

AN OVERVIEW OF PROGRESS IN UTILIZATION OF EDUCATIONAL TECHNOLOGY FOR EDUCATING THE HEARING IMPAIRED

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1978 Symposium on Research and Utilization of Educational Media for Teaching the Deaf

Captioned Films and Telecommunications Branch and
Media Development Project for the Hearing Impaired

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The history of educational technology predates the invention of the term by a considerable period of time. From a historical perspective, technology applied to education must be seen in reference to the available technology of the society and the times of which we speak. When Moses brought the Ten Commandments from the mountain engraved in stone, there is no question but that it carried a greater impact than if it had been hand-lettered on Papyrus or whatever alternatives existed. One might say that engraving the Ten Commandments in stone added an appropriate kinesthetic dimension to such a weighty message, and it didn't discriminate against the deaf and blind. However, you can be sure that, had the technology been available, Moses would have recorded the voice of God on Memorex audiotape and played it back full volume on a stereo system with appropriate psychedelic lighting. To pursue ancient history a bit longer, we hardly need to point out the massive effect of printing technology in the dissemination of knowledge and God's Commandments. Printing, we might say, has been and still is the backbone technology of the world's various educational systems.

The dawn of educational technology for the hearing impaired is generally regarded to be the year of 1958 when P.L. 85-905 established Captioned Films for the Deaf. In terms of modern communication technology, particularly electronics, this is as good a starting point as any, although there are educators of the deaf who would insist that hearing aid technology has made as great an impact as Captioned Films for the Deaf. We would all agree, however, that learning technology in a general sense was applied to the problems of teaching the deaf long before the 1958 milestone.

The author of this paper obtained his elementary education in a one-room Nebraska school and may be said to have been technologically deprived during his formative years. The first arc projected 16-mm educational film he ever saw was around 1930. It was a film developed by the Department of Agriculture for use of county agents on the use of electricity on the farm. His introduction to technology for the hearing impaired occurred some years later, and interestingly enough, concerned radio. Harvey T. Christian, a math teacher at the Nebraska School for the Deaf, was one of those people who applied available technology to the unique communication needs of the deaf. In the late '30s, Mr. Christian rigged up some ropes and pulleys on a chalkboard to communicate World Series radio broadcasts to deaf students at school. By manipulating a drawstring, he was able to provide a very realistic play-by-play and thus bring radio communication and baseball vocabulary to the deaf. Mr. Christian also designed a cover for a card table with which football games were made highly visible to deaf gridiron fans. If this wasn't communication technology, it is only because we lack agreement on the meaning of the term.

Despite occasional ingenuity such as described above, the pre-1958 level of media utilization in schools for the deaf was rather skimpy. The writer's teaching experience at the Nebraska School for the Deaf may have been more or less typical of many schools during the 1940-1958 period. The duplicating machine was unquestionably the major vehicle of educational communication during this era, although there was an annual tendency to run out of paper stock early in November. Other than ditto handouts, the educator of the deaf may have had access to a collection of filmstrips that, most likely, numbered less than fifty. The showing of a 16-mm film, such as *Chronicles of America*, was such a momentous occasion that they were usually shown to the entire student body in an assembly program. The earliest filmstrips to appear at the Nebraska School were, for the record, freebies distributed by the National Council of Churches and used for Sunday school instruction. The athletic coach, with access to athletic funds, probably was occasionally able to schedule an athletic demonstration film which was borrowed for a small fee from a nearby University Film Library. Bulletin boards were usually a form of second life for picture magazines which abounded at that time.

While deaf students in the late forties were being tantalized by occasional exposure to new learning technology, events were transpiring in the New York area that would turn this infrequent utilization into a tide that within a short period of time would revolutionize the education of the deaf. Before going into the details of the coming revolution, it is perhaps necessary to digress a bit and try to explain why this particular area of education was such a fertile field for learning technology.

General educators keep asking, "What's so special about special education? Or what is so unique about the needs of the hearing impaired?" The partial answer to this is that education is primarily a process of communication between the learner and his society. Without communication an individual cannot assimilate his or her culture. In a society where the spoken word is dominant, it is most difficult for the hearing impaired individual to become a fully participating member. Effective communication is a necessary condition for all members of a society. An individual's role hinges, more than anything else, on his ability to communicate, to initiate, propagate, and share ideas, to interpret communication from other persons and the environment. To achieve this objective, it is logical that communication technology should be enthusiastically embraced by everyone concerned with the education of the hearing impaired.¹

Educational technology can free the hearing-impaired student from the limited and sheltered interpretation of the world that heretofore had restricted his learning and his participation. For the handicapped, educational technology vastly enlarges the window through which they view the world. Technology, thus, is the most effective way of overcoming one's sensory deprivation. As important as the basics of reading and writing may be, the illiterate of the future is one who cannot grasp the complexities of the world in which he lives.

To return to the chronology of events that comprise the technological revolution in the education of the deaf, one may establish 1958 as the dawn of educational technology in the education of the deaf. One must recognize that P.L. 85-905 marked the beginning of massive and effective application of communication technology to the needs of the hearing impaired. With the possible exception of better amplification devices, there was very little difference between the classrooms of 1930 and those of 1950. The change from 1958 to the present, on the other hand, has been little short of phenomenal. Legislation in the American system of government, however, doesn't just happen, so it is appropriate to describe the gestation of events that preceded P.L. 85-905.

The idea for Captioned Films for the Deaf was spawned in a doctoral dissertation during the 1946-48 period by Ross Hamilton, a student in the Department of Special Education at Teachers College, Columbia University. Dr. Hamilton was at that time administrative assistant to Dr. Clarence D. O'Connor, director of the Lexington School for the Deaf in New York City. Hamilton's study involved a technology that appears primitive by today's captioning technology and involved the use of two cameras, one for the movie and one for the captions. Dr. O'Connor became intrigued by the concept and he, in turn, interested Dr. Edmund B. Boatner, superintendent of the American School for the Deaf in West Hartford, Connecticut. These people expounded the concept of systematically providing captioned materials for the deaf and gave their enthusiastic support and direction to subsequent events.

Kundert² reports that with some funding from the Junior League of Hartford, Captioned Films for the Deaf, Inc. was organized as a nonprofit corporation under the laws of the state of Connecticut. With technical expertise provided by Jules P. Rakow, a vocational teacher at the American School, the fledgling corporation soon acquired a library of thirty captioned feature films which were rented to schools for the deaf. The demand for films shortly outgrew the resources of Captioned Films for the Deaf, Inc., and alternative sources of funding were sought. The general idea was to provide captioned films for the hearing impaired on the same basis as "talking books" are provided for the blind. One step led to another and on September 2, 1958, President Eisenhower signed P.L. 85-905, an act to provide for a loan service of Captioned Films for the Deaf in the Department of Health, Education, and Welfare.

Captioned Films for the Deaf

Initial funding for CFD was an inconsequential \$78,000. The purpose essentially was to "provide enriched cultural, educational, and entertainment experiences for hearing impaired persons."³ The program became operational in 1959 under the direction of John A. Gough. Negotiations with film producers developed criteria for acquisition of films. Research and experimentation was conducted to determine

the most favorable captioning techniques, and three depositories were established for distribution of the films. During this period, films were of an entertainment nature and were distributed largely to deaf clubs and organizations. From the very beginning, the demand for the films exceeded the supply.

P.L. 87-715 in 1962 amended the Captioned Films Act and increased funding to \$1,500,000. The amendment added authorization to provide for educational and training films for use with the deaf and to conduct research. This legislation initiated various activities which in a short time led to the condition where captioned films and other innovative educational media became an integral part of classroom instruction for the hearing impaired. The national office at this time extended its effectiveness by an arrangement with the New Mexico Foundation at New Mexico State University in Las Cruces, whereby the latter agency served as a facilitator for change by developing awareness and familiarity with new equipment and materials.

Media Services and Captioned Films

In 1965, Congress passed P.L. 89-258 which again expanded the original Captioned Film Act and the 1962 amendments. This law increased funding from \$1,500,000 to \$3,000,000 for the fiscal years of 1966 and 1967; to \$5,000,000 for fiscal years 1968 and 1969; and to \$7,000,000 thereafter. With increased funding came revised objectives. Public Law 89-258, for example, also established the National Advisory Council on the Education of the Deaf (NACED). Amendments in 1967 extended similar media services to other handicapping conditions, and further amendments in 1970 established the National Center for Educational Media and Materials for the Handicapped (NCEMMH) at Ohio State University. During this period, there was extensive reorganization within Health, Education, and Welfare (HEW). The Bureau of Education for the Handicapped (BEH) was established and Captioned Films for the Deaf became the Media Services and Captioned Films Branch (MSCF) of the Division of Media Services (DMS).

During the 1965-1974 period, vastly expanded services were provided for teachers of the deaf. The Educational Media Distribution Center (EMDS), established in 1966, provided distribution and dissemination services for MSCF and related agencies. Four thousand classrooms and training centers were provided with basic media equipment consisting of overhead projectors, filmstrip projectors, screens, and tables. Over two million discrete items of instructional software, largely transparency masters, filmstrips, transparencies, and other print and nonprint materials were made available to teachers of the hearing impaired by EMDC and the RMCDs. Included in the free distribution program were nearly 200,000 manuals and curriculum guides.³

Over this period of time, 16-mm films were being captioned at the rate of about 65 titles per year for both entertainment and educational films, a total of 130 titles. Sixty-five prints were produced for each captioned educational title. These were distributed through sixty depositories to enhance accessibility. Captioned Films services involve much more than the captioning and distribution process. A mechanism for screening and selecting films for captioning has been established; study guides are developed annually for the new films entered into the educational library; workshops are conducted for writing captions which in the case of syncapped films involves rewriting the entire sound track; and catalogs are printed and disseminated to all potential users of both educational and entertainment films.⁴ Utilization data collected indicates⁵ that bookings of theatrical and documentary films to schools, organizations, clubs and eligible agencies exceed 19,000 per month. The educational films are seen by more than 1,500,000 hearing impaired viewers every year.

From 1966 onward, the four Regional Media Centers for the Deaf (RMCD) carried out a significant portion of MSCF functions. The four centers had common objectives of media in-service training for teachers and materials production. Additionally, each had a unique function. The Southwest RMCD concentrated on programmed instruction and instructional design. The Midwest RMCD at the University of Nebraska

stressed the utilization and production of 8-mm films and related media. The Northeast RMCD at the University of Massachusetts gave its attention to transparencies and overhead projector utilization, while the Southern RMCD at the University of Tennessee focused its attention on educational television. The Midwest RMCD, for example, had a six-week summer media institute for teachers of the deaf which annually involved 30 teachers of the hearing impaired. They also had a one-week institute during the school year for supervising teachers and another for IMC personnel. They also conducted about ten or twelve short-term workshops (two days as a rule) within an eleven state area.⁶ In-service training activities at the other RMCDs were of a similar magnitude. Many of the workshops and institutes were exemplary models of instructional design. The Southwest RMCD sponsored Project Hurdle which featured a van loaded with media equipment which traveled all over the West to impact selected schools with media skills and utilization. Consultation services to schools were also provided.

In addition to in-service activities, the RMCDs made other contributions to the media revolution too numerous to mention. The Northeast RMCD developed several sets of transparencies which were made available to teachers of the hearing impaired. The Midwest Center produced a number of films, multimedia kits, and a set of transparencies. The Southern RMCD experimented with captioned television and provided videotape duplication services. The Southwest Center produced programmed learning materials and guides and manuals for program writing. The Midwest RMCD also conducted an annual Symposium on the Research and Utilization of Educational Media for Teaching the Deaf. The reports from these ten symposia were reprinted in the *American Annals of the Deaf* from 1965 through 1974.

Perhaps the greatest impact of the RMCDs was an activity that never developed much visibility. In-service training projects developed numerous educational products of a useful nature which were taken home and used with hearing-impaired students. The same in-service training functions developed production and utilization skills which undoubtedly led to hundreds and hundreds of items of teacher-produced materials which have enhanced the learning of hearing-impaired children.

An attempt to evaluate the impact of MSCF and RMCD activities was made in a survey conducted by the Midwest RMCD in 1973.⁷ A questionnaire mailed to 423 symposium participants yielded a response rate of 71.3 percent. Data obtained indicated that 85 percent had an IMC and that 82.2 percent of them had one or more full-time media specialists, compared to 7.9 in 1964. Other interesting data were as follows: the average teacher was using an overhead projector for 33.2 percent of instructional time; 73.5 percent of schools were using Project LIFE materials; the average use of captioned films was for 18.5 percent of instructional time; and educational television was being used on the average of 7.6 percent of instructional time.

The events described above were paralleled by other developments which vastly increased the impact of educational media on the education of the deaf. It is not within the scope of this paper to make an exhaustive listing of all the events and activities that had a direct or indirect bearing on the impact of educational technology on the education of the deaf. We can only highlight some of the related events. One of the enhancing factors was the rapid development of communication technology in America. The overhead projector came on like gangbusters, along with commercially available materials to use with it. Developments in educational television, spearheaded by *Sesame Street*, were similarly phenomenal. Continuous Project LIFE activity eventually brought innovative hardware and a comprehensive collection of over 400 filmstrips and other materials into classrooms for the deaf.⁸ At the same time, BEH supported the developments of numerous other projects and activities, such as the Programmed Learning Electronic Assembly Program for the Deaf,⁹ a doctoral program in educational technology for educators of the deaf at Syracuse University, Career Media at the Technical-Vocational Institute in St. Paul, and many similar activities.

Also, conducive to educational technology developments for the hearing impaired were various pieces of legislation that supported educational services for the handicapped. Chief among these was the Elementary and Secondary Education Act of 1965.⁹ The various titles and amendments of this act had a

significant impact on the education of handicapped children. School administrators, who a few years earlier could hardly support the appetite of a ditto machine, could now think in terms of installing costly video equipment and building new facilities. A survey conducted by the Southern RMCD¹⁰ involved a questionnaire that was sent to 200 of the larger school programs for the deaf in this country. One hundred and forty-two of the 180 schools that responded indicated that they had television receivers/monitors. The number of receivers/monitors added up to about 2,000. One hundred and twenty-three of the respondents indicated that they had video recorders, and 109 had some sort of production capability. Forty-two of the schools had cable systems, and six had color production capabilities.

Effective September 1, 1974, the Bureau of Education for the Handicapped established the Learning Resource Center Program to provide regional centers and specialized national offices to assist the handicapped child. This was done largely in response to a mandate for a generic approach to services for the handicapped and for channeling these services through state education agencies. The Learning Resource Center program consisted of 13 Regional Resource Centers, 13 ALRCs, a coordinating office for the RRCs, four Specialized Offices, and the National Center for Educational Media and Materials for the Handicapped. The network's prime purpose was to help states develop delivery of such supportive services to the handicapped as necessary to achieve 1980 educational goals for the handicapped. For this new structure, the Division of Media Services split into two branches—the Learning Resource Branch and Captioned Films and Telecommunications Branch.

Under the new program, services to the hearing impaired previously provided by the RMCDs were to be carried out by state agencies with assistance from the RRCs and ALRCs. The Specialized Office for the Hearing Impaired (SO-2) at the University of Nebraska-Lincoln continued with the development of instructional materials for the hearing impaired, but the major function of the office was to review and abstract materials for entry into the National Instructional Materials Information System (NIMIS). During the three years of operation as a specialized office, more than 15,000 items of instructional materials were reviewed and approved items were entered into NIMIS. SO-1 and SO-3 achieved similar objectives for the visually impaired and for other handicapping conditions. This data bank in 1977 was transferred from Ohio State to the National Information Center on Educational Materials (NICEM) in Los Angeles. NIMIS data can presently be retrieved from the Lockheed computer bank in Palo Alto. The NIMIS data base is of incalculable value in prescriptive teaching.

In the meantime, Captioned Films and Telecommunications (CF&T) continued to provide continuity in the form of developing new and innovative approaches to the education of the handicapped. As part of CF&T functions, the Captioned Films Program was continued and expanded to the point where there are now more than 800 films in each of the educational and entertainment libraries. Most of the CF&T activities, as they pertain to the hearing impaired during the 1974-77 period, were in the development of television programming. Most people are aware of the Captioned ABC News being broadcast regularly by PBS stations. Deaf citizens now accept Captioned ABC News as a fact of life. This activity is being carried out by WGBH in Boston and fed into the PBS network from Washington, D.C. WGBH was involved with open captioning some time before 1974. Julia Childs was captioned experimentally several years earlier. WGBH has captioned other programs, including segments of ZOOM, and has conducted experimentation and evaluation for various captioning techniques. The Caption Center at WGBH has been funded by CF&T.

While open captioning was being developed at WGBH, another series of contracts with PBS in Washington, D.C. has developed closed captioning using the Line 21 feature of video broadcasting. PBS has developed the necessary decoding device, a self-contained or free-standing captioning unit; they have also obtained a favorable ruling from the FCC that Line 21 be reserved exclusively for the hearing impaired; and they have also been improving captioning equipment and training captioners. This closed-captioning technology now makes it possible to broadcast captioned programs into the television receivers of the hearing impaired without cluttering up the picture of normal users. As an outgrowth of

PBS and WGBH activities, a considerable number of PBS stations are regularly telecasting captioned programs for hearing-impaired viewers.

In 1977, the Learning Resource Center Program was phased out, but various activities are being continued. The National Instructional Materials Information System is being refined and after necessary modifications will be known as NIMIS II. Teachers of the deaf can retrieve data on an interim basis from NIMIS by contacting the National Information Center on Special Education Materials (NICSEM). The funding that went into the Learning Resource Center Program has been reallocated. A considerable number of the numerous contracts and grants funded by CF&T are concerned with the needs of the hearing impaired learner at all ages and grade levels. One of the major projects currently funded by CF&T is the Media Development Project for the Hearing Impaired (MDPHI). This new project at the University of Nebraska-Lincoln, under the direction of Dr. Robert E. Stepp Jr., has several functions. The major activity involves the adaptation and development of materials for the hearing impaired in areas where extant materials do not meet identified needs. MDPHI also does evaluation and field testing, search and retrieval, conducts marketing activities, and is renewing the annual Symposium on Research and Utilization of Educational Media for Teaching the Deaf.

It is not within the scope of this paper to deal fully and appropriately with the many current and projected activities in learning technology that will affect the hearing impaired population. Most of the current activities in learning technology for the hearing impaired will be reported by other presenters at this and future conferences.

The saying goes that the past is but a prelude. The past two decades have seen more change in the education of the deaf than the previous 100 years. Learning technology, to be sure, is making a significant contribution in the amelioration of sensory impairment and is reducing the disparity that exists between the deaf and the normal population. However, in our information-rich society, we have not fully managed our technical resources to the point that permits optimal transfer of knowledge to the new generations of handicapped children.¹¹ A reader of the literature on learning technology may possibly be dismayed between what is and what might have been. Not everyone has embraced the available resources.¹² Thousands of effective items of instructional materials remain unpurchased; hundreds of pieces of useful equipment are gathering dust; countless children are being taught with outmoded methods; however, in the overall sense, education of the deaf has been first and foremost in harnessing the potential of learning technology.

Learning technology will need to be heavily employed to achieve the handicapped individual's rights for full development of his or her educational potential.¹³ The current mainstreaming concept for education of the handicapped will require a massive application of the resources that exist as well as the development of technology that lies beyond our present dreams. American ingenuity and determination will, you can be sure, be equal to the new challenges and new dimensions necessary to bring the handicapped into the mainstream of American life.

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