip
 - an upcoming event
 - a movie you have seen or will see
 - boys (or girls)
 - a book you have read
3. Using toy telephones, have one child "call" the instructor. Discuss a previously agreed upon topic. During the conversation, help the child choose appropriate questions to ask and appropriate answers.
4. Using toys telephones, follow the same procedure but have one child call one of the other children as the instructor watches.

Session II

1. Using one typewriter, practice asking and answering questions with the child.
One person types a question and the other types a response.

2. Follow the same procedure but use two different typewriters with a partition separating the instructor and the child. Another child will carry the responses back and forth. This will prepare the child for the TDD conversation in which he or she is unable to see the person to whom he or she is conversing with.

Session III

1. Introduce the codes used when communicating on the TDD (GA, SK and HD).
2. On the same TDD, have several conversations with the children incorporating these codes where appropriate. The topics of conversation should be agreed upon beforehand.

Session IV

1. Introduce the telephone signals and demonstrate their patterns (you will need to have someone on another telephone to receive and place calls to the TDD).
2. Have the children identify the different patterns. Give them a written test on these signals (See Appendix B).

Session V

1. Demonstrate how to place a call and how to receive a call (See Appendix A).
2. Have the child do the same.
3. Have the child place a call to someone on a different TDD. Both TDDs, if possible should be in the same room, preferably across from one another. The instructor will be beside the child to help him if necessary. The children will discuss an agreed upon topic.

Session VI

1. The child will place a call and discuss an agreed upon topic. Again, both TDDs will be in the same room but with a partition separating them.

The instructor will be beside the child to help him, if necessary.

2. The child will place another call, but the other TDD will be in a different location. The instructor will be beside the child.

Session VII

1. The child will place a call to another person without the instructor beside him.
2. The child will place and receive calls from the other children. They will decide beforehand the topic of conversation.

Session VIII

1. The child will place a call to his or her parents (provided that they have access to a TDD. The instructor will be beside the child. When the child has acquired facilitation with the TDD, he or she will make calls home on a regular basis.

Session IX

1. The children as a group will discuss the procedures to follow in case of an emergency.
 - a. call the TDD number (which will be next to the telephone)
 - b. give your name and complete address
 - c. describe the problem (a fire, an injured person, etc.)
 - d. give the telephone number your are calling from
 - e. wait for the other person to acknowledge that they understand what you have typed; answer any question asked by the other person and follow any advice given.
2. The instructor will serve as the emergency facility. Create a make believe emergency and have the children follow the correct procedures.

Appendix A

Procedures For Making A Call

1. Turn on the power switch on top of the C-Phone.
2. Put the telephone handset into the coupler with the telephone cord to the left.
3. Check the monitor light - it should show a steady pattern.
4. Dial the number.
5. Check the monitor light for the different patterns.
6. The person you are calling will type first. When you see GA it is your turn.
7. Type your name and any other message. Type GA.
8. When both of you have typed SK (meaning that you are finished with the conversation), press the clear key and turn off the power switch.
9. Hang up the handset.

(Castle, 1980)

The same procedure is followed when receiving a call except that you are the first to type.

Appendix B

Basic Telephone Signals

1. Name the five basic telephone signals you may see or hear when you use a telephone.

a. _____

b. _____

c. _____

d. _____

2. The dial tone:

a. What does a dial tone mean?

b. What is the rhythm pattern?

3. The busy signal:

a. What does a busy signal mean?

b. What is the rhythm pattern?

4. The ringback signal:

a. What does a ringback signal mean?

b. What is the rhythm pattern?

5. The misdial signal:

a. What does a misdial signal mean?

b. What is the rhythm pattern?

6. The ringing signal:

a. What does a ringing signal mean?

b. What is the rhythm pattern?

(Castle, 1980)

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