
A Cross-Case Study of Audiologic Services Delivered to Students in Four Different Demographic Settings

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A negative outcome of the decentralization of students who are deaf or hard of hearing may be the unavailability of school personnel knowledgeable about the maintenance of amplification devices and the provision of appropriate audiologic services in school settings. The purpose of this study was twofold: first, to compare the consistency of data regarding audiologic practices and procedures in a variety of school settings within a single state, with policy and procedures stipulated in IDEA 97 and the State Plan; and second, to provide a model for gathering data that will enable local education agency administrators to make informed policy decisions in special education settings.

Field-based data identified specific information and procedures across individual school programs that were inconsistent with state and federal documents. Also, a key factor associated with programs that were highly consistent with the State Plan and IDEA 97 was the employment of an educational audiologist who played an active role in direct service provision, in-service training of personnel, and supervision of services provided by others.

Introduction

Since the passage of Public Law 94-142, also known as the Education for All Handicapped Children Act of 1975, a major trend in the education of children who are deaf or hard of hearing (D/HH) has been a movement away from placement in special residential and day schools to placement in local educational settings. Congress passed PL 94-142 and its current reauthorization, PL 105-17 (hereafter referred to as IDEA 97) to ensure that students with special learning needs receive a free and appropriate public education (FAPE) in an education setting suitable to meet those needs (see footnote at end of article). Placement in local educational settings may provide many benefits to students who are D/HH that they did not experience in the past (Moore, 1996). However, a negative outcome of the decentralization of students who are D/HH may be the unavailability of school personnel knowledgeable about the maintenance of amplification devices and the provision of appropriate audiologic services in school settings (Davis, 1990; Johnson, Benson, & Seaton, 1997; Musket, 1988). According to Johnson, Benson, and Seaton (1997), schools are challenged "in reconciling the sheer numbers of children [who are D/HH] and their diverse needs with insufficient support, equipment, money and staff to meet those needs" (p. 4).

The Nineteenth Annual Report to Congress on the Implementation of IDEA 97 reported that 68,070 or 0.11% of the school-age population had a hearing loss (U.S. Department of Education, 1997). According to the National Association of State Directors of Special Education (NASDSE), "Approximately 16 per 1,000 school-aged children have an average hearing loss between 26 and 70 dB (of mild to moderate degree) in the better ear, eight times the number of children who are deaf" (Easterbrooks & Baker-Hawkins, 1995). Easterbrooks (1999) suggested that surveys tend to underestimate the number of students who are D/HH because many children experience

transient, fluctuating hearing loss due to otitis media and because hard of hearing children tend not to be identified by schools. Even so, hearing loss is referred to as a "low incidence disability" (Easterbrooks & Baker-Hawkins, 1995). As such, providing appropriate support services to this small population of learners presents challenges, especially in the area of providing qualified personnel to deliver specialized services (Easterbrooks, 1999).

The American Speech-Language-Hearing Association (ASHA) (1993) recommended that for every 12,000 students in a school system, a full-time (FT) educational audiologist should be available. For student populations of 12,000 or less, a part-time (PT) audiologist should be available. In spite of these recommendations, many school systems rely on professionals other than educational audiologists to provide hearing aid maintenance and other hearing related services (e.g., aural rehabilitation, teacher in-servicing) to their students. These professionals include school nurses, regular classroom teachers, and speech-language pathologists. Studies surveying sample populations of these professionals documented that their experience with students who are D/HH and the associated variety of amplification and assistive devices is limited and disconcerting (e.g., Chorost, 1988; Johnson, Stein, & Lass, 1992; Lass, et. al, 1989; Martin, Bernstein, Daly, & Cody, 1988; Moseley, Mahshie, Brandt, & Fleming, 1994). In settings where professionals other than educational audiologists are performing tasks for which they lack training and confidence, the risk is high for children who are D/HH to suffer the consequences of inadequate expertise.

IDEA 97 requires that states develop policies and procedures demonstrating their plan for complying with the federal law, including the provision of related services. All special education programs offered by public and approved private agencies within a state must be operated in a manner fully consistent with the requirements of the federal law and the individual state plans. The state plan provides guidance to local education agencies

(LEAs) in the design of their policies and procedures for providing related services to students with special needs. The plan gives LEAs a great deal of flexibility in determining how they will comply with the law, allowing them to choose or design service delivery systems tailored to accommodate various local characteristics such as demographics and types of resources. Most significantly, administrators of LEAs are responsible for policy decisions regarding service delivery in educational settings (Allard & Golden, 1991; American Speech-Language-Hearing Association, 1993; Johnson, Benson, & Seaton, 1997; McKinney & Hocutt, 1988). As policy decision makers, administrators commit the organization's resources for the future, bind it to certain courses of action, and foreclose other options (Mann, 1974).

Four models of service delivery are commonly implemented by LEAs for provision of audiologic services (Johnson et al., 1997): the parent-referral model, the school-based model, the contractual agreement model, and the school and community based model. These models vary by the degree to which audiologists are integrated as support personnel in the delivery of services in school settings. The parent-referral model relies on parents to utilize local audiologic services for evaluation and intervention procedures after a child fails a second hearing screening. The school-based model relies on the school to employ an educational audiologist to provide a full range of services to its students. The contractual agreement model places responsibility for provision of services on the school to contract with a local audiologist to provide necessary services. Finally, the school and community based model places responsibility for audiologic services on both entities (e.g., the educational program may be responsible for the hearing assessment and a private practice audiologist may be accountable for the interpretation of the assessment).

The National Council on Disability (NCD) (2000) report to the President indicated that many LEAs are out of compliance with the law. Given pressure from groups such as the NCD, LEAs need to evaluate the degree of consistency between practices and procedures implemented in their programs with the law so that they may conduct policy analysis and implement changes which will bring them into compliance with federal requirements and their respective state plan (Mann, 1974; Patton, 1997). Currently, little is known about the consistency of the practices and procedures for delivery of audiologic services provided by LEAs implementing various service delivery models with requirements in IDEA 97 and their respective state plans. The purpose of the following study was twofold: first, to compare the consistency of data regarding audiologic practices and procedures in a variety of school settings within a single state, with policy and procedures stipulated in IDEA 97 and the State Plan; and second, to provide a model for gathering data that will enable local education agency administrators to make informed policy decisions in special education settings.

Method

Description of Research Design

A qualitative research design can provide valuable data to

LEA administrators when making policy decisions regarding service delivery. The field-based data of qualitative research can be used to provide an accurate picture of actual practice and procedures implemented by a program, and test the validity of data on official records. Murray, Anderson, Bersani, and Mesaros (1986) emphasized the importance of qualitative methods for conducting research in special education. They proposed that qualitative methods encourage the development of more valid educational practices by bringing the special education database up to date. They also suggested that the database may be a collection of "detailed descriptions of existing phenomena with the intent of employing the data to justify current conditions and practices [and leading one to] make more intelligent plans for improving them" (p. 16). Ethnographic designs have been applied elsewhere in the field of communication disorders (Kovarsky, Duchan, & Maxwell, 1999; Maxwell, 1997; Radaszewski Byrne, 1994, 2000), however, a review of the literature indicates that the research reported in this paper is the first study implementing a qualitative design to evaluate the delivery of audiologic services in education settings.

A "formalized qualitative research design" was selected for this study (Firestone & Herriott, 1983). Several reasons account for this decision. First, formalized qualitative research emphasizes the development of narrative codes and categories instead of thick descriptive narrative. The rationale for this switch to standardization is to retain the rich data collection method of ethnography while adapting it to the needs of policy development - "relevance, timeliness, and utility" (Firestone & Herriott, 1983). Second, formalized qualitative research emphasizes the codification of questions and variables before beginning fieldwork rather than as the research process evolves. Advanced codification leads to the development of a semi-structured interview instrument and enhances the ability to make cross case comparisons. As stated by Firestone and Herriott (1983), "... interest in formalization arose in part from the need to coordinate data collection in many sites and to ensure responsiveness to a client's need for cross-site conclusions" (pp. 438-439).

Third, to achieve relevance, timeliness, and utility, a "thematic content analysis" of federal and state documents focused on policy related specifically to children who are D/HH was conducted (Berg, 1998). Interviews, notes taken during interviews, and respondent review of interview transcriptions were then categorized according to these themes. This mix of data sources and respondent review ultimately provided multiple measures of the same phenomenon. Data were compared across sources to reduce potential problems of internal validity (Berg, 1998; Denzin, 1978; Patton, 1990; Yin, 1994). In addition, these data were compared with data from the State Education Agency (SEA) regarding program demographics.

Participants

The process of identifying participant programs consisted of three steps. First, the State's Center for Resource Planning and Management was contacted to obtain the most recent (1998) statewide population and demographic data. Three geographic categories, defined by the US Census Bureau (1995, 1997) and

based on total population, were identified:

1) rural – territory, population, and housing units not classified as urban (Note: Although “rural” may be defined as territory, population, and housing units with less than 2,500 persons [US Census Bureau, 1997], it is also defined as “not urban” [US Census Bureau, 1995]. That is, an urban area comprises one or more places [“central place”] and the adjacent densely settled surrounding territory that, together have a minimum of 50,000 persons. For the purposes of this study, an education program serving a county wide, total community population of less than 50,000 was classified as rural);

2) metropolitan statistical area (MA) – a total community population of equal to or greater than 50,000 (and equal to or less than 1,000,000), hereafter referred to as metropolitan; and

3) consolidated metropolitan statistical area (CMSA) – total community population greater than 1,000,000, hereafter referred to as consolidated metropolitan.

Second, the SEA was contacted to obtain the counts of students who were D/HH and the location of programs employing educational audiologists as of December, 1998. Finally, data from both resources were used to identify those school programs that met the following criteria: (1) school program with low incidence of D/HH students and no FT educational audiologist; (2) school program with high incidence of D/HH students and no FT educational audiologist; (3) school program with high incidence of D/HH students and FT educational audiologist; and (4) school program at the State School for the Deaf and FT educational audiologist.

Program #1 (rural/no FT audiologist) had a total community population of approximately 25,000, including 4,500 students within its service area, and did not employ an educational audiologist. Program #2 (metropolitan/no FT audiologist) had a total community population of approximately 301,000, including 35,000 students within its service area, and did not employ an educational audiologist. Program #3 (consolidated metropolitan/FT audiologist) had a total community population of approximately 1,043,000 including 100,000 students, and employed two FT educational audiologists. Program #4 (State School for the Deaf/FT audiologist) served 143 students, all of who had been diagnosed as having permanent hearing loss. This program employed one FT educational audiologist.

Instrument

IDEA 97 and its regulations, along with the most recent State Plan for Part B of the Individuals with Disabilities Education Act, were obtained from the selected State’s SEA. Both documents were analyzed thematically. All text containing the following key words as they related to services for learners who are D/HH was extracted: deaf, hearing impaired, FAPE, related services audiology, screenings, personnel qualifications, assistive technology, hearing aids, individual education plan (IEP), IEP team, and residential placement (see Appendix A for document references). The themes related to this text were used to formulate a semi-structured interview instrument. Prior to interviewing program

respondents, a pilot interview was conducted with a former elementary school principal who provided feedback regarding the interview items and length of the interview process. Based on this pilot interview, minor changes in wording were made. The final interview instrument contained 66 questions; 19 of these were designed to provide reliability checks to the responses of previous questions.

Data Collection

Telephone contact was made with professionals who might serve as interview respondents in each selected school setting. The order of preference for selection of potential interview respondents at each setting was based on professional knowledge of audiologic services for learners who are D/HH, or administrative responsibility for ensuring the provision of such services: 1) educational audiologist; 2) coordinator of D/HH programs; 3) special education director; or 4) certified teachers of children who are D/HH. In Program #1 (rural/no FT audiologist), the special education director was initially interviewed (identified as 1 (a) in Table 1). Upon her suggestion during the interview, the teacher of D/HH was also interviewed (identified as 1 (b) in Table 1). At Program #2 (metropolitan/no FT audiologist), the process coordinator was interviewed. At Programs #3 (consolidated metropolitan/FT audiologist) and #4 (State School for the Deaf/FT audiologist), an educational audiologist was interviewed. A total of five interviews were conducted.

After initial telephone contact, each interviewee was sent a cover letter summarizing the purpose of the study, a copy of the proposal, and a copy of the interview instrument. Prior to the interview, all respondents were encouraged to reference any federal and/or state documents they thought would be helpful. Interviews were conducted in a setting of the respondent’s choice. At the beginning of each interview, the purpose of the study was reiterated, the interviewee was assured of anonymity and was asked to sign a consent form. All respondents consented and agreed to an audio taped interview. Written notes were taken throughout each interview. Interviews were transcribed and sent back to each respective respondent with instructions to review their responses and make additions or corrections as necessary.

Data Analysis

Data from three records of the same interview event (audiotaping, notes written during the interview, and respondent evaluation of responses) were triangulated: that is, they were compared with one another for reliability, thereby minimizing researcher error or bias. Data regarding program demographics were compared to SEA counts of students who were D/HH. Responses to the 19 questions asked as reliability checks were eliminated from the analysis because no discrepancies were found among respondents’ answers. Responses to 47 questions were used for data analysis (see Appendix B). In addition, it was determined during the interviews that Program #4 (State School for Deaf/FT educational audiologist) was unique because all of its students had been diagnosed as having hearing loss prior to placement. Consequently, the professional staff did not conduct annual hearing screenings. To accommodate this difference, seven questions regarding hearing screenings were deleted from

the analysis of data pertaining to that program. As a result, responses to 47 interview questions were analyzed for Programs # 1, #2, and #3; 40 questions were analyzed for Program #4.

Responses to questions in the reviewed transcripts were used to identify the service delivery model used by the program to deliver audiologic services to children who are D/HH as described above. In addition, responses regarding demographics were compared to data provided by the SEA. Remaining responses were compared to selected text from IDEA 97 and its regulations, and the State Plan. Responses that were similar with all reference documents were coded as "consistent." Responses that indicated procedural practices that were above minimum standards described in the reference documents (e.g., minimum

Table 1. Rank order of programs listed according to percentage of "consistent" responses

Program Class	No. of Questions Asked	% of Responses Consistent with Reference Documents	Employment of Audiologist
#3: Consolidated metropolitan Pop: >1,000,000	47	98	2 FT audiologists
#4: State school for Deaf	40	93	1 FT audiologist
#2: Metropolitan Pop: >50,000	47	72	None
#1: Rural Pop: <50,000	(a) 47 (b) 47	(a) 64 (b) 62	None

Table 2. Number of students who are D/HH as reported on state education agency records vs interview responses

Program	State Education Agency Records	Interview Responses
Program #1 (Rural/No FT Audiologist)	1 deaf 5 hard of hearing	5 deaf 12 hard of hearing
Program #2 (Metropolitan/No FT Audiologist)	3 deaf 46 hard of hearing	20-25 deaf 40-45 hard of hearing
Program 3 (Consolidated Metropolitan/FT Audiologist)	27 deaf 109 hard of hearing	200 deaf 200 hard of hearing
Program #4 (State School for the Deaf/FT Audiologist)	143 deaf	100 deaf 50 hard of hearing

level for failure of hearing screening was 15 dB rather than 20 dB as stipulated in State Plan) were also coded as "consistent." Responses that were determined to be partially consistent were coded as "inconsistent." For example, if an interviewee stated that the service providers responsible for hearing screenings included the school nurse and volunteers from the school's parents' organization, that response was coded as "inconsistent" because parent volunteers are not mentioned in the State Plan. The percentage of consistent responses was calculated for each program by dividing the number of "consistent," responses from the respective respondent by the total number of questions asked of that person. Programs were ranked in terms of the percentage of responses that were consistent with all reference documents (see Table 1).

Results

Field-based data from the multi-site study were used to identify the model of program delivery implemented to deliver audiologic services to learners who are D/HH. Data regarding the number of students served in all education settings were inconsistent with data provided by the SEA, which consistently underestimated the number of students being served (see Table 2). In addition, field-based data identified specific procedures within individual school programs that were inconsistent with state and federal requirements (see summary, Table 3).

Program #1 (Rural/No FT Audiologist)

Service Delivery Model and Distinguishing Characteristics.

Program #1 was located in a rural area with a total community population of approximately 25,000. The total population of students being served by this program was approximately 4,500. All of the 17 students identified as D/HH used amplification and assistive listening devices. The service delivery model used in this program was the parent-referral model. When a student failed any portion of the screening protocol, a two-week period had to elapse before a re-screening was administered. If the student did not pass during the re-screening, then the parent or guardian would be contacted regarding the findings with a recommendation that an audiologist evaluate the child. Program #1 has neither a FT nor PT educational audiologist.

Inconsistent Data and Practices or Procedures.

Two interviews were conducted to compile the data for Program #1. According to the SEA, there was one student who was deaf and five students who were hard of hearing receiving services from this program. In contrast, the interviews revealed that this program served five students who were deaf and 12 students who were hard of hearing. As indicated in Table 1, the findings were highly consistent between both interviews with a difference of only two percentage points (64% to 62%). However, consistency with federal and state standards was much lower than the other three programs (#2 at 72%; #3 at 98%; and #4 at 93%;). The most notable findings for inconsistencies involved child find, composition of the IEP team, responsibility for obtaining assistive technology devices, and training and qualifications of personnel, described as follows:

- Child Find. The State Plan stipulated that schools meet the minimum standards for Awareness and Child Find by (1) giving

Table 3. Inconsistencies between reference documents and interviewee responses across four demographic settings

Program	Referent Document	Area of Inconsistency	Problem
Program #1 (Rural/No FT Audiologist)	*SEA *State Plan *State Plan *IDEA 97 *State Plan	*Student population *Child find *Composition of IEP team *Responsibility for purchasing assistive technology devices. *Training and qualifications of personnel	*Interview no. greater than no. reported by SEA *No written letter to parents re: hearing screening *No educational audiologist *Did not mention possible program responsibility for purchase of hearing aids for home use *No report of training offered to personnel to monitor assistive technology devices
Program #2 (Metropolitan/No FT Audiologist)	*SEA *State Plan *State Plan *IDEA 97 *State Plan	*Student population *Child Find *Composition of IEP team *Responsibility for obtaining assistive tech. *Training and qualifications of personnel	*Interview no. greater than no. reported on records *Screens less frequently than stipulated in plan *No representative from evaluation agency *Did not mention possible program responsibility for purchase of hearing aids for home use *No report of training offered to personnel to monitor assistive tech. devices
Program #3 (Consolidated Metropolitan/FT Audiologist)	*SEA *State Plan *State Plan	*Student population *Hearing screening *Child find	*Interview no. greater than no. reported on records *No mention of otoscopy *No public notice of screening via radio, TV, or newspaper
Program #4 (State School for the Deaf/FT Audiologist)	*SEA *IDEA 97 and State Plan *IDEA 97 *State Plan	*Student Population *Definitions *Responsibility for obtaining assistive technology devices *Training and qualifications of personnel	*Interview no. greater than no. reported on records *Does not identify student using standard definitions *Did not mention possible program responsibility for purchase of hearing aids for home use *Did not indicate need for SLP to be supervised by audiologist when administering screening

public notice of screening activities in the newspaper, (2) announcing it on the local radio and/or television during general listening or viewing hours, (3) placing posters or notices in all the school administrative offices, and (4) providing written literature to parents at least twice a year (once before November and again prior to April). Program #1 offered three different forms of notification to parents regarding early childhood screening information. The public was informed about kindergarten screenings via radio and newspaper advertisements (consistent with standards 1 and 2) as well as via posters and notices displayed in the school buildings (consistent with standard 3). The notification was publicized a month in advance and usually

occurred in the spring for the preschool and kindergarten students. This practice allowed parents ample opportunity (summer months when school was not in session) to obtain aid for students who failed their screenings. In contrast, there was no written literature directly distributed to parents (inconsistent with standard 4). Such information would have been helpful as part of an ongoing screening process for parents who suspected their children had special educational needs prior to the periodic screening offered by this school.

• **Composition of IEP Team.** In Program #1, the IEP team for a child identified as being D/HH consisted of the following professionals: (1) a representative from the local education

agency, either an administrator or principal, (2) a regular education teacher, (3) a special education teacher or director, (4) a teacher of D/HH students, (5) a speech-language pathologist, (6) a case manager, and (7) a counselor. The participation of the case manager and the counselor went beyond minimal standards for team membership. However, according to the State Plan, an educational audiologist should also have been included as a member of the team to fulfill the following role requirements: (1) evaluate and diagnose students with hearing loss, (2) participate in special education services by providing input regarding the results of the audiogram and appropriate placement of the child during development of the initial IEP, and (3) inservice school personnel and supervise services provided by others. As stated earlier, Program #1 had neither a FT nor a PT educational audiologist.

• Responsibility for Obtaining Assistive Technology Devices. IDEA 97 states that "on a case-by-case basis, the use of school purchased assistive technology devices in a child's home or in other settings is required if the child's IEP team determines that the child needs access to those" (emphasis added). A respondent in Program 1 indicated that, if a parent had financial or transportation concerns, then Program #1 would offer them assistance to obtain funds through the Lion's club or through the local education agency. This response indicated that it was primarily the parents' responsibility to purchase and maintain hearing aids, and therefore was identified as inconsistent.

• Training and Qualifications of Personnel. The State Plan indicated that professionals, such as educational audiologists or speech-language pathologists, were appropriate supervisors of hearing screenings. A shortage of such professionals existed in the geographic area studied. Consequently, Program #1 employed "speech implementers" who were not recognized as appropriate supportive personnel qualified to administer periodic hearing screenings. Specifically, teachers of D/HH students, representatives from a local parent organization, and volunteers performed these screenings with supervision provided by the school nurse. It is noteworthy that the state plan does not identify a school nurse as a qualified professional. Worse yet, some school districts in rural areas, such as the one studied, do not employ a registered nurse and, therefore, do not provide any supervision over the hearing screenings. On occasion, Program #1 has had personnel attend the State School for the Deaf training course presented by an educational audiologist. This type of training course was stipulated in the State Plan.

The State Plan required "training or technical assistance for professionals who provide services" to monitor assistive technology devices. The professionals responsible for participating in the daily hearing aid listening checks in Program #1 included the school nurse, the speech-language pathologist, the interpreters, the special education teacher, and the teacher for D/HH students. The teacher for D/HH and the director of the special education program were responsible for the supervision of the hearing aid monitoring activities. No evidence of training to provide these services was provided.

Program #2 (Metropolitan/No FT Audiologist) Service Delivery Model and Distinguishing Characteristics.

Program #2 was located in a metropolitan area with a total population greater than 200,000 and a student population of approximately 35,000. Sixty to 70 students in the program were identified as deaf or hard of hearing. Ninety-eight percent of them wore amplification; 100% used assistive technology devices. Similar to Program #1 (rural/no audiologist), Program #2 used the parent-referral service delivery model. The school provided hearing screenings and recommended that parents have follow up evaluations conducted by an audiologist when a failed screening occurred. Program #2 did not employ an educational audiologist even though ASHA (1993) guidelines recommend that a program of this size should employ three educational audiologists.

Inconsistent Data and Practices or Procedures. According to the SEA's latest D/HH child count, there were three deaf students and 46 hard of hearing students being served by this program. In contrast, the respondent for this program revealed that there were approximately 20 to 25 deaf students and 40 to 45 hard of hearing students being served. Responses to the interview instrument yielded 72% consistency for Program # 2. Responses that were judged to be inconsistent involved issues concerning child find procedures, constitution of the IEP team, financial responsibility of hearing aid purchase, assessment of functionality of assistive technology devices or hearing aids, and training and qualifications of personnel, to wit:

• Child Find. Similar to Program #1 (rural/no audiologist), Program #2 addressed screening issues less frequently than stipulated in the State Plan. It provided information in a kindergarten packet distributed during fall enrollment, but did not provide any notification thereafter.

• Composition of IEP Team. Professionals representing the IEP team of Program #2 included a regular education teacher, special education teacher, a D/HH teacher, a representative from the LEA (either the principal or the process coordinator), and the parent(s). The State Plan indicated that a student whose hearing is initially evaluated and identified as having a hearing loss should have a representative from an evaluation agency present to review the results. Program #2 did not include an audiologist on the IEP team, but relied on his/her input in the form of a report attached to the student's audiogram.

• Responsibility for Obtaining Assistive Technology Devices. Similar to Program #1 (rural/no audiologist), Program #2 offered assistance to obtain funds for parents who could not afford to purchase a hearing aid. The response indicated that the program placed the financial responsibility of purchasing and maintaining hearing aids on parents, and therefore was identified as inconsistent with IDEA 97.

• Training and Qualifications of Personnel. The school nurse, the regular education teacher, or the special education teacher monitored the assistive technology devices or hearing aids used by the students. The process coordinator or the teacher for D/HH provided supervision of the monitoring program. The State Plan stipulated that an educational audiologist provide training or technical assistance to professionals who provide services to those students who utilize an assistive technology device. The respondent for Program #2 did not report a training program used to instruct the individuals listed above.

Program #3 (Consolidated Metropolitan/FT Audiologist)

Service Delivery Model and Distinguishing Characteristics.

Program #3 was located in a consolidated metropolitan area with a total population greater than 1,000,000, a student population approximately 100,000, and included 30 school districts. Fifty percent of the approximately 400 students who were D/HH wore some form of amplification. The program employed two FT educational audiologists to provide itinerant direct and indirect services to students. In addition, a third person who functioned as an administrator of the program was also an educational audiologist. Given the size of the program, ASHA (1993) guidelines recommend that eight educational audiologists be employed. Program #3 utilized the contractual agreement service delivery model that relied on the school districts to contract with a centralized program on an annual basis. Contracted services provided supervision of hearing screenings, diagnostic evaluations, and other services deemed necessary to D/HH students in their respective districts.

In contrast to Programs #1 (rural/no FT audiologist) and #2 (metropolitan/no FT audiologist), all persons responsible for performing daily listening checks in Program #3 had received training from an educational audiologist. Professionals responsible for administering the checks included the classroom teacher, the school nurse, and the speech-language pathologist. During the training course, professionals learned how to use the "steth-o-set" (a listening checks tool for personal amplification systems) and the Ling Six Sound Test (speech sounds produced to perform the listening checks). This training prepared professionals to assess whether a hearing aid was functioning properly and how to check the battery. This protocol was consistent with both IDEA 97 and the State Plan.

If a problem occurred that could not be solved at the building level, then the educational audiologist would assess the device and administer an electroacoustic analysis. If a correction could not be made, then a notice was sent home to the parent(s) explaining that the hearing aid needed to be repaired. If the school provided the assistive listening device, then the school took responsibility for repair. Students usually did not have downtime without amplification during a repair because the educational audiologist either (1) contacted the dispensing audiologist to obtain a loaner device, or (2) used the loaner units that were on standby at the school.

Inconsistent Data and Practices or Procedures. According to the SEA's latest D/HH child count, there were 27 deaf students and 109 hard of hearing students who were being served by this program. During the interview the respondent stated that there were approximately 200 deaf students and 200 hard of hearing students who were being served. Program #3 provided the greatest number of responses consistent with the pertinent text in all reference documents. An inconsistency was noted with regard to child find procedures, specifically:

- Child Find. Program #3 offered little advertisement of imminent screenings. Information could be found in school calendars, manuals, or newsletters, but there was no public notice via radio, television, or the local newspaper as recommended in the State Plan.

Program #4 (State School for the Deaf/FT Audiologist)

Service Delivery Model and Distinguishing Characteristics.

The population of Program #4 was not representative of the state's general school population. Program #4 was a state supported residential program that provided services to D/HH students. Because of its unique population, this program utilized the school-based service delivery model to provide audiologic services to their students, and employed one FT educational audiologist.

Seventy-five percent of the elementary students in Program #4 wore amplification. The number dropped to about 50% at the junior and high school level and, according to the respondent, was "dependent on whether hearing aids [were] in vogue that year." A unique characteristic of this program was that all school staff and personnel, including those on the IEP team, were required to take a proficiency exam to assess their sign language skills before becoming employed. This policy ensured that all the students who used sign language were given the opportunity for direct communication with "sign language fluent personnel."

Inconsistent Data and Practices or Procedures. According to the State's latest D/HH child count, this program was serving 143 deaf students. In contrast, the respondent reported that the population of students consisted of approximately 100 deaf students and approximately 50 hard of hearing students. Inconsistencies were noted were issues of definitions, financial responsibility of hearing aids, and qualification of personnel delivery services, as follows:

- Definitions. The interviewee from Program #4 emphasized that the personnel in that program did not interpret the results of evaluations, and place children based solely on IDEA 97 definitions of "deaf" or "hearing impaired." Instead, personnel "look at the whole child individually and how he functions in the classroom and does not simply look at an audiogram." This practice appears to be consistent with the "special considerations" language in IDEA 97 regarding in the placement of D/HH children in educational programs; however, there was considerable disparity between the SEA account of the number of students who are hard of hearing served by the program (0), and the number of hard of hearing students as reported during the interview (50). Given that students who are hard of hearing have needs that are distinct from those who are deaf, it follows that, even though they are placed at the state school for the deaf, their numbers should be identified according to definitions in federal law (which uses the term "hearing impaired") and the state plan so that services unique to hard of hearing persons could be provided to them.

- Financial Responsibility of Hearing Aids. Parents of students in Program #4 are not required to pay for audiologic evaluations, earmolds, batteries, and maintenance or assessment of their amplification devices. However, the cost of hearing aids could be billed to the parent if insurance, the bureau of special health care, or Medicaid did not assist with financial support. As stated earlier, the IEP team may determine that the school program should purchase a hearing aid, if members of a team determine that it is an appropriate to take in any particular case.

- Training and Qualifications of Personnel. The respondent

from Program #4 offered annual training to all staff members who administered listening checks, as well as public school personnel across the state (grant supported). These training practices were consistent with federal and state guidelines, but one inconsistency was revealed in the interview. The respondent stated that a speech-language pathologist could administer hearing screenings without supervision or training from an educational audiologist. This practice was in contradiction of the State Plan indicating that a speech-language pathologist must have training and supervision by an audiologist. When reviewing the transcript of this interview, the respondent did not alter any of the answers given. At first, this inconsistency with state regulations would appear insignificant because hearing screenings were not performed at Program #4. What made this inconsistency significant was that programs throughout the state consult personnel at the state school as a resource of their program. Consequently, this response may indicate that the practices of other programs in the state could be inconsistent with the state plan.

Discussion

The four programs chosen for cross-case comparison in this study varied by demographics, concentration of D/HH students, service delivery models, and available resources, including an audiologist. In regard to services provided to D/HH children, several trends emerged. First, the policies and procedures of programs with a FT educational audiologist were more consistent with IDEA 97 and the State Plan than those without a FT audiologist. This finding is supported by the work of Allard and Golden (1991). In their research they found that the records of D/HH children in educational settings who received services through an educational audiologist met a higher proportion of standards than those without an educational audiologist. Second, programs without a FT educational audiologist did not contract nor employ a PT audiologist thus relying on a parent-referral model of service delivery. Based on our findings, the parent-referral model of service delivery was least effective in ensuring that children received a full diagnostic assessment in a timely manner.

Third, only those programs with FT educational audiologists consistently ensured that students would be minimally impacted while repairs to amplification devices occurred. Fourth, services such as hearing screening supervision, equipment maintenance, in-service training for teachers, and participating on an IEP team were performed by personnel identified as unqualified in both IDEA 97 and the State Plan. In fact, it is recommended that these services be provided by an audiologist or minimally supervised by one. Fifth, when professional personnel such as school nurses were used to administer hearing screenings, the correct protocol was not followed. In addition, those programs without a FT educational audiologist did not adequately utilize the state provided availability of the audiologist at the State School for the Deaf. This person was available for training purposes as well in aiding in the access to assistive devices. Sixth, differences in service delivery models (parent-referral, school-based, contractual agreement, school and community based) did not appear to account for the differences found in the degree of consistency with the reference documents. In other words, regardless of service delivery model, the key to program consistency with

federal and state documents was the presence of a FT educational audiologist (see Table 1).

A last finding that emerged, but did not fully develop during the interview process, was the method used to identify students with fluctuating hearing loss. In IDEA 97, the definition of "hearing impaired" includes those children with fluctuating hearing loss and provisions are made in the law for them to receive a FAPE. Respondents from those programs that did not have a FT educational audiologist were unclear as to what constituted "fluctuating" hearing loss and consequently, who was "hearing impaired." An implication of this response was that, if appropriate assessment of a fluctuating hearing loss was not available, then, the identification and timely management of the loss could not occur. This discrepancy clearly raises another red flag when assessing the impact an educational audiologist can have on providing adequate services to students who are deaf or hard of hearing.

We close this discussion by pointing out that the trends identified above were based on interview data, not survey data. Consequently, this study adds to the ever widening recognition that qualitative research lends itself well to program evaluation (Patton, 1990). For example, all respondents during the interview process revealed that the number of D/HH students being served by their programs was higher than those reflected in the state records. Although discrepancies between record and ethnographic data are not unique (de la Puente, 2000), when evaluating their programs and, by association, the resources they would need to provide services to students who are D/HH, accurate information that could be provided by ethnographic data would be invaluable to program planners. In addition, our interview instrument measures consistency with state and federal documents that further enhances its usefulness to those providing services to students who are D/HH. Lastly, all data were acquired in face-to-face interaction. Such interaction consistently yields more quality data than "the impersonal questionnaire" (Robson, 1993, p. 237). For example, the second trend identified above states that the parent-referral service model was least effective in ensuring that students who are D/HH receive the services they need. This finding would not have emerged if respondents had not only identified the service model being used but went on to explain how it was used. It was this added explanation, offered throughout the interview process that helped us determine the negative effect on students who are D/HH when a FT audiologist was not involved in the service delivery process.

Footnote

At the time this study was initiated, IDEA 97 had been authorized and all special education programs offered by public and approved private agencies were subject to the law immediately upon its signing (B. Foley, The Council for Exceptional Children, personal communication, March 16, 2000). Publication of the final regulations of IDEA 97 had been postponed until March, 1999. Therefore, the interim regulations were used as part of the IDEA referent documents until the permanent regulations were published. The final regulations contained only editorial changes to the text pertinent to this study, therefore, the content of the text originally used for this study was still valid and the results may also be assumed valid.

Authors' Note

This article is based on Casey Cordell's Master's Thesis, completed at Southwest Missouri State University.

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Appendix A

Policy and Procedures Delineated in PL 105-17 and Its Regulations and the Selected State Plan Related to the Provision of Educational Audiology Services

IDEA and Its Regulation

Sec. 300.5 Assistive technology device
Sec. 300.6 & Sec. 300.308 Assistive technology service
Sec. 300.7 (b) (3) Child with a disability & 29
Sec. 300.11 & Sec. 300.24 Free appropriate public education
Sec. 300.16 Individualized education team
Sec. 300.18 Local education agency
Sec. 300.19 Native language
Sec. 300.22 Public agency
Sec. 300.23 Qualified Personnel
Sec. 300.135 Comprehensive system of personnel development
Sec. 300.136 Personnel standards
Sec. 300.24 Related services
Sec. 300.24 (b) (1) Audiology includes- -
Sec. 300.24 (b) (1) (i) Identification
Sec. 300.24 (b) (1) (ii) Determination of range and degree educationally sig. p. A-29
Sec. 300.24 (b) (1) (iii) Habilitation
Sec. 300.24 (b) (1) (iv) Prevention of hearing loss
Sec. 300.24 (b) (1) (v) Counseling and guidance
Sec. 300.24 (b) (1) (vi) Amplification p. A-75
Sec. 300.24 (12) School Nurse
Sec. 300.24 (14) Speech-language pathologist
Sec. 4
Sec. 300.125 Child find
Sec. 300.128 Individualized education programs
Sec. 300.130 Least restrictive environment
Sec. 300.247 Responsibilities of the PROGRAM
Sec. 300.301 FAPE-methods and payments
Sec. 300.302 Residential placement
Sec. 300.303 Proper functioning of hearing aids p.29
Sec. 300.342 When IEPs must be in effect pp. 24-27
Sec. 300.343 IEP meetings
Sec. 300.344 IEP team
Sec. 300.346 Development, review, and revision of IEP
Sec. 300.347 Content of IEP
Sec. 300.531-532 & Sec.300.536 Evaluation and Reevaluation pp. 61-63

State Plan

Assistive technology p. 28

Deafness & hearing impaired p. A-16

Public expense: Section VI (A) (2) (a), p. 1
IEP team p. 25
Parent notification p. 19 & 61
Evaluation procedures p. 62
Public notification pp. 13-14
Qualified personnel: audiologist p. 81
Training p. 28

Personnel development p. 71, A-4
Related services p. 1
Audiology p. A-7
Screening p. 15
Hearing screening Sec. 4,

Therapies and rehabilitation p. 28

Regular classroom modifications

Health screenings pp. A-10
Evaluations p. A-6 & 29, screenings

Screening pp.13-15,
Individualized education program
Training/workshops p. 57, A-4
Parent notification pp. 19 & 61
Public expense p. 1
Guidelines for referral p. B-8
Properly functioning hearing aids

Individualized education program

Participants p. 25
Annual evaluation p. 96
Content IEP pp. 26-27
Evaluation by trained personnel

Appendix B

Semi-Structured Interview Instrument

1. Who are the service providers responsible for hearing screenings?
2. Who are the service providers responsible for diagnosis of hearing loss?
3. Who are the service providers responsible for hearing aid monitoring?
4. Who are the service providers responsible for hearing aid maintenance?
5. Who are the service providers responsible for aural rehabilitation?
6. Who are the service providers responsible for consultation/in-service concerning classroom management of learners with hearing loss?
7. Who supervises paraprofessionals conducting hearing screenings? *
8. How do you define "Deaf"?
9. How do you define Hard of Hearing?
10. Who pays for diagnostic testing?
11. Who pays for hearing aids?
12. Who pays for hearing aid maintenance?
13. Who pays for aural rehabilitation given outside the school setting? *
14. Who pays for time of a consultant audiologist? *
15. What support services are administered by your audiologic service provider?
16. What is the protocol for identifying students who are Deaf or Hard of Hearing? *
17. What type of public notification about hearing screenings is provided prior to screenings?*
18. Who administers hearing screenings to the students in your school/district? *
19. What kind of certification, licensure, or training do you require the screener to have?
20. If a student fails a screening, then what is the follow-up on that child? *
21. What local agency is utilized to conduct a full, initial evaluation when confirming a hearing loss?
22. What kind of certification, licensure, or training is needed to conduct diagnosis evaluations?
23. What is your protocol for re-evaluating a student receiving audiologic services or special education?
24. What audiologic information is considered necessary and should be included within each Deaf or Hard of Hearing student's file?
25. What is the protocol to locate those students currently receiving audiologic services?
26. What professional is responsible for conducting the tests to evaluate for an educationally significant hearing loss?
27. What mode of communication is used to administer these educationally significant hearing loss tests?
28. How often are students with students with hearing loss re-evaluated?
29. When must an IEP be in effect?
30. How do students with hearing loss qualify for an IEP?
31. What types of audiologic needs are addressed in IEPs?
32. Describe how your learners who are Deaf or Hard of Hearing are given the opportunity for direct communication with their peers?
33. Describe how your learners who are Deaf or Hard of Hearing are given the opportunity for direct communication with personnel?
34. What professionals represent the IEP team involving Deaf or Hard of Hearing students?
35. What type of licensure or certification does your district require for professionals providing audiologic services to your students?
36. Who is responsible for selecting the type of amplification?
37. Who is responsible for the fitting of the amplification?
38. Who is responsible for evaluating the effectiveness of the amplification?
39. What is the process for evaluating the effectiveness of the amplification?
40. Who is responsible for the expense of purchasing, leasing, or providing assistive technology devices?
41. Describe your protocol to evaluate if a hearing aid is functioning properly?
42. How often are these evaluations conducted?

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43. Who are the professionals supervising those individuals monitoring the hearing aids?
44. How does your district or school provide counseling or guidance to regular classroom teachers of Hard of Hearing students?
45. How does your district or school provide counseling or guidance to parents?
46. What professionals aid in the decision making regarding residential placement of students with hearing loss?
47. Who is responsible for disseminating information on the prevention of hearing loss?

*Denotes questions not used to measure consistency at the State School for the Deaf (#4).