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Modes of Communication and Education Placement of Children Who Are Deaf and Hard of Hearing: A Review of the Efficacy Literature

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Introduction

Students who are deaf and hard of hearing (D/HH) are educated in a variety of educational placements (Moores and Meadow-Orlans, 1990) and use a range of communication pathways (Easterbrooks and Baker, 2002). The debate over which placement and which communication option is *the* best began in Europe in the 1700s, found foothold in this country in the 1800s (Winefield, 1985), and continues today. The Washington State Institute for Public Policy (Institute) seeks to answer the same questions that have perplexed the field for centuries. Specifically, they seek information to answer the following questions regarding mode of communication and education placement:

1. What is the research evidence regarding how different approaches to communication affect linguistic development and literacy for deaf and hard of hearing children? Does research support one approach over another? What key factors influence the success of various approaches?

2. What is the research evidence regarding the effectiveness of various types of educational placements for deaf and hard of hearing children? Does research support one placement type over another? What key factors influence the effectiveness of different types of placements?

These two questions and their corollaries, while appearing to be straightforward, are in fact among the most complicated to answer. Issues of individual differences, gaps in the knowledge base, and the existence of more than one correct answer to each question confound a determination of *the* answer. Answers are often contradictory and rarely conclusive, with two possible exceptions: even a mild degree of hearing loss can cause communication and academic delays (Carney and Moeller, 1998; Gregory and Hindley, 1996; NIH, 1993) and early identification/intervention is a key factor in success (Robinshaw, 1997; Yoshinaga-Itano and Apuzzo, 1998; Yoshinaga-Itano, Sedey, Coulter, and Mehl, 1998).

Terminology and Demographics

Communication Options

There are three major pathways by which we impart language to children who are deaf and hard of hearing (Easterbrooks and Baker, 2002): the auditory pathway leading to the development of spoken language, the visual pathway leading to the development of English, and the visual pathway leading to the development of American Sign Language (ASL). Within these categories, there are many sub-categories, which are briefly defined in Table 1.

When spoken language is the objective, an auditory-oral or auditory-verbal approach may be followed. For children who have not had access to or cannot benefit from amplification or interventions supporting the development of English through spoken language input only, a visual representation of the structure of English is often added. When American Sign Language is the objective, ASL is the language used. Recent efforts to develop English as

a second language based on ASL as the first language have contributed much to the knowledge base. The concept of Total Communication (TC) is just that: a concept. It is neither a language nor a method, but a philosophy. How it is conducted in practice varies from teacher to teacher and program to program, complicating the research process (Baker, 1999). It is more accurate to describe what teachers who sign English do as *Simultaneous Communication,* also referred to as Sim Com. Whereas TC is a philosophy that has different meanings depending on who is giving the definition, Sim Com simply means the combined use of signs and speech, where speech leads the signs chosen for production.

Table 1
Definitions Used to Describe Communication Options

Option	Definition	Source
Auditory-Oral	An approach based on the principle that most deaf and hard-of-hearing children can be taught to listen and speak with early intervention and consistent training to develop their hearing potential. Also known as aural-oral education. May be conducted one-on-one or in small groups.	http://www.oraldeafed.org/library/resources/glossary.html
Auditory-Verbal	The Auditory-Verbal approach is based upon a logical and critical set of guiding principles which enable children who are deaf or hard of hearing to learn to use even minimal amounts of amplified residual hearing or hearing through electrical stimulation (cochlear implants) to listen, to process verbal language, and to speak. Usually occurs in parent-child-clinician triads.	http://www.auditory-verbal.org
Visual Representation of English Structure	Practices that use a visual representation of structure are based on the notion that the child will learn English when presented with its rules via a metalinguistic symbol system.	Paul and Quigley, 1994; http://www.listen-up.org
Bilingual-Bicultural	For those Deaf individuals whose primary avenue of language is visual, American Sign Language is the primary language, with English in print form as a second language.	Mahshie (1995)
Total Communication	Total communication (TC) is the title of a philosophy of communication, not a method. It may involve one or several modes of communication (manual, oral, auditory, and written), depending on the particular needs of the child. The original expectation of TC was for teachers to use the communication method(s) most appropriate for a particular child at a particular stage of development, this choice changing as the needs of the child change.	Hawkins and Brawner, 1997
Simultaneous Communication (Sim Com)	Simultaneous Communication (Sim Com) is the term used to describe the concurrent production of speech and English-based signs. Speech leads the production of signs, which are used to match the spoken message.	http://clerccenter.gallaudet.edu/SupportServices/series/4010.html

Placement Options

Table 2 provides a brief description of the placements of students identified as hearing impaired in the *Twenty-Second Annual Report to Congress on the Implementation of the Individuals with Disabilities Education Act (2000)* as well as figures comparing Washington State with the United States, the District of Columbia, and Puerto Rico.

This table demonstrates that in Washington, more students with hearing loss are educated in regular environments and fewer in separate programs than the national average.

Table 2
Placement of Hearing Impaired Students

Placement	Description	Washington State	U.S., D.C., P.R.
Local School: < 21% Time Outside Regular Class	Students receiving this level of service are usually in the regular classroom for most academics with some resource help. Traditionally thought of as the *resource model*.	865 (44.37%)	26,687 (38.82%)
Local School: 21-60% Time Outside Regular Class	Students receiving this level of service usually have some of their coursework in the regular classroom and some with a teacher of the deaf. Often called *part-time self-contained*.	587 (30.10%)	13,092 (19.04%)
Local School: >60% Time Outside Regular Class	Students receiving this level of service usually receive most of their academic instruction from a teacher of the deaf with some services in the regular classroom. Primarily *self-contained.*	291 (14.92%)	17,423 (25.34%)
Separate Public Facility	Day school. May be for children with hearing losses or may be a program serving children with a variety of disabilities.	32 (1.64%)	3,168 (4.61%)
Separate Private Facility	Day school. Same as above. Usually dedicated to one or another communication approach.	30 (1.54%)	1,888 (2.75%)
Residential Public Facility	Residential school. Each state has different criteria for allowing D/HH students to attend.	141 (7.23%)	5,746 (8.36%)
Residential Private Facility	Residential school. Usually dedicated to one or another communication option.	0 (0%)	584 (0.85%)
Hospital/Homebound	Service for children unable to attend school for reasons not associated with the hearing loss.	4 (0.21%)	161 (0.23%)
Total Local School		1,743 **(89.39%)**	57,202 (83.2%)
Total Separate School		207 **(10.62%)**	11,547 (16.8%)

Veracity of the Literature

In order to address the questions posed, one must first understand the nature of the knowledge base in deaf education. Problems in conducting research in deaf education plague the field.

Nature of the Population

First, because educationally significant hearing loss occurs with such low incidence, finding sufficient subjects to conduct controlled experiments is challenging. According to the *Twenty-Second Annual Report to Congress on the Implementation of the Individuals with Disabilities Education Act (2000),* which reported data on students ages 6 to 21, only 68,749 students with hearing losses were being served in schools in the United States, District of Columbia, and Puerto Rico (<http://www.ed.gov/offices/OSERS/OSEP/Research/>). This means that, on average, each state has fewer than 1,400 students who are deaf and hard of hearing across all ages. This figure is meaningless except to demonstrate why it is so difficult to conduct quality, controlled research. Given the range of communication options used, the variety of placements available (U.S. Department of Education, 2000), the heterogeneous nature of the population (Easterbrooks, 1999), and the geographic constraints of many states, instituting a well-implemented random assignment of subjects to a treatment group and a control group is extremely difficult (Aos, Phipps, Barnoski, and Lieb, 2001), especially when considering ethical questions surrounding the withholding of treatment.

Second, few children who are D/HH are educated under one placement or communication methodology alone (Akamatsu, Musselman, and Zweibel, 2000; Spencer and Lederberg, 1997; Stredler-Brown, 1998), making it impossible to make clear-cut comparisons between placements and communication methodologies. More often, families start their children in one communication mode (typically oral) or educational placement then switch to another (typically involving some degree of sign language), or they move from one school to another, availing themselves of the services offered. Bernstein and Martin (1992) surveyed 128 parents of students with hearing loss enrolled in segregated schools and concluded that many parents felt they did not have sufficient information about placement options to make an informed decision. Even if they do have information, many parents make the decision based on the needs of the family constellation rather than the needs of the individual child. Izzo (1999) interviewed four mothers of children with hearing loss regarding their choices of placement and communication options. In all four cases, placement was chosen based on location rather than an institution-or-mainstream choice, and communication mode was chosen based on the child's apparent skills, not the parent's choice.

It is also difficult to find pure research to compare students educated in one of the oral options with students educated in one of the manual options because most students migrate from the oral-only option to some form of combined instruction. According to Gallaudet Research Institute's 1999 Annual Survey of Hearing-Impaired Children and Youth, approximately 56 percent of deaf and hard of hearing students in the United States are educated in programs where some form of sign is combined with oral instruction. Of the students in this group who have severe to profound losses, more than 80 percent use some

form of sign language as their primary source of communication. Stredler-Brown (1998) and Musselman, Wilson, and Lindsay (1989) found that most families choose an oral approach initially but then switch to a signing approach at a later date. Akamatsu, Musselman, and Zweibel (2000) studied 153 Canadian children who were deaf and found that, while 93 percent were initially educated orally, that number declined to 58 percent during the elementary years and 31 percent during the adolescent years. This may be due to ineffective instruction or to the changing challenges of the communication task (e.g., group instruction is more challenging communicatively than individual instruction). An associated and non-productive trend in the literature has been to look at speech versus sign, leaving gaps in the knowledge base surrounding language per se.

Third, the communication system used in the school is not always consistent with the system used at home (Lederberg and Everhart, 1998), where most deaf children are communicatively isolated. This contributes to the difficulty in matching comparison groups by pre-existing differences. Consequently, there are virtually no studies of large numbers of subjects where assignment to a treatment group or a control group was done randomly and where all pre-existing program and subject characteristics are equally matched. Pre-existing variables that are difficult to account for include (but are not limited to) age at onset of hearing loss, age at identification of loss, age at first amplification, successful use of amplification, degree of hearing loss, amount of parental involvement, the existence of secondary and tertiary learning disorders, the range of placements attempted, and the impact of home language. Taken together, the low incidence of the population and its heterogeneity severely limit the ability of researchers to conduct rigorous, robust, empirical studies.

Fourth, there is little attempt in the literature to separate the culturally Deaf population from the culturally hard of hearing population. Rather, they are both included in subject pools or little attempt is made to describe their degrees of loss. Although there is sufficient information available to implicate even mild degrees of hearing loss as a contributor to diminished linguistic, academic, and social outcomes (Carney and Moeller, 1998; Gregory and Hindley, 1996; NIH, 1993), the needs of students who cannot benefit from auditory-based instruction differ from the needs of students who can. Israelite, Ower, and Goldstein (2002) conducted a qualitative study of the identity construction of seven adolescents who were hard of hearing and determined their identities to be separate from the Deaf identity, requiring specific interactions with other hard of hearing students. When differentiation between these two groups is not made, then generalization of results becomes questionable. Clearly, the constraints on and weaknesses in deaf education's knowledge base are problematic. Any decisions based on the literature must account for these constraints.

Finally, there exists a significant interrelationship among language, cognition, and experience. To view communication as separate from experience (nurture) and ability (nature) is to ignore the holistic, multidimensional nature of development. Therefore, comparing communication methods per se ignores myriad contributing factors, both internal and external to the child. Likewise, the characteristics of separate and mainstream schools vary from one another as do individual schools. It is the characteristics of *good* placements that should be investigated, not simply characteristics between placements.

Procedures Followed

Two principles guided the choice of literature reviewed here. First, only peer-reviewed articles or chapters published within the past ten years were included, with the exception of several seminal papers or recent program reviews. Pairing search topics related to the disability (e.g., "deaf," "hard of hearing," "hearing loss," or "hearing impaired") with topics related to communication and placement options (e.g., "language," "communication," "literacy," placement," "mainstream," "residential school," "inclusion," or "efficacy") into several search engines (ERIC, Education Index, Linguistics and Language Behavior Abstracts, PsychInfo, PubMed, Social Services Abstracts, and Sociolinguistic Abstracts) yielded fewer than 500 articles, many of which appeared redundantly across search engines. The same search topics were placed in the U.S. Government Documents search engine (FirstGov) and yielded several hundred documents. Article and document titles were reviewed to eliminate contributions not germane to the topic, contributions proposing a new theoretical perspective, contributions demonstrating theory-to-practice, contributions summarizing a body of literature not associated with the questions, or contributions providing clinical application. Next, article, chapter, and document abstracts were reviewed using the same filter, further limiting the field of available articles for review. Finally, the Institute research evaluation rubric (Aos, Phipps, Barnoski, and Lieb, 2001) was applied to the empirically based articles.

Almost none of the articles reviewed could be described as receiving a rating of 5 (subjects randomly assigned to treatment and control groups controlling for pre-existing characteristics) or of 4 (quasi-experimental research controlling for self-selection bias influencing outcomes). Most of the remaining articles included were rated as a 3 (evidence available to indicate that the groups matched had few differences in pre-existing variables). Studies of children who are deaf and hard of hearing tend to look at available populations, and to purge articles at this level would effectively eliminate most of the available data. There is also a preponderance of literature presenting aggregates of case studies ranging from single subjects to 12 or 15 subjects. Many studies report on the skills, features, or outcomes of certain experiences in which children are naturalistically engaged. Finally, a large body of the literature may be classified as retroactive case studies and interviews. While these studies do not compare treatment and control groups, many are quite informative and contribute to an exploration of the questions posed.

Literature on Treatment Efficacy: Communication Options

Background and Context

There is an available body of non-empirical literature redressing the concept of "treatment efficacy" as an appropriate model from which to discuss the social, emotional, linguistic, and academic development of children who are deaf and hard of hearing (Wrigley, 1996). Rather, pleas are made to view these students from a developmental perspective (Schlesinger, 2000) or a cultural perspective (Metzger, 2000). Of additional concern is the notion that children who are deaf are educated in *either* signed languages (English or ASL) *or* spoken language when, in fact, most are educated from early ages under a combination of practices (see discussion below). Little is available to inform the field of the interactions

among multiple modes and forms. Related to this is the high degree of misunderstanding among educators regarding instructional practices associated with different approaches. Easterbrooks (2001) conducted focus groups of teachers who self-identified as providing oral instruction and teachers who self-identified as providing total communication instruction. The groups were given the task of identifying instructional practices they would use to teach a specific, defined lesson and then identify instructional practices teachers subscribing to the other communication philosophy would do differently from what they would do. Each group came to consensus on what they did and on what practices they ascribed to teachers using the other modality. Interestingly, teachers on both sides of the communication philosophy ascribed practices to themselves that both sides used and ascribed practices to the other side that were not a part of that approach. Thus, it is clear that the factors associated with instruction of either oralism or of the use of sign language are too complex to make such a distinction useful. Finally, the communication environment of the child's home rises to the surface again and again as a key factor in language and learning outcomes. Rather than focusing on which option is best, forces should be mustered to make sure that all children with hearing losses receive the support necessary to communicate optimally with their families.

Question: What is the research evidence regarding how different approaches to communication affect linguistic development and literacy for deaf and hard of hearing children? Does research support one approach over another? What key factors influence the success of various approaches?

Every approach provides examples of trophy students (Easterbrooks and Baker, 2002), but most often, successful students are greatly outnumbered by those not as successful. In determining which teaching method provides the most benefit, one must look beyond the small numbers of successes that are frequently cited to the greater numbers of students who have been unable to reach full potential because of inefficient and ineffective intervention and instruction.

Spoken English and English-Based Signing

Marschark (2001) reviewed the literature on language development of students who are deaf and hard of hearing and concluded that:

> Because of the emphasis on speech reception and production rather than language development per se in children who are acquiring spoken language, we actually have more information concerning the development of sign language than the development of spoken language in children who are deaf. This situation makes it difficult, if not impossible, to fairly evaluate the relative merits of spoken language versus sign language for young deaf children, especially with regard to semantics, grammar, and more complex aspects of language. There is one safe conclusion however: neither spoken nor sign language is inherently better than the other. (21)

The factors that contribute to success in one option cannot be separated from the factors that lead to success in another.

The majority of deaf children of hearing parents remain significantly delayed in communication throughout their lives when compared with their hearing peers of hearing parents and their deaf peers of deaf parents (Johnson, Liddell, and Erting, 1989; Spencer, 1993a, 1993b). The development of language, spoken or signed, is dependent upon the availability of that language and the opportunities a child has for uptake of the language (Lederberg and Spencer, 2001). Children who are deaf and hard of hearing and have hearing parents typically grow up in linguistically impoverished surroundings. Spencer and Lederberg (1997) and Lederberg and Prezbindowski (2000) summarized the literature on hearing mothers' interactions with their deaf babies and found that hearing mothers of deaf babies struggled with many aspects of interaction, especially relating to sensitivity to their child's signals or cues. When non-responsive to a child's signals or cues, mothers miss prime opportunities to engage in language stimulation. In addition, hearing mothers lack some of the skills that deaf mothers have in maintaining their child's attention. Without shared attention to an object in the environment, communication has no basis upon which to develop.

The acquisition of language, whether signed or spoken, depends upon the responsiveness of the individuals with whom the child routinely interacts (Sass-Lehrer, 1999). Pressman, Pipp-Siegel, Yoshinaga-Itano, and Deas (1999) added to our understanding of a mother's importance to the language acquisition process. These researchers studied parent-child dyads and their relationship to maternal sensitivity and found that sensitivity made significant, positive, and unique predictions of expressive language gain when the effects of maternal education, degree of child hearing loss, dyadic mode of communication, and time between assessments were controlled. They found that affective measures were valuable in prediction language gain. Snitzer-Reilly and Bellugi (1996) indicated that deaf mothers of deaf preschoolers are sensitive to the need to clarify communication for their children and willingly produce ungrammatical (i.e., baby talk) utterances in an effort to make their messages clear. This area requires further investigation.

Musselman and Churchill (1993) followed the language development of profoundly deaf children enrolled from ages four to almost seven in either a total communication (TC) program or an auditory-oral program. They noted that some mothers in each group tended to be more dominant in conversational turn-taking than other mothers in the same group. The two groups did not differ in their expressive or receptive language abilities based on communication modality used; instead, those children whose mothers were less dominant in conversational turn-taking showed greater gains in expressive language development than the children whose mothers were more dominant, despite modality.

Spencer (1993a) conducted research on deaf and hearing infants between 12 and 18 months of age. Her findings revealed that both deaf and hearing infants who had access to linguistic information in the early stages of prelinguistic development used intentional communication and referential and symbolic gesturing. Meadow-Orlans (1997) found that the quality of interactions between deaf mothers and deaf infants and between hearing mothers and hearing infants were similar. This suggests that it is not the children's deafness that impacts maternal behavior, but rather the mismatch between the mother's and infant's hearing status.

Lederberg and Spencer (2001) described their ongoing study (Lederberg, Spencer, and Prezbindowski, 2001; Lederberg, Spencer, and Prezbindowsi, 2000) of the vocabulary

acquisition of children with hearing loss. Using data from the MacArthur Communicative Development Inventory, these researchers have detailed the word-learning processes in which deaf and hard of hearing preschoolers engage. These processes (explicit reference, social intention, or internal strategy conditions) led children to fast mapping of novel words. Fast mapping is the process that allows children to learn new words with minimal direction. Lederberg and her colleagues have found that the ability to fast map novel words is more closely related to linguistic development than is chronological age or mode of communication. The cognitive ability to learn new information and access to experiences supporting linguistic uptake account for vocabulary growth, not whether the information is conveyed through sign or through speech.

In addition to being unsure of how to interact with their children who are deaf, families tend to change communication modes over time (Lederberg and Spencer, 2001). Most frequently, families choose an oral approach, and then switch to a signing approach at a later date (Stredler-Brown, 1998). Hearing fathers tend to have poorer signing skills than hearing mothers (Gregory and Hindley, 1996), which further limits the amount of communication available in the home. Whether a family chooses to sign or to use an oral approach, given the time delay in learning to sign, speech accounts for the bulk of linguistic input, especially during the first three years or an infant's life, so data on children who are exposed to English signs are very limited.

The communication modality that a child ultimately uses is not necessarily related to the severity of his hearing loss. Strong, Clark, and Walden (1994) studied the relationship between severity of loss and demographics, age, treatment, and intervention effectiveness in 2,519 children who had attended SKI*HI home-based intervention services between 1979 and 1991. They found that the greater the degree of loss, the earlier a child was identified, amplified, and entered into a program, but they found only a small relationship between severity of loss and communication methodology. Thus, how and when intervention begins is more important in determining communication outcomes than whether or not the parents use a spoken language or a signed language option.

When considering school-aged children, the question of whether spoken instruction is better than signed instruction becomes even more complicated. The fact that many children change options reduces the number of subjects available who were adequately signed to at young ages. Further, according to Johnson, Liddell, and Erting (1989), a typical signing teacher using simultaneous communication will omit from 25 to 50 percent of their spoken message, so the quality of language instruction will vary considerably among programs. In addition to dropping much of the message, it is possible that many signers are also using inaccurate or immature signed productions; thus, the message many deaf children receive is often incomplete. Geers, Moog, and Schick (1984) compared the grammar skills of 168 deaf children ages 5 to 9 years enrolled in programs following a spoken language approach with the grammar skills of 159 same-aged deaf children enrolled in programs following a TC approach. They found no significant differences in English grammar skills between the two groups, although the spoken performance of the TC group lagged behind their signed language performance. Viewed from a different perspective, one might conclude that, for the children not progressing in spoken language, the use of signs was an effective alternative for enhancing their language.

Much of the literature comparing young children who sign with young children who do not sign is in the form of case studies, the outcomes of which vary depending on what trait is being assessed and how the skill is being elicited (Schick, 1997). There appears to be a tendency for oral programs to produce children who have better speech (Geers, Moog, and Schick, 1984) and for signing programs to produce children whose signed vocabularies outpace their spoken vocabularies (Notoya, Suzuki and Furukawa, 1994). Although there are few studies of large numbers of deaf children comparing signed to spoken vocabulary development, the case and small group studies available consistently report positive benefits for vocabulary development in the presence of sign (Daniels, 1993; Notoya, Suzuki, and Furukawa, 1994; Dodd, McIntosh and Woodhouse, 1998; Preisler and Ahlstroem, 1997).

The major criticism leveled at the English-based signing is that it is not sufficient to meet all the communicative needs of children who are deaf. As described earlier, few parents sign English well, and few teachers sign a complete message to their students. In addition, English signs do not adequately present the emotional and pragmatic content of a message. It is how this mode of language is applied that determines its success or failure, not that it is better or worse than auditory-oral instruction. A second criticism against the use of signs, in addition to or as a substitute for speech, is that they will inhibit the child's ability to learn spoken English. Evans (1988) refuted the notion that the early use of gestures or signs hampers deaf children's ability to develop spoken English. Evidence presented earlier implicates the lack of opportunities for language uptake rather than inherent problems with oral or signed instruction in the language success of young children who are deaf and hard of hearing. One's brain does not care how it receives a language, it cares only *that* it receives a language. Decisions regarding mode of conveyance of that language, then, become a social issue based on social need of the parents and professionals involved, not the developmental need of the child.

ASL as a First Language and Bridge to English as a Second Language

The bilingual-bicultural perspective on language acquisition in children who are deaf and hard of hearing came to the forefront after a significant amount of research in the 1980s revealed that deaf children of deaf parents acquired language through stages and at rates similar to those of hearing children of hearing parents (see Newport and Meier, 1985; Siple, 1997, for reviews). Proponents of this approach contend that ASL is the deaf child's natural language and should be made available to all deaf children so that they can begin school with a language base similar to the language base available to hearing children. With such a language base present, second language learning, that is, the learning of English, can be facilitated (Wilbur, 2000). Recent research continues to point out that deaf children of deaf parents may have advantages over deaf children of hearing parents (Prendergast and McCollum, 1996; Spencer, Bodner-Johnson, and Gutfreund, 1992). For example, Jamieson (1995) studied the manner in which profoundly deaf 4- and 5-year-olds used "private talk" or self talk (i.e., that talk which occurs while looking at books or playing) during a construction task and found that the deaf children of deaf parents used more mature self-talk than the deaf children of hearing parents. Cook and Harrison (1995) found that this takes the form of private signing among children who are deaf and have deaf parents. Private language is a factor in later reading success, as we often talk to ourselves in our heads as we read.

Early exposure to a complete message for uptake is essential in the language development process, yet there are several ways in which signing children who are deaf are deprived of a complete message. Children who are deaf need visual enhancements to communication when auditory-vocal communication is not available (Erting, Prezioso and Hynes, 1990; Koester, Brooks and Traci, 2000; Spencer, 2000; Spencer, Bodner-Johnson, and Gutfreund, 1992). When a deaf child is not receiving communication through a visual channel, he is still surfing for visual information, resulting in split attention between the language partner and the visual world of information around him (Harris, 1992). When children must split their attention between stimuli, they miss some information. While children who do not have access to visual information split their attention, the situation is not much better for signing children whose parents are learning to sign. It is rare for hearing parents of deaf children to have high levels of ASL proficiency (Young, 1997), and proficiency in the mode of communication the child needs contributes significantly to language outcomes. "Hearing children learning spoken English and deaf children learning ASL exhibit similar development of syntax: The signed utterances of deaf children are much like hearing children's spoken utterances. Thus modality of language has little impact on structure of the earliest word or sign combinations, even though the structure of signed languages and spoken English are different in later stages" (Spencer and Lederberg, 1997, 223).

Mayberry (1993) and Singleton, Supalla, Litchfield, and Schley (1998) report that the age at which a deaf child is exposed to ASL as a first language is a primary predictor of ASL fluency in childhood and adulthood. While the development of native competence in a language requires exposure to that language during the critical period, deaf children may gain a certain degree of skill with ASL no matter when they begin to learn the language (Meirer, 1991). Singleton, Supalla, Litchfield, and Schely (1998) studied language development beginning at later ages and concluded that deaf students of hearing parents, when given the opportunity to master ASL before the age of six, have systems of grammar similar to those of deaf students whose parents are also deaf. Therefore, it is possible for both groups (i.e., deaf children of hearing parents and deaf children of deaf parents) to learn a first language and enter school with a fully functioning language on which all future learning is based.

A new line of research that may provide insights into how best to take advantage of ASL/ESL bilingual instruction is a body of literature describing the accumulated benefits of multiple sources of linguistic input. Recently, position paper studies that look at the combined use of ASL and some form of English-based signing have emerged, and these available studies tend to suggest that visual support from both ASL and English signs yields positive results (LaSasso and Metzger, 1999; Mayer and Akamatsu, 1999; Wilbur, 2000). For example, Hauser (2000) demonstrated through the case study of a student who was deaf that one can successfully code-switch between ASL and cued English. Efforts to look at how communication options can mutually support one another may provide better direction than previous efforts to disprove the other’s importance.

A large body of literature regarding bilingualism theoretically discusses the benefits of ASL/ESL bilingual programs (Erting, 1992; Johnson, Liddell, and Erting; 1989; Singleton, Supalla, Litchfield, and Schley, 1998), yet this approach is so new that there is no large-scale evidence of its benefits. However, data are being gathered on large-scale applications of this method in schools affiliated with the Star Schools Engaged Learner

Project (Baker, 2002, personal communication), and the field is anxiously awaiting the results, which are scheduled for release in September 2002 (Nover, Andrews, and Baker). In addition, bilingual instruction of students who are deaf is being initiated more and more world-wide (Ahlgren and Hyltenstam, 1994; Detthow, 2000; Komesaroff, 2001), and results from other countries attempting to solve the same dilemmas will become a source for direction.

Literacy

The data on current literacy levels among students who are deaf and hard of hearing presents staggeringly poor outcomes. According to Traxler (2000), less than half of 18-year-old students who are deaf leave high school with reading and writing skills below a fifth grade level, and more than 30 percent of those leaving school (Waters and Doehring, 1990) are functionally illiterate. Does the ability to use spoken language, signed English, or ASL predict better literacy outcomes? Several studies have suggested that both spoken and written English skills may be enhanced by early acquisition of signs (LaSasso and Metzger, 1999; Mayer and Akamatsu, 1999; Wilbur, 2000).

Yoshinaga-Itano, Snyder, and Mayberry (1996) measured five written-language variables of 21 school-aged students who communicated through sign, speech, and audition (Sim Com) and compared them with similar measures of 25 students who used speech, auditory skills, and lipreading (oral) to communicate. Results of this study showed no significant differences between the two populations on their written language performance, indicating that communication methodology did not appear to be a significant factor.

Moores and Sweet (1990) engaged in an extensive study of the reading outcomes of students who are deaf. Conducting extensive testing on 16- and 17-year-old students with hearing losses in the profound range, they gathered data on 65 students using ASL who had deaf parents and 65 students using total communication who had hearing parents. Extensive testing of language, reading, writing, intelligence, speech, and hearing was conducted. Group means were similar on tests of intelligence, but differences existed on many other parameters. No statistical procedures were applied to determine significance between the group mean scores since both groups had attended at least some schooling in residential schools and both groups had at least some exposure to total communication. The researchers concluded that the commonalities of the two groups far outweighed the differences. They found that for both groups, measures of speech did not predict outcomes in reading, but measures of English language competence did predict reading and writing outcomes. Similarly, Wilbur (2000) found that neither speech nor speech-reading abilities predict better reading scores. Case studies (Daniels, 1993) suggest that signs support the development of vocabulary in hearing children of deaf parents.

Marschark and Harris (1996) demonstrated that children who are deaf are able to make use of the phonological patterns of English but with much less success and at much later ages. Phonology seems to be a key factor in literacy among both hearing and deaf students (for extensive review of the literature, see Perfetti and Sandak, 2000). Continued research on the mechanisms for relaying phonological information visually along with the better understanding of the supports to text comprehension available through visual grammar hold promise for impacting the literacy development of students who are deaf and hard of hearing.

Characteristics of Successful Students

Success is a relative term and has been defined in the literature from multiple perspectives. We must be careful that our measures of success are in fact related to the outcomes we seek. For example, if we approve of oralism over the use of signs because we define success by speech production, then we may underestimate the potential of this population because few children with profound hearing losses develop completely intelligible speech (Paatsch, Blamey, and Sarant, 2001). Rather, we need to look at those characteristics that promote successful linguistic, academic, and social outcomes.

Lederberg and Spencer (2001) reviewed the literature on language development in deaf children of deaf parents and hearing children of hearing parents and concluded that those children whose parents were skilled signers, whether hearing or deaf, showed a language advantage over children whose parents were not skilled signers. Calderon (2000) found that maternal communication skill proved to be a more significant indicator for language development, early reading skills, and social-emotional development in children who are deaf or hard of hearing than did the mother's educational achievement. Calderon found that even mothers with higher levels of education might struggle with communicating effectively with their children. As will be discussed later, it is clear that enrollment in an appropriate early intervention program is one of the single best predictors of positive outcomes for children with hearing loss, both in terms of developmental and educational growth (Calderon and Greenberg, 1997; Carney and Moeller, 1998). Accessibility to an environment where uptake of a comprehensible language is possible must become a first priority for all education and public health organizations and agencies claiming to care about the early development of young children who are deaf and hard of hearing. In 1978, Geers and Moog identified the conditions of success in spoken language to include strong family support. Twenty years later these pre-conditions remains the same.

Summary

In summary, the single most important variable in the acquisition of communication may be the availability of a complete linguistic message within the context of shared, parent-child communicative interactions (Harris and Mohay, 1997). Whether that is conveyed through spoken English, signed English, or ASL does not seem to matter. Children around the world develop a variety of languages, and deaf children are capable of developing a complete language, whether English or ASL, when that language is available to them from infancy on. An early mastery of language may be the single best predictor of cognitive, academic, and social success during the school years, both in hearing and in deaf children (Drasgow, 1998; Risley and Hart, 1995). Early access to comprehensible language for successful uptake and a parent who is willing and able to communicate successfully are key predictors of all-important outcomes. The question of which form of language input is best views the issue from an ineffective stance. Rather, the question should be: How do we bridge the communication gap between a hearing mother and her deaf or hard of hearing child at an early enough age to allow the child to benefit from available communication, whether auditory or visual, so that language may unfold in a natural and timely manner?

Literature on Treatment Efficacy: Placement Options

Background and Context

As previously described, attempting to determine which placement is most effective for *all* children who are deaf and hard of hearing asks the wrong question. There is evidence that some children thrive in one environment while others thrive in another. Rather, we should be looking at which environment meets the needs of an individual child. More importantly, we should be making sure that a quality educational environment is available to all children with hearing losses, whether they live in urban, suburban, or rural areas. Typically, options are available for the traditionally advantaged but are less available for the traditionally disadvantaged (Easterbrooks, O'Rourke and Todd, 2000). In addition, the *quality* of an educational placement contributes so importantly to the outcomes of that environment as to render comparison all but moot. Lastly, children differ, as do their needs, and the environment that is least restrictive for one student may be most restrictive for another. This was the impetus for policy guidance provided by former Education Secretary Lamar Alexander (1992), who stated that:

> … the least restrictive environment provisions of the IDEA and Section 504 are interpreted incorrectly to require the placement of some children who are deaf in programs that may not meet the individual student's educational needs. Meeting the unique communication and related needs of a student who is deaf is a fundamental part of providing a free appropriate public education (FAPE) to the child. Any setting, including a regular classroom, that prevents a child who is deaf from receiving an appropriate education that meets his or her needs including communication needs is not the LRE for that individual child.
>
> Placement decisions must be based on the child's IEP. Thus, the consideration of LRE as part of the placement decision must always be in the context of the LRE in which appropriate services can be provided. Any setting which does not meet the *communication and related needs* [emphasis added] of a child who is deaf, and therefore does not allow for the provision of FAPE, cannot be considered the LRE for that child. The provision of FAPE is paramount, and the individual placement determination about LRE is to be considered within the context of FAPE.
>
> The Secretary is concerned that some public agencies have misapplied the LRE provision by presuming that placements in or closer to the regular classroom are required for children who are deaf, without taking into consideration the range of communication and related needs that must be addressed in order to provide appropriate services. The Secretary recognizes that the regular classroom is an appropriate placement for some children who are deaf, but for others it is not. The decision as to what placement will provide FAPE for an individual deaf child — which includes a determination as to the LRE in which appropriate services can be made available to the child — must be made only after a full and complete IEP has been developed that addresses the full range of the child's needs.
>
> The Secretary believes that consideration of the factors mentioned above will assist placement teams in identifying the needs of children who are deaf and will enable them to place children in the least restrictive environment appropriate to their needs.

The overriding rule regarding placement is that placement decisions must be made on an individual basis. As in previous policy guidance, the Secretary emphasizes that placement decisions may not be based on category of disability, the configuration of the delivery system, the availability of educational or related services, availability of space, or administrative convenience.

States and school districts also are advised that the potential harmful effect of the placement on the deaf child or the quality of services he or she needs must be considered in determining the LRE.

The Secretary recognizes that regular educational settings are appropriate and adaptable to meet the unique needs of particular children who are deaf. For others, a center or special school may be the least restrictive environment in which the child's unique needs can be met. A full range of alternative placements as described at 34 CFR 300.551(a) and (b)(1) of the IDEA regulations must be available to the extent necessary to implement each child's IEP. There are cases when the nature of the disability and the individual child's needs dictate a specialized setting that provides structured curriculum or special methods of teaching. Just as placement in the regular educational setting is required when it is appropriate for the unique needs of a child who is deaf, so is removal from the regular educational setting required when the child's needs cannot be met in that setting with the use of supplementary aids and services.

Question: What is the research evidence regarding the effectiveness of various types of educational placements for deaf and hard of hearing children? Does research support one placement type over another? What key factors influence the effectiveness of different types of placements?

Who Attends Mainstream and Separate Schools

Although there are no large-scale studies to tell us the nature of the students in separate (day and residential) programs and how they differ from students in local (mainstream) programs, it is commonly accepted that separate schools serve a population distinctly different from local programs. In addition to students who are deaf and hard of hearing and live near a separate facility, these facilities also serve young children who are difficult to teach due to the existence of additionally disabling factors that impede their progress and older students with hearing loss who have not benefited from placement in their local schools and are either failing academically or have become severe behavior problems. If in fact those students who are better able to learn are being separated from those who are lesser able to learn, then it is clearly an unfair comparison to expect equivalent outcomes from both placements.

Available Research

There was a flood of research on mainstream versus residential placement in the 1970s and 1980s post PL 94-142, before the bilingual-bicultural movement. Although this line of research is not so active today, there are several studies that warrant discussion.

Musselman, Mootilal, and MacKay (1996) studied the social adjustment of deaf adolescents enrolled in segregated (n=39), partially integrated (n=15), and mainstreamed (n=17) settings compared with a hearing control group (n= 88) using an adapted version of The Social Activity Scale, which required students to apply a three-point scale (almost never, sometimes, almost always) to a series of questions looking at in-class participation, social participation, emotional security, and perceived social competence. In addition, the subjects' signing skills were evaluated. Not surprisingly, the researchers found that regardless of placement, deaf students reported better adjustment to other deaf students than to hearing students. Further, the better signing skills a student had, the better adjusted he was in environments with other deaf students, and the better spoken language skills a student had, the better adjusted he was in environments with hearing students. They concluded that deaf students can benefit from both placements, integrated or segregated, and that these placements may provide complementary forms of social experiences, each contributing to the overall adjustment of the student. Wilson (1997) interviewed 23 teenagers who were deaf and asked them their opinions on segregated versus mainstream placement. She found that these teens preferred a mixed placement because it afforded them the opportunity to have a well-rounded educational and social experience that they perceived met their developmental needs.

Walker, Munro, and Rickards (1998) reported on the literal and inferential reading abilities of a naturalistic sample of 195 subjects, aged 9 to 19 years. All subjects had bilateral, prelingual hearing losses averaging >/= 85 dB HL in the better ear. Forty-seven students (24 percent) were in a segregated special setting for students who are deaf and hard of hearing, 88 (45 percent) were in resource classes in a general education school, and 60 (31 percent) were fully mainstreamed in general education classes. Walker et al. found that students in the general education setting were better readers, both literally and inferentially, while the segregated and resource classes performed more poorly, and they did not read a variety of materials with equal facility. This begs the chicken and egg question: Are children who are deaf and read poorly placed in segregated facilities because of their reading skills, or do their reading skills become poor as a result of placement in the separated facility? Although experience tells us that the former is true, there are no data available to disprove the latter.

The question of which placement is more efficacious for deaf and hard of hearing students assumes that such a distinction can define why some children who are deaf and hard of hearing have better educational outcomes than others. However, there are myriad factors that contribute to academic success but about whose contributions we have little knowledge. The availability and skill levels of interpreters in the classroom, closed captioning, speech-to-print software, TTYs and TDDs, computers, and other technology all have an impact on a student's success, yet our understanding of these contributions is limited. In the face of all these impinging factors, we continue to implicate oralism versus sign or special schools versus mainstream schools as the answer, or rather, the burning question.

In an in-depth case study of the placement of three second-grade boys with deafness who were placed in the mainstream, Ramsey (1997) chronicled the many turns at which placement in a regular education environment can go wrong. She noted limited efforts to prepare teachers and students to interact with her subjects and poor attempts to bridge the language barriers either academically or socially. She concluded that, for these three

children, the educational goals achieved could have been done so more efficiently and comprehensively in a self-contained environment. The results for these students point out the importance of carefully planning for the integration of children with hearing losses into the regular education class. Simply leaving success up to chance guarantees its failure.

In a study on the process of inclusion, Afzali-Nomani (1995) interviewed 55 teachers of the deaf and 48 regular educators who worked with deaf students to obtain their perspective on what was needed for successful inclusion of students who are deaf and hard of hearing in the general education classroom. The following list of traits were identified as associated with positive inclusive placements:

- Ample opportunity to make friends with hearing students
- Certified interpreters available
- Placements made based on individual needs
- Regular teachers fully supportive of inclusion
- Full range of options available to meet individual needs
- Placement based on needs of student rather than budget
- Parents supportive of inclusion
- Sign instructions for students and staff members
- Sufficient number of teachers of the deaf to meet students' needs
- Acoustically treated rooms
- Deaf adults on staff who sign proficiently
- Reduced classroom size
- Opportunity for deaf students to interact with one another

Luckner and Muir (2001) conducted a similar study, querying 27 students who had been identified as highly successful, their parents, interpreters, teachers in general education and deaf education, and paraprofessionals and found similar themes to emerge as those of Afzali-Nomani. The factors that emerged across respondents were:

- Family involvement
- Self-determination
- Extracurricular activities
- Social skills/friendships
- Self-advocacy skills
- Communication with and support from general education teachers
- Pre-teach/post-teach content and vocabulary being learned in the general education classroom
- Collaboration with early identification/early intervention service providers
- Reading
- High expectations

Characteristics of Successful Placements

It is clear that a successful placement is one that meets the unique needs of the individual child. Neither residential schools nor full inclusion programs can adequately serve all children with hearing loss. The severely involved child who is the only person with a

hearing loss in his county's program might benefit more from a residential school than from sharing minimal services from an itinerant teacher who works across counties. The child whose success with her cochlear implant has afforded her the ability to develop communication skills on target developmentally might benefit more from full inclusion than from placement in a self-contained class with other students who are deaf and hard of hearing. The amount and variety of services within a region, and the number, age range, and skill range of other students with a hearing loss are important factors to consider when making placement decisions. Availability of resources, parental support, and the school's willingness to make accommodations are key factors.

Given that parental involvement is a key factor in the success of any child who is deaf or hard of hearing, the Laurent Clerc National Deaf Education Center at Gallaudet University sponsored a National Forum on Family Involvement (Hallau, 2002) bringing together parents and professionals from all around the country for a period of three years to develop recommended practices for family involvement. To summarize, these practices include the following statements:

- **Collaborating With Families.** In a program where parents, caregivers, and program staff work collaboratively as partners, the program staff are positive, flexible, resourceful, and accepting. Parents, caregivers, and staff are viewed as equal in what they bring to the table. Together, parents, caregivers, and program staff make decisions about program planning and design. Communication between program staff and parents and caregivers is informal, frequent, appropriately personal, and two-way (p. 7).

- **Program Goals.** Program components focus on language and communication, which promote the development of literacy. There are avenues for parents and caregivers and family to develop communication skills with children, and more broadly, to learn parenting skills. Families learn strategies to help them include the deaf child as an interactive member of the family, one who shares in family decisions, concerns, responsibilities, and joys (p. 8).

- **Resources.** The program provides unbiased, accurate information so parents and caregivers can make choices. The perspectives of informed individuals with varying points of view, such as deaf individuals, other parents and caregivers, and professionals, are a part of the information provided to parents and caregivers. Empowered parents and caregivers make informed decisions (p. 9).

- **Program Structure.** The program offers different levels of involvement with clear pathways for becoming involved. There are various opportunities for different family members, including fathers, siblings, and the extended family. The program offers flexible locations and meeting times. Respect for cultural differences and sensitivity to differing abilities is evident. Program structures encourage parent-to-parent interactions. There are extensive opportunities for families and for the program to work and play together and learn from each other (p. 10).

- **Families From Diverse Cultures.** The program is accepting of different cultures. It finds ways to involve parents and caregivers from different cultures in ways that

meet the families' needs. A nonjudgmental attitude and openness are important, especially in terms of making cultural connections. Trust is built through one-to-one connections. Coordination of language services for spoken, signed, and written information is needed to ensure appropriate delivery of information to families who do not use English (p. 11).

- **Student Progress.** The assessment team includes the child's parents and caregivers as well as educators to provide accurate and timely information for determining whether or not the child is making satisfactory progress. Observations from parents and caregivers are included so that the assessment process becomes more collaborative between the program and the parents. A focus on the successes of the individual students is essential. An important role of the program is to help the parent consider the benefit of the program's goals and philosophy for his or her child (p. 12).

Summary

Children who are deaf and hard of hearing form a widely heterogeneous population. Eliminating any of the available placement options will cause educational, social, and emotional hardships for some children. The best educational placements are those that have:

- Adequate resources;
- Staff trained in and committed to the needs of students who are deaf and hard of hearing;
- Parental involvement; and
- Provisions for the differing social needs of deaf and hard of hearing students.

Additional Contributing Factors

Critical Mass and Regionalization of Services

The concept of *critical mass* may hold an important key in determining how adequately to address issues of communication and placement (Easterbrooks and Baker-Hawkins, 1995). Critical mass means a *sufficient number of professionals with expertise in the development and education of children who are deaf and hard of hearing* and a *sufficient number of students themselves who are deaf and hard of hearing*, who can have an impact on a child's development cognitively, communicatively, socially, and emotionally. The question becomes: What is a sufficient number?

In terms of professionals, a critical mass would be a sufficient number of individuals with specialized backgrounds in the development and education of deaf and hard of hearing children to form a truly multidisciplinary team. The practice of having an speech-language pathologist with no specific background or training in deafness, a regular educator with no background in deafness, and a teacher of the deaf violates the intent of the multidisciplinary team concept and places on the teacher of the deaf the onus of speaking on behalf of the

deaf student across all curricular areas, related service areas, and grades. Often it occurs either that the teacher of the deaf is outvoted by uninformed team members or advanced, whether warranted or not, to the status of expert in all aspects of deaf education.

In terms of student population, a critical mass would be a sufficient number of peers with whom the student can communicate so that he has choices of social and communication partners. Often in smaller school systems, a child who is deaf or hard of hearing may be served with one or two other students, either of greatly disparate ages or greatly disparate abilities. The false assumption regular educators often make is that these individuals will naturally form friendship bonds just by virtue of their deafness. All individuals need younger children with whom they can communicate to reinforce their own developing skills and older children with whom they can communicate for exposure to more advanced levels of communication and socialization. The key is to provide a choice of communication partners and a choice of social partners.

Critical mass as a concept has not been addressed adequately at any level of research. Nor has its corollary, the regionalization of services to students who are deaf and hard of hearing. Two populations for whom the isolation of traditional deaf education structures are burdensome and for whom regional services might provide a solution are Hispanic students (Steinberg, Bain, Li, Montoya, and Ruperto, 2002) and students in rural environments (Wolfe, 2002). Both of these large sub-groups of children who are deaf and hard of hearing suffer tremendously, socially and academically, from the devastation of isolation. When school systems work cooperatively to overcome the isolation of professionals and the isolation of students, the negative qualities of regular education placement can be ameliorated.

The National Association of the Deaf (NAD) includes the concept of critical mass in its position statement on the education of students who are deaf and hard of hearing:

> The NAD believes that an appropriate placement for a deaf or hard of hearing child is one that:
>
> - Enhances the child's intellectual, social, and emotional development;
> - Is based on the language abilities of the child;
> - Offers direct communication access and opportunities for direct instruction;
> - Has a critical mass of age-appropriate and level-appropriate deaf and hard of hearing peers;
> - Is staffed by certified and qualified personnel who are trained to work with deaf and hard of hearing children;
> - Provides full access to all curricular and extracurricular offerings customarily found in educational settings;
> - Has an adequate number of deaf and hard of hearing role models;
> - Provides full access to support services;
> - Has the support of informed parents; and
> - Is equipped with appropriate technology.

In essence, the NAD believes that ALL deaf and hard of hearing children are entitled to a free and appropriate public education (FAPE), in an environment that enhances their intellectual, social, and emotional development. The NAD also believes that direct and uninhibited communication access to all facets of a school's programming is essential if a deaf or hard of hearing child is to realize his or her full human potential. As stated in a U.S. Department of Education Policy Guidance (October, 1992):

> Meeting the unique communication needs of a student who is deaf is a fundamental part of providing a free appropriate public education (FAPE) to the child. Any setting, including a regular classroom that prevents a child who is deaf from receiving an appropriate education that meets his or her needs including communication needs, is not the LRE for that individual child (<http://www.zak.co.il/deaf-info/old/inclusion.html>).

Regionalization of services allows a critical mass of professionals to collaborate and provide a team that is multidisciplinary from the perspective of the pupil who is deaf or hard of hearing (Easterbrooks and Baker-Hawkins, 1995). In addition, it allows regions to provide Deaf culture, hard of hearing culture, and socialization experiences for all children with hearing loss.

Potential Impact of Universal Newborn Hearing Screening and Intervention

The efficacy of early intervention programs cannot be overlooked, as report after report become available supporting the impact of early programs on development (Calderon and Naidu, 2000; Mayne, Yoshinaga-Itano, and Sedey, 2000; Yoshinaga-Itano and Gravel, 2001;Yoshinaga-Itano, Coulter, and Thomson, 2000). The unbeatable combination of earlier detection *and* earlier intervention holds the most promise. Yoshinaga-Itano and Apuzzo (1998) found that children who began early intervention programs before the age of 6 months showed significantly more progress in language acquisition than did their subjects who began early intervention programs after 6 months of age. In study after study, Yoshinaga-Itano and her colleagues in Colorado (for an extensive review see Yoshinaga-Itano, Coulter, and Thomson, 2000), and Moeller and her colleagues at Boys Town Research Hospital (see Moeller, 2000) as well as others, have documented the major gains that can be made by children who are deaf and hard of hearing when provided with adequate and early intervention. New resources (http://center.uncg.edu) and new tools (Anderson and Reilly, 2002, MacArthur CDI-ASL version) are becoming available more and more rapidly to assist states in implementing appropriate services to infants and toddlers who are deaf and hard of hearing. We can only imagine the potential impact. Yet without concerted efforts toward the development of appropriate services available to all parents, this potential may not be realized.

Parents' needs are great. According to Baker (1999), whatever the communication approach, without early access to a viable communication system, deficits in language development occur. The challenge is to do a better job of matching the child's learning and communication needs with an appropriate system. Baker feels that when working with families with a deaf infant, we tend to work backwards, engaging in trial and error. Most often parents choose an approach that is least different from what they know in their personal worlds, then see if it works. Once they discover that the child is not making gains, they try something else. This is detrimental to the developing child who will have missed

out on critical early months. A systematic approach that will allow language to develop while families are coming to grips with their challenges is needed. For a comprehensive review of the literature on early language development in deaf and hard of hearing children, see Marschark (2001).

Historically, studies of cognitive growth in children who are deaf and hard of hearing have pointed to differences between the deaf and hearing populations (for a summary of the literature, see Braden, 2001). Early access to communication is an essential ingredient in the development of normal cognitive and academic success (Calderon and Greenberg, 1997), and number of years of effective exposure to language in the child's preferred communication mode (excluding years in a non-preferred mode) accounts for differences in a child's memory for language tasks (Bebko and McKinnon, 1998). Recent information on the effects of early identification and intervention on babies who are deaf and hard of hearing provides us with our first glimpse of a future where questions surrounding cognition might be answered more positively than in the past (Yoshinaga-Itano, submitted).

An important component in a comprehensive approach to early intervention is collaboration. Arehart and Yoshinaga-Itano (1999) sited a study by the Marion Downs National Center for Infant Hearing, which revealed that only 30 percent of intervention sites in 17 states had teachers of the deaf on their staff. Most teachers of the deaf have backgrounds in amplification devices, auditory-speech development, language development, and sign language development (see CEC-CED Joint National Standards for Beginning Teachers of Students who are Deaf and Hard of Hearing (http://deafed.net/activities/ixb4.htm). Any endeavor to retrain general early interventionists with the depth and breadth of knowledge and skills necessary to serve infants and toddlers who are deaf and hard of hearing grossly underestimates the complexity of the task. Further, it may inhibit the ease with which infants and toddlers are transitioned into preschool programs in the schools.

The availability of new research will compel us to rethink old practices and procedures. The landscape of deaf education is changing rapidly.

Potential Impact of Cochlear Implants and Other Technological Developments

The availability of cochlear implants and other technological developments such as captioning and computerized instruction is providing new information on almost a daily basis with which researchers, educators, and parents must grapple. Regarding the use of captioning and the use of computers, although these technologies are now readily available and extensively used, we have virtually no evidence to prove that they provide enhanced benefits to language acquisition or academic outcomes. The situation surrounding cochlear implants is far better documented but far more emotionally charged.

Individual differences in success with implants exist (Pisoni, Cleary, Geers, and Tobey, 1999). While there is evidence to suggest that not all deaf children benefit equally from the use of implants (Allen, Rawlings, and Remington, 1993; Easterbrooks and Mordica, 2000; Robbins, Renshaw, and Berry, 1991), they do provide some benefits for many students (Meyer, Svirsky, Kirk, and Miyamoto, 1998) and excellent benefits for some children (Geers and Moog, 1994; Parkinson, el-Kholy, and Tyler, 1998; Tomblin, Spencer, Flock, Tyler and Gantz, 1999). Children who seem to acquire the most benefits from their implant are those who lost their hearing some time after the first few critical months of life (Tait and Lutman,

1995; Vermeulen, Beijk, Brokx, van den Borne, and van den Breok, 1995) and those who received their implants at very young ages (Waltzman, Cohen, Gomolin, Green, Shapiro, Brackett, and Zara, 1997). Although there is evidence that many students continue to enhance their understanding of the world around them with signs in addition to their implants (Spencer, Tye-Murray, Tomblin, 1998), no studies have looked at the combined influence of implants and sign on communication development. As with spoken and signed language studies, comparison between the two dominate the literature rather than looking at the ways in which multiple pathways to language learning might enhance one another.

Summary

The questions of which mode of communication, oral or sign, and which placement, separate or mainstream, are most efficacious for a child who is deaf or hard of hearing were posed at the beginning of this paper. The answer to these questions is that they cannot be answered. All children are different, and all family constellations have unique needs and challenges. The citizens of this country are becoming more diverse with disparate needs. The answer to whether the oral approach is the right approach is: Yes, for some children. The answer to whether sign language is the right approach is: Yes, for some children. The same holds true in answering questions regarding placement. All available placement options currently in use are right for one child or another. But until we change the questions, we will continue to be frustrated by the answers. This paper attempts to present the case that we should be combining efforts and approaches, not eliminating them. The question needs to be: How do we get quality, early concept and language access to all children who are deaf and hard of hearing, not just to those who are traditionally advantaged?

Two reports are scheduled to become available in the next several months that should be of interest relative to the questions posed. In 1993, the NIH announced a request for proposals to study approaches to intervention for deaf children of hearing parents. That grant was awarded to the University of Colorado (Contract No. N01-DC-4-2141) and is still ongoing. This proposal was for a multi-year contract to gather data and develop a literature review on effective approaches to intervention in deaf and hard of hearing children. The grant is scheduled to expire July 31, 2002, at which time a final report will become available. Second, the final report of *The Star Schools Engaged Learner Project, Critical Pedagogy in Deaf Education: Teachers' Reflections on Creating a Bilingual Classroom for Deaf Learners* (Nover, Andrews, and Baker) is due to the U.S. Department of Educational Research and Improvement in September 2002. Together, these projects represent different points along the continuum, yet, together, they hold potential for clarifying new perspectives on services to children who are deaf and hard of hearing. The answers to the needs of children who are deaf and hard of hearing lie in innovations such as these and in continuing to ask better questions.

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