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Diane L. Castle

*National Technical Institute for the Deaf- Rochester Institute Technology*

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## TELECOMMUNICATIONS TECHNOLOGIES USED BY EMPLOYEES WHO ARE DEAF<sup>1</sup>

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**DIANE L. CASTLE**

**National Technical Institute for the Deaf**

**Rochester Institute Technology**

### **Abstract**

Employees who have a hearing loss can use much of the same technology for telephone communication that is available for other employees in the workplace, e.g., computers, electronic mail, fax, pagers, and cellular phones. Combining special deafness - related devices, strategies or services with these new technologies may allow employees who are deaf or severely hard of hearing to demonstrate their efficiency and productivity. The various telecommunication technologies used by eight employees are described. Appendixes provide a listing of telecommunication equipment, strategies, and services useful for employees with a hearing loss, and educational resources useful to hearing co-workers.

telephone amplifiers were used at work in addition to asking hearing colleagues to make telephone calls.

The current explosion of telecommunication technologies has opened up a wide variety of options for employees with a hearing loss. Business and industry are using computers, electronic mail, fax, pagers and cellular phones as standard telecommunication equipment. Employees who are deaf or hard of hearing can and do combine these new technologies with strategies and equipment they have used before. For example, cellular phones can be connected to battery-operated TTYs or to a hearing aid telecoil interface for employees whose jobs require mobility.

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### **Introduction**

Over the years, employees who were deaf viewed the telephone as the greatest single barrier to equality in the workplace. It was typical during the 1970's and before, to assume that employees who were deaf would not use the telephone but would do more non-telephone tasks while a hearing co-worker would answer all telephone calls. Gradually, text telephones (TTYs)<sup>1</sup> and

Simultaneous with the growth of telecommunication technologies, federal legislation focused on telecommunication and other areas of access for persons who are deaf or hard of hearing. Legislation, such as the Americans with Disabilities Act (ADA), requires employees with disabilities to be knowledgeable about various kinds of accommodations and how those accommodations can maximize their potential in the workplace.

This paper describes ways in which selected employees who are deaf use a multiplicity of telecommunication technologies to demonstrate their effectiveness in the workplace. Often, the

<sup>1</sup> This material was produced through an agreement between the Rochester Institute of Technology and the U.S. Department of Education.

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employee supplements the standard telecommunication equipment with special deafness - related devices, strategies or services (see Appendix A).

### Interviews With Selected Employees

Since September, 1990, selected deaf and severely hard-of-hearing employees have been interviewed about their use of telecommunication at work. As a group, they represent diverse communication styles, variable levels of college education and different academic majors. These stories present an interesting picture of the variety of equipment employees who are deaf may use to get the job done. There are several themes that run through these stories including the importance of advocacy in conjunction with educating coworkers about deafness and the importance of using current technology and strategies for communication.

#### Employee A

A computer graphic specialist with a Master of Fine Arts degree works for a large computer company. Eighty percent of her time is individual work, 15-20 percent is team work. There are eight people on her team. Soon after she was hired, she held a workshop for her department to explain ways to communicate with people who are deaf. As a result, her supervisor required all his employees to take sign language classes which she taught during lunch time. There are ten deaf employees working in different sections of the company.

This employee uses her speech and depends on lipreading or writing if information is not understood. She wears two hearing aids even though she doesn't understand words clearly through listening. To help her understand them, her coworkers may try using their signs, write down the misunderstood word or speak more

slowly. These strategies are useful during conversations with employees from foreign countries also.

The company provides fax, electronic mail, TTY software for her computer, a text pager, a voice/TTY answering machine, a separate TTY, a tape recorder, and an interpreter or notetaker as needed. The employee explained how these technologies and services helped her work more efficiently. She uses the TTY to call others with the same equipment when she needs to know information immediately; that occurs approximately three-to ten-times a day. She uses the state relay service to request an interpreter when needed or to call other companies for information about graphics; this occurs about twice a week. She uses electronic mail approximately three hours a day and fax about twice a week. The pager is used to contact her if she is in a meeting or away from her desk. The tape recorder is used if there is no interpreter at a meeting; the employee audiotapes the meeting and later the interpreter transliterates the information as she takes notes. At her request, the company will hire a stenotypist for real time captioning for meetings. She is very proud of the fact that she told the company about this technology.

The employee can choose to have either an interpreter or captioning for a meeting. Her decision is based on the topic of the meeting. She chooses, for example, an interpreter for a general division meeting, but uses captioning for meetings that focus on technical, detailed content. She has found that some interpreters do not know computer technology signs and she has to teach them the signs she uses. Similarly, she has to give the stenotypist a list of terms and abbreviations to use when captioning a meeting.

At her company, there is a lot of brainstorming at meetings. She explained that everyone thinks fast and you are expected to use language that explains what you are thinking. Her company wants people to contribute their ideas

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during meetings. She wants to develop her self-confidence and ability to speak in these business situations in order to promote her ideas. She does not want to be seen as a "token" deaf person.

### Employee B

The next employee is an associate packaging technologist with a Bachelor of Science degree who works for a large specialty foods company. He is the only deaf professional in the company, and three people report to him. It took time for all of them to adjust to working with each other.

He wears two hearing aids which provide him with an awareness of sound. He uses speech and depends on lipreading and listening and explained that he is getting used to their lip movements. If some terminology is not understood, it is written down. He is very open about telling coworkers how to improve communication with him. One person has a beard and he tells him to put his head up and repeat the information. The company hired an interpreter to teach sign language to the employees in his department.

The company provides him with two TTYs (one for his office and one for travel), fax, an interpreter for meetings, and electronic mail within his department. Although other departments do not have electronic mail yet, the company recognized the advantages of providing it to this employee and his team.

The relay service is used 15-20 times a day. His coworkers are located in different areas throughout the building and they call each other using the relay service for immediate answers to questions. One of his team members will be getting his own TTY because he is on the opposite side of the building and they need to be in close contact by telephone. He uses electronic mail about three times a day for detailed explanations among his team members. Fax is used approximately once a day to people in other plants.

The employee never uses an interpreter for one-to-one meetings, but does if there is a group of people. His team meetings usually include 8-10 people from marketing, purchasing, advertising, quality control, etc. He travels one to two times a month to visit other company plants and to attend conventions and hires interpreters as they are needed in those cities. When he gains more training and experience in management he believes he will have an opportunity to be promoted.

### Employee C

A product design engineer with a Bachelor's degree works for a large equipment design and manufacturing company. Five people report to him. He designs the concepts for new electronic instruments and delegates specific parts of the development to members of his working group.

This employee does not use speech or hearing aids. His day-to-day communication is by writing and he uses full sentences to express the information, not just two or three words. He does not want any misunderstandings to occur because the products under development may cost millions of dollars.

Over his 18 years with the company he has had 13 different supervisors. He taught half of them to use sign language. Also, some of his coworkers learned sign language from him. At meetings, when he gives a presentation, his supervisor will speak for him. If his supervisor is not at the meeting, he uses an overhead transparency to show what he has written. If the audience has questions, they write them on paper and he responds by writing on the overhead. In his opinion, the audience seems to be patient with the process.

He uses a TTY, electronic mail, interactive computer communication, fax and writing on paper. If he or his coworkers need to communicate immediately, they meet together and use writing. If the information relates to

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something in the future, they use electronic mail. Sometimes he communicates with the secretary by typing on the TTY without using the phone whereby they take turns typing back and forth.

He uses electronic mail to contact other divisions and outside companies. If a small company does not have electronic mail, he uses fax. In addition, he can have a real-time conversation using the computer. For example, if he is doing some drafting on the computer, a message may appear showing that someone wants to talk with him. He can stop his drafting, change windows and have a conversation with that person. When the conversation is finished, he goes back to his drafting window.

He uses the relay service to contact vendors or other companies. If the person he wants to speak with is not there, he leaves his secretary's phone number with the message. All voice calls go to the secretary or coworkers. When a call comes in for him, the secretary gets him and they sit next to each other. When the caller speaks, the secretary writes down the information and he writes a response and they go back and forth until the call is over. He finds that many people are not comfortable using the relay service, but it depends on the individual.

Since college, he found that he could develop strong cooperative relationships with hearing colleagues. For example, he might help people with some work they found difficult and in return they helped him with phone calls or communication at meetings. He feels that patience and flexibility are very important qualities in developing good relationships with coworkers.

### Employee D

A severely hard-of-hearing person is trying to succeed in the movie business as a film producer. For him, the telephone is a very important means of communication. He can speak clearly on the telephone, but he has difficulty understanding many people, even though he uses hearing aids.

In face-to-face conversations, he combines listening with lipreading and feels confident of understanding the information. He is learning to use an oral interpreter for some of his telephone calls. Instead of listening to the person through the phone, he speechreads the oral interpreter.

In his kind of work, he is seldom seated at a desk; he is always moving from place to place. He wears a pager that displays the words of the message. Using a very small, portable TTY with a cellular phone, he can answer any page, using the relay service. The relay operator types what the hearing person says, it is read on the text telephone display and he responds by speaking.

He explained that he cannot understand messages left on an answering machine. To solve this problem, he pays an answering service to receive his telephone messages. Each message is typed into the answering service computer and immediately faxed to his home or it can be sent to his home computer. This saves time and allows him to avoid answering the telephone.

### Employee E

An interactive computer graphic designer with a Master of Fine Arts works for a new business. He is the only deaf person in the group of eight people and all employees are working from their home offices to keep costs and overhead low.

This employee shared the cost of purchasing telecommunication equipment with his boss. He bought a TTY and a fax machine for his home office. The company bought him a computer, a printer and a second printer with wide paper for the TTY. He uses the TTY and relay service to call clients while the computer is used to send electronic mail to his boss and coworkers about the progress he is making on his projects. The fax is used to send artwork to his boss or his clients for their approval.

The company has been very successful. Recently, it was decided to rent office space so all employees could be together in the same location.

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The employees still work independently, but use their computer network to log in their progress and their status on each phase of a project.

Group meetings are held in a conference room that has a computer. Employees reporting on a project use the computer connected to an overhead projector. Sitting on top of the projector is a liquid crystal display panel. This panel makes it possible to show their work in color and enlarged. The employee who is presenting information about the project types the information into the computer. It is projected, enlarged, and easily read by everyone in the room. These electronic meeting notes are sent to each employee's computer file. The employee can decide to keep the file, discard the file, or send it to the laser printer. If employees leave the room or miss a meeting, they know what is happening when they return.

The director of the company explained that these procedures were established to maximize efficiency, to keep everyone informed of current projects, and not because of any special needs relating to this employee.

### Employee F

A senior technical associate who develops software for electronic switching systems does not wear hearing aids or speak but he does use clear lip movements without voice which helps people understand him. A number of people who are deaf work in this company. The employer provides a full-time interpreter in addition to electronic mail, fax, and TTYs. A relay service, established within the company, is used for telephone calls between deaf and hearing employees. The senior technical associate prefers to use electronic mail. If he does not receive a response, he calls again using the relay service. During his ten years with the company, he has been very active in teaching coworkers about deafness, relay services, interpreters and sign language.

### Employee G

A construction inspector with a Bachelor's degree in civil technology is the only severely hard-of-hearing person in the five-person department. He travels to different locations each day to inspect construction jobs. The employee was using a vibrating pager for contact with the office. Whenever the pager would vibrate, he would look for a pay telephone and call the office using the portable TTY with the relay service. The office would tell him where to go for the next inspection. This would happen 3 or more times each day. He was able to convince his boss to get a text pager for him. The message on the pager shows where to go for the next inspection. The new pager saves a lot of time for him, the secretary and the company. Recently, his company bought a cellular phone for him to use with the text telephone. If he needs to call the office, he does not waste time looking for a telephone.

### Employee H

An art director-graphic designer with a Bachelor degree in Fine and Applied Art works for a national organization. She creates designs for national and international publications. She must be in touch with organizations all over the world. She communicates easily using clear speech and good oral English and she wears two hearing aids. She taught her coworkers about the state relay service so they can call her if she is at home. She has explained how to communicate with her, for example, to speak more slowly and face her. However, their accents and lack of patience are two problems she encounters.

This employee has both IBM and Macintosh computers in her office. TTY software and a modem are connected to the IBM. She contacts people using the state relay service approximately five times a day, five-to ten- times a day using fax,

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approximately 20 times a day using electronic mail, and she uses an amplified telephone with selected people. Her deafness does not interfere with her work because she uses a variety of technologies to obtain feedback and approval from these different locations before the final copy is sent to the printer. She says electronic mail and fax are the two telecommunication technologies she uses most frequently.

### Conclusions

Each of these employees has taken the initiative to educate members of their department about their communication style and about sign language, as appropriate. Several employees held a special meeting with coworkers while others explained preferences on a one-to-one basis. These employees took the initiative to request specific telecommunication technology and explain how the equipment could help them work more efficiently. Although there was no mention of sharing specific educational materials with coworkers, there are several products that are aimed at a hearing audience and provide information about deaf people, sign language, TTYs, telephone amplifiers

or various telecommunication technologies (see Appendix B). Keeping up with changing technology can place a tremendous responsibility on the employee as well as on agencies and programs serving persons with hearing loss. Ways to learn about new telecommunication technologies may include networking with colleagues, reading articles and advertisements about new devices, and using a natural curiosity about various features incorporated into newly purchased office equipment. For example, telephones increasingly are being described as multipurpose, e.g., having a keyboard for text (TTY and/or computer) communication, a port to connect a lap top computer or fax machine and an amplified handset. Soon, multimedia technology, incorporating audio, video, and data in one device will be come more available.

For the employee with a hearing loss, obtaining appropriate accommodations may improve working conditions, demonstrate greater efficiency, provide opportunities to assume additional responsibilities or increase job satisfaction. Creative use of technology can enhance telecommunication accessibility for everyone in the workplace.

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### Endnotes

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<sup>1</sup>The Federal Communication Commission uses the terms "text telephone" (TT) for this device, which is also referred to as a telecommunication device for the deaf (TDD) or a teletypewriter (TTY).

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### Appendix A

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#### Telecommunications Equipment, Services and Strategies\* Helpful to Deaf and Severely Hard-Of-Hearing Employees

##### Equipment

###### Voice Telephones

- battery-operated amplifiers
- built-in handset amplifiers
- amplifiers in base of phone
- variable frequency response
- speakerphones
- cellular phones with hearing aid adapter

###### TTYs

- ASCII/Baudot code
- keyboard dialing
- automatic answering
- display/printer
- remote message retrieval
- clock-calendar
- battery pack
- direct connect
- cellular phone connector for TTY

###### Computers

- electronic mail
- conferencing
- interactive communication
- TTY software with ASCII-Baudot modems
- LCD projection panel, video interface and overhead projector
- converter box between computer and TV

###### Facsimile (Fax) Equipment

- internal fax board
- stand-alone fax machine
- portable fax machines

###### Pagers (silent alert/vibration)

- text (alphanumeric)
- digital
- voice
- tone
- paging via TTY or computer

###### Voice Mail for TTY users

- one phone number for voice/TTY calls
- separate TTY phone number

###### Voice-TTY Answering Machines

- Heidico
- MIRAC

###### Multipurpose Phones

- AT&T Pay Phone 2000
- Philips Screen Phone
- TTY pay phone

##### Communication Services

###### Telecommunication Relay Services

###### Interpreters

###### Information Services (Prodigy,

###### CompuServe, Deaftek...)

- airline schedules
- bulletin boards
- electronic mail
- shopping
- weather
- other services

##### Strategies for Communication

###### Voice Carryover (VCO) for Relay Calls

###### Fingerspelling, Sign Language

###### Writing

###### Using Lip Movements, Whisper or Voice

##### Strategies for Meetings

###### Computer Assisted Notetaking

###### Assistive Listening Systems or Devices (FM, Loop, Infrared)

###### Overhead Projector

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### Appendix B

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#### Educational Resources

AT&T Accessible Communications Product Center (formerly AT&T Special Needs Center)  
1-800-233-1222 (Voice) 1-800-833-3232 (TTY)

Free brochures describing phones, amplifiers, TTYs, signaling devices and other products that can be purchased from the Center.

Cagle, S. & Cagle, K. (1991). GA and SK etiquette. A paperback book that cleverly describes, in words and pictures positive and negative behaviors for TTY conversations. \$8.00 Order from:

Telecommunications for the Deaf, Inc.  
8719 Colesville Road  
Suite 300  
Silver Spring, MD 20910

Castle, D.L. (1988). Telephone strategies. A paperback book that explains ways of using the standard phone with various amplifiers, assistive listening devices and verbal phone strategies. \$6.00 Order from:

SHHH Publications  
7800 Wisconsin Avenue  
Bethesda, MD 20814

Castle, D.L. (1994). New solutions to old problems: Telecommunications for deaf and hard of hearing employees. A brochure that describes telecommunications technology and services useful for employees with a hearing loss. Single copies free. Order from:

Rochester Institute of Technology,  
National Technical Institute for the Deaf  
52 Memorial Drive  
Rochester, NY 14623-5604

Hello Direct

5884 Eden Park Place  
San Jose, CA 95138

Free quarterly catalog of telecommunication equipment and accessories.

HARC Mercantile, LTD.

P.O. Box 3055, 3130 Portage Road  
Kalamazoo, MI 49003-3055

Free annual catalogs of equipment including phones, TTYs, modems and software, decoders, assistive listening devices, alerting devices, etc.

HITEC Group International, Inc.

8205 Cass Avenue  
Darien, IL 60561

Free annual catalogs of equipment including phones, TTYs, modems and software, decoders, assistive listening devices, alerting devices, etc.

Moore, M. & Levitan, L. (Eds.) (1992). For hearing people only. A paperback book that answers some of the frequently asked questions about deaf people, sign language, communication and Deaf Culture. \$15.00 Order from:

HPO Book  
MSM Productions, LTD.  
85 Farragut Street  
Rochester, NY 14611-2845

PC Novice

P.O. Box 85380  
Lincoln, NE 68501-9815

Monthly magazine written for people with little or no experience with computers. Subscription rate: \$12/year.

Sound Improvement

2192 Stringtown Road  
Grove City, OH 43123

Free annual catalogs of equipment including phones, TTYs, modems and software, decoders, assistive listening devices, alerting devices, etc.

Tele-Consumer Hotline

1910 K Street, N.W., Suite 610  
Washington, DC 20006  
1-800-332-1124 (TTY/Voice)

202-223-4371 (TTY/Voice) in Washington, DC

Free advice about TTYs, phone bills, repairs, listing of products, answering machines, modems, prices.

Telecommunications for the Deaf, Inc. (1993). Using your TTY. (40-minute Open-Captioned Videotape). Describes how to make and receive TTY calls. \$35.00 Order from:

Telecommunications for the Deaf, Inc.  
8719 Colesville Road  
Suite 300  
Silver Spring, MD 20910