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AN ABSTRACT OF THE DISSERTATION OF William L. Nicolay for the Doctor of Education in Educational Leadership presented May 17, 1989

Title: The Use of Efficient Information Systems for Information Acquisition by the Hearing Impaired: A Case Study

APPROVED BY THE MEMBERS OF THE DISSERTATION COMMITTEE:

John D. Lind, Chair

Judith Edwards Allen

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Roderic Dimon

This paper presents an exploratory case study focusing on the acquisition of information, through technologically efficient systems, by

the hearing impaired. The multiple-case study was conducted during one school year with seven students participating at various times. Application of emergent technologies in the hearing impaired classroom may offer a way to increase the rate of knowledge acquisition.

As stated above, this study is exploratory in nature and, while a central question and propositions derived from that question guide the data collection and analysis, is a hypothesis-building activity. The purpose of the study was to generate questions to focus further research of a descriptive or explanatory format.

One question, and the propositions generated by it, dominated this research:

How do efficient acquisition systems in the classroom effect academic and social behavior, independent activity choices, or student, peer, and adult expectations?

Three propositions directed the data collection / analysis of this research.

As knowledge increases in students:

- the rate of academic production will increase
- times of independent activities will be focused on productive projects
- self-concept will improve as measured by students, peers and significant adults

Six sources (documents, physical artifacts, archival records, interviews, direct observations, participant observation) were used to gather data for the analysis of the research project

The results of this study showed that the students who had only the disability of hearing impairment had significantly different experiences throughout and at the end of this study than those who evidenced intellectual impairments. Generally, their work output was greater, increased more, and reflected a qualitative change.

The data gathered from the unstructured activity periods also clearly show a dissimilar behavioral pattern. The hearing impaired students "grew" into increasingly more productive (in terms of thinking activities) behaviors while the other group showed, for all practical purposes, no change at all.

The analysis of the third proposition was more problematical. The findings are not as clear as the first two propositions because the reporting and recording of data was subject to more interpretation. What indicators there are would support the proposition that increased learning has a positive effect on self-image.

Each of the hearing impaired students showed indications in all areas of cognitive growth. Whether it be output or attitude, their behaviors differed significantly from the others in the study. Both averages and anecdotes testified to schema-building processes.

The results from this study carry with it some implications for current educational practices in classroom of hearing impaired:

- Computer and video technology need a directedness not now evident. Purpose, developed through small research projects, in

terms of specific programs and styles of implementation, should guide classroom applications.

- Placement decisions, which have a profound effect on the make-up of the classroom, should be influenced by new information on expectations and achievements of the various populations served.
- More sophisticated technology should be placed at the disposal of the classroom teacher.
- Mainstreaming considerations should also be carefully considered by all the professionals involved to prevent disasters in self-concept and academic growth.

THE USE OF EFFICIENT INFORMATION SYSTEMS FOR
INFORMATION ACQUISITION BY THE HEARING IMPAIRED:
A CASE STUDY

by

WILLIAM L. NICOLAY

A dissertation submitted in partial fulfillment of the
requirements for the degree of

DOCTOR OF EDUCATION
in
EDUCATIONAL LEADERSHIP

Portland State University
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TO THE OFFICE OF GRADUATE STUDIES

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It isn't that they can't see the solution. It is that they can't see the problem.
- G.K. Chesterson

The truth is more important than the facts.
- Frank Lloyd Wright

Do not always assume that the other fellow has intelligence equal to yours.
He may have more.
- Terry-Thomas

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For crying out loud, gentlemen! That's us! Someone installed the one-way mirror in backward!

Even when a group of exceptional children can be identified as having similar characteristics, educational needs among members vary extensively. In the area of the hearing impaired, for example, preciseness is possible in measuring hearing loss if a person elects to use degree of hearing loss as a major definition criterion; however, the needs of children still vary, since children of the same age and level of hearing have differing language development, academic performance, social skills, and physical development levels. Variability is even greater in other categorical areas which are more difficult to define, such as the emotionally disturbed and learning disabled. (Meyen, 1978, page 50)

CHAPTER I

DESCRIPTION OF THE PROBLEM

INTRODUCTION

This paper presents an exploratory case study focusing on the acquisition of information through technologically efficient systems by the hearing impaired. These "systems" include video tape and film, cable television, and computers.

The study was done in the school year 1987-1988 in a special education classroom in the Vancouver School District, Vancouver, Washington. There were five to seven children included in the study at various times (one came in mid year, two left early). Each student, as will be seen in the following report, was considered a separate case.

The emergent technologies (both in electronics and learning theories) have generated new information and theoretical questions about knowledge acquisition. This new information comes at a time when researchers are looking at assumptions that have been made about learning and language acquisition in the hearing impaired. Most of the current research (King, 1985; Meadow, 1980; Quigley, 1984; Rogers, 1983; Schirmer, 1985) indicates that, given the absence of other disabilities, hearing impairment alone does not preclude normal cognitive functioning. The tremendous lack

of achievement by the hearing impaired in school as measured in reading and language scores may be due more to methodology than etiology.

Work by those outside the world of hearing impairment also gives support to a more positive approach and raised expectations of the hearing impaired student. Ginzburg and Oppen (1969), in a book about Piaget, state:

While not denying that language is an important human acquisition or that internal speech sometimes controls behavior, Piaget feels that logical thinking is primarily non-linguistic and derives from action. (Page 171)

Also it has been found that deaf children, for whom language is lacking or minimal, are capable of classification once they reach a certain age. Therefore, classification and other kinds of thinking are not fully dependent on language. (Page 172)

All else being equal, most children arrive at school with a great deal of information, most in categorical or attributable format (ducks fly and quack, Macintoshes may be apples or computers), some of it heuristically coded. What teachers do (in some part) is manipulate and use this readiness to accomplish established goals. Hearing impaired children typically do not come so prepared. Much of what the teachers of hearing impaired need to do is to provide both the readiness and its manipulation at the same time. A need for efficiency is indicated.

Application of emergent technologies to the hearing impaired student offers tremendous promise. Using efficient systems to increase the rate of acquisition of information will allow more time for other activities. This study looks at this possibility.

STATEMENT OF PROBLEM

The Moores' (1982) quotes (below) present a problem to educators of the hearing impaired. Simply stated, hearing impaired do not differ from the normal population in cognitive abilities, but hearing impaired achieve at a much lower level than their hearing counterparts in our schools.

This research project was originally conceived as an exploration of the cognitive processes of hearing impaired students and the effects of technologically efficient information systems on acquisition, storage and retrieval of information within the classroom. So, given that, a statement needs to be made about knowledge acquisition and the hearing impaired.

This research project is based on a theory of cognitive development. That is, that the acquisition, storage and retrieval of information is a cognitive process; that "structures", or schemas, exist in the brain that store information in meaningful ways; that accessing these structures aid in understanding new information and; that the more information structures that are developed the more perspectives (levels of thought) will be manifested.

Knowledge (in the broad sense, general information) is not gained by hearing impaired children in a manner similar to normally hearing children. Moores (1982, page 108) speaks of language acquisition for linguistically normal children as learned "in a consistent, relaxed, almost unconscious manner." The auditory channel allows early mastery of the sound and sense of language. This "sense" of language comes from many sources. Examples of

this type of semantic and syntactic development would be television or radio programs and conversations (either taken part in or overheard). Hearing impaired children do not have access to this information except through some process of direct acquisition/instruction. This creates a profound knowledge deficit that is manifested in academic delays and failures during the school experience.

Perhaps it is best to quote Moores (1982) at this point because in two statements he conceptualizes the dissonance for educators of the hearing impaired:

The available evidence suggests that the condition of deafness imposes no limitations on the intellectual capabilities of individuals. In addition, there is no evidence to suggest that deaf persons think in more "concrete" ways than the hearing or that their intellectual functioning is in any way less sophisticated. As a group, deaf people function within the normal range of intelligence, and deaf individuals exhibit the same wide variability as the hearing population. (page 137)

The incontrovertible evidence - an endless stream of children pouring out of programs for the deaf unable to read at the fifth-grade level, unable to write a simple sentence, unable to speechread anything but the most common expressions, and unable to speak in a manner understandable to any but their immediate family - stands as stark testimony to an inability, or unwillingness, to come to grips with the generic problems of individuals with severe auditory deficits.

The first of these problems deals with such individuals' difficulties in mastering the language of the larger society in which they live and the effects of the resulting communication limitations on the many aspects of their development. A second, obviously related problem is the insensitivity of hearing individuals toward the impact of early severe hearing loss and the debilitating ramifications of such a lack of empathy. (Page 2)

We, whether as teachers or administrators, are faced with the very real possibility that the "problem" of academic failure of hearing impaired students may not be the hearing impairment, but the inadequate nurturing and education they receive.

It should be noted that since the original proposition and the start of the research project the classroom composition changed with the addition of two students who did not evidence any sign of a hearing deficit. Both of these students (detailed in chapter III) had been documented (by a Multi-Disciplinary Team) as mildly mentally retarded (along with other exceptionalities). It was decided to include these children in the study because two of the original students also evidence mild retardation and information gathered may clarify questions about hearing impairment, retardation and their interaction.

PURPOSE OF STUDY

Certainly a solution to this "problem" in hearing impaired education (especially where there is no evident cognitive damage) is to efficiently provide information for the schema-building process. If a deficit of experience is assumed to be part of the problem then systems to provide experience and opportunities to deal with that experience within the school environment would be helpful.

This study is exploratory in nature and, while a central question and propositions derived from that question guide the data collection and

analysis, is a hypothesis-building activity. Following Yin's (1984) case study research method, this is a form of explanation-building used in exploratory research. It allows for adaptation during the study so that a data collection link is always tied to the original propositions.

This study will observe, after a two month base period, technological applications across the curriculum. Although computer usage will predominate, the video media will also be applied. The study will note the effect of these applications on the schema-building process.

SIGNIFICANCE OF THE STUDY

This study, because of its exploratory nature, will hopefully provide indicators for explanatory-based case study research in the future. Efficient systems applications are new to all of education, not just hearing impaired. The effects of these applications on learning, on the whole of the cognitive process, still remains to be seen. This research arrives with a set of assumptions and propositions, but, because of the structure and the open-endedness of the data collection and analysis, other possibilities may surface. It is either the early confirmation or refutation of these assumptions that will give significance to this work and point the way for other studies.

DEFINITION OF TERMS

Three terms, presented below, will aid the reader in conceptualizing the focus of this work. Other terms (e.g., learning disability) are defined within the body of this paper.

Hearing Impairment: While the research section in this study on hearing impaired is titled "Deafness", the term hearing impaired is much more inclusive. This term, as used in this paper, indicates those children in our school systems for which the loss of hearing in either one or both ears has educational ramifications. Certainly, there has never been an argument that deafness does not have serious implications for education, but as the hearing loss becomes less many disagreements arise. The definition does not argue the form (such as decibels on an audiogram, aided or unaided) but the function. If a child has any loss that precludes normal information acquisition auditorially then that is a functionally hearing impaired child.

Efficient (Information) Systems: For the purpose of this study, efficient information systems are computer hardware and software applications and video devices (e.g., VCRs) that provide a means for a classroom teacher to present information relevant to a student's educational needs in a manner more efficient than in the past. The purpose of the applications is to provide more information quicker thus providing other time in the school day to work on applying and generalizing this information and building within the student more cognitive schemas.

Cognition: This term can get you in even more trouble than defining hearing impairment. As used here, the term refers to all the processes by which sensory input is transformed, reduced, elaborated, stored, recovered, and used. Information processing, heuristic skills and schema-building or memory constructs are central parts of the cognitive process.

LIMITATIONS

This case study is exploratory, the subjects are not a microcosm of all hearing impaired classrooms, and the propositions are generated from subjective assumptions made by the researcher. For these reasons the interpretation of this study must be seen not as definitive, but indicative. It is a "first step" research project that can point the way to more encompassing studies. The sample was small and reflective of the variability of special education classrooms in small to mid-size school districts. The groupings are rarely homogenous and so literal replication would be difficult. Obviously, replicating this study with a larger sample would be helpful to broaden the implications of the results.

SUMMARY

Despite evidence that hearing impairment does not by itself prevent normal cognitive growth and development, clearly there is nothing to

indicate that this is the expectation in any of our state and public classrooms for the hearing impaired. New technologies may help to change this. Emergent systems and theories in information processing offer an opportunity to classroom teachers to implement strategies to change the achievement levels of hearing impaired students. The following research is an exploratory case study focusing on this possibility.

A child miseducated is a child lost.
- John F. Kennedy

The secret in education is respecting the pupil
- Ralph Waldo Emerson

What we want is to see the child in pursuit of knowledge,
and not knowledge in pursuit of the child.
- George Bernard Shaw

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People who don't know which end is up

Ironically, it is not deafness or the secondary physical problems associated with it which are the primary causes of severe handicaps among the deaf adults. Instead the primary causes are the counselling and programming provided by professionals in speech pathology, education, audiology, medicine, psychology, and other specialties in the field of deafness.

Thus, we have in the majority of deaf clients individuals whose primary disability is not their deafness. It is the gross educational, psychological, and social deprivation forced on them by anachronistic parent counseling followed by an educational system equally inappropriate, both of which are promulgated by professionals insensitive to and unaware of the needs of deaf people and oblivious to existing research data in deafness. (Vernon, 1971, P.10)

CHAPTER II

REVIEW OF THE LITERATURE

DEAFNESS

Reviewing the research on deafness, one is struck by the profound effect various theorists have had on the lives of deaf people down through the ages. Perhaps more than any other discipline in the humanities, the gurus, saints and charlatans in deaf education have prescribed a life and culture for literally thousands of people, a culture of desperate and inescapable dimensions.

This section will not address the historical and cultural issues not germane to the task at hand; however, as with most research, a glance into the past shows more clearly the present. Rene Descartes in *Discourse on Method* said in 1637:

On the other hand, even those men born deaf and dumb, lacking the organs which others make use of in speaking, and at least as badly off as the animals in this respect, usually invent for themselves some signs by which they make themselves understood by those who are with them enough to learn their language.

Carroll in *Language and Thought* said the following in 1966:

.....deaf children without language can acquire concepts, compare magnitudes, remember sequences and associations,

and solve simple problems involving forms, colors, and the like. These performances are generally well above the level of cognitive functioning than can be secured by primates. (Page 118)

Animals and primates! So much for 300 years of enlightenment! ¹

The twentieth century has witnessed the greatest technological and social changes in history. Perceptions of the intelligence of the deaf have also been altered. As they say, the times they are a-chang'n. A brief look at the developments of the twentieth century highlights this change.

In the 1940s. Pinter held center stage. He, and others, reviewed all available data on the deaf and concluded that deaf children were inferior in intelligence to hearing children. He said the average retardation was about 10 IQ points.

In the 50's, Myklebust did his own review and concluded that the deaf were not inferior to the hearing in intelligence, at least not quantitatively. He qualified this however by saying the deaf were qualitatively different and that deafness did not just effect the hearing, but also the whole being of the deaf person.

Finally, starting in the 60s, and primarily generated out of the work of Furth, deaf people were seen as equal intellectually. The differences in their functioning was attributed to cultural, environmental and educational causes. Moores (1982) stating that Furth even asserted that:

although deaf children receive inadequate instruction in English, speech, and school subjects, and although their parents are miscounseled and misled; and although they face prejudice,

¹So pervasive were the attitudes that the first school established for the deaf in Washington Territory (in Yancouver, 1866) was called the Washington School for Defective Youths and the students were referred to as inmates.

distrust, and discrimination - in spite of all this - the majority of deaf individuals make an adequate adjustment to the world.
(Page 132)

In late sixties and seventies statements began to appear on a regular and acceptable basis about the cultural needs and identity of the deaf (Rainer & Altshuler, 1967). Broader issues were also coming out into the open in the late seventies and early eighties. Streng, Kretschmer and Kretschmer (1985) stated:

If Piaget is correct in proposing that cognitive growth is independent of language, it seems safe to assume that children born with severe or profound hearing deficits would exhibit the same cognitive characteristics as normally hearing children,
(page 31)

Rogers and Sloboda (1983) took on one of the greatest myths about deaf people, one that can be traced back at least as far as Descartes. They said it is:

clear that we cannot regard the deaf as natural control group of people without language. We must rid ourselves of the notion that general theories of symbolic functioning can be tested simply by looking to the deaf as a population lacking linguistic capabilities. (page 188)

Later on in their book they concluded that various evidences they had presented "suggest that the cognitive processes underlying linguistic development are common to deaf and hearing people" (page 191)

In the early eighties, Savage, Evans and Savage (1981) and Meadow (1980) both wrote that perhaps the types of tests given, the procedures used, may have been enough to invalidate any conclusions drawn from them.

Linguistic considerations were stressed by both authors and a conscious effort was extended to separate linguistic and cognitive functioning.

Stephan Quigley is presently one of the leaders in research in deaf education and his books with Paul in 1984 and King in 1985 offer prescriptives to overcome real, but unnecessary differences in the functioning level of the deaf. After stating that whatever differences might exist in intellectual or cognitive functioning between deaf and hearing people was not significant to prevent adequate functioning, he concluded:

educational, occupational and other deficiencies in deaf people are the result of our present inability to fully help deaf people develop and use their abilities rather than the result of any inherent deficiencies in those abilities. (page 11)

Finally, Schirmer (1985) continues this descriptive theme with the conclusion that deaf and hearing language development is the same (the deaf only being delayed) and that the deaf's

language curricula should parallel normal language acquisition in at least three important ways: curricula should incorporate all components of language, hearing impaired children should be immersed in a language-rich environment, and these children should be given the freedom to use nonadult forms." (page 17-18)

We now have travelled all the way. From deaf people being somewhat like animals and primates to deaf people being like us. In the research, even as we look at the latest writings, language always is the cornerstone for development of the deaf. While important research has shown that cognitive

abilities are intact in the deaf and that language is not necessary for concept formation the emphasis still remains on language. This is probably so because, in spite of the fact that reams have been written on cognitive process (see section on cognition) little is still understood.

If you scoff at language study . . . how, save in terms of language, will you scoff?

- Mario Pei

Many people have played themselves to death. Many people have eaten and drunk themselves to death. Nobody ever thought himself to death.

- Gilbert Highet

Men . . . employ speech only to conceal their thoughts.

- Voltaire

Big Bob says he's getting tired of you saying he doesn't really exist.

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Nothing yet ... How about you, Newton?

"... the enormous range of problems confronting investigators of human cognitive activity requires a commensurate range of types and levels and theories. No one of the current approaches - information processing, psycholinguistic theory, associative coding theory - can be sufficient by itself. One reason is that the structural and organizational properties of memory are manifest in quite different ways at levels of analysis. Owing to our inability to comprehend all aspects in a single manageable formalism, we find ourselves working with a number of different bodies of theory, and a particular investigator's choice of plots in this array depends on both his theoretical predilections and empirical problems he happens to be addressing. (Estes, 1982, page 213)

COGNITION

Researching and presenting any cogent reports about the discipline of cognitive science is beyond the scope of this paper. Some of the issues in cognitive science that have individually taken up shelves at libraries are: attention, perception, memory, information processing, imagery, language and cognitive development. All are relevant to this study, but since language and cognitive development has been the historical issue in deaf education that will be the focus here.

It should be noted that language development of the deaf has not been an important factor in the growth of cognitive psychology, usually receiving little notice in the works of those instrumental in the development of this new science. Norman's book *Memory and Attention* (1969), which was an important early work in this area, devoted most of the chapter on acquisition of information to speech and hearing channels.

What have the cognitive psychologists said about thought and language? Not surprisingly, like all major disciplines, almost every position has been taken. In 1969 Bruner (another important theoretician of the cognitive movement), in *On Knowing*, said:

But language learning is also concept learning, and the price one pays for the gift of language is that one also learns to operate in terms of the concepts that are codified in a language - all the concepts of relationship, of modification, of cause and effect. I am not supporting the so-called strong form of Whorf's hypothesis - that language ineluctably molds the shape of thought - but rather the weaker form which holds that language

predisposes a mind to certain modes of thought and certain ways of arranging the shared subjective reality of a linguistic community. (Page 165)

By 1983, his views had certainly not softened. In fact he was on one side of what has become a critical issue in the late 1980's, namely the work of Chomsky and others on transformational grammar and the importance of the language's structure (syntax) as opposed to meaning (semantics). In *Search of Mind*, Bruner said:

Then there were Lev Vygotsky and Benjamin Lee Whorf. Theirs was the next step beyond the banality that language influences mind and thought. Theirs was the claim that language must influence, must even shape thought - language not just as narrative or label but as a system for cutting up the world into categories and relations by virtue of grammar and lexicon. (Page 306)

Wilson (1980) was writing and exploring an almost opposite view.

There is abundant evidence that semantic factors play a more important role in the form of sentences retained in long term memory than do their syntactic structures. An analysis of parsing indicates that syntax is quite secondary to semantics but that syntax does play an important role in generation of sentences. In view of all this, it is hard to understand how Chomsky, and his followers, can make such strong psychological claims on the basis of largely syntactic regularities. It seems clear that all plausible psychological models of language users must have a strong emphasis on semantics. (Page 137)

This appears at this point to be a major crossroads for those educators of sensory impaired; that the sensory impairment will not in and

of itself cause cognitive impairment; that the cognitive structure, lying intact, would retain all its semantic abilities and; that, given adequate instructional and communicative techniques, normal knowledge acquisition, retention, recall and use would be expected.

Before changing the focus a little, one final word by Jerry Fodor (1975) also provides hope that sensory impairments, if unaccompanied by cognitive injury, might be less of a determinate for failure:

My view is that you can't learn a language unless you already know one, it isn't that you can't learn a language unless you've already learned one the language of thought is known (e.g., is the medium for the computations underlying cognitive processes), but not learned. That is, it is innate. (Page 65)

The cognitive psychologists both ask for and give support to people involved in many other disciplines. Hence, there is more talk of a cognitive science made up of psychologists, linguists, anthropologists and neurobiologists to name a few. The Mind's New Science by Gardner (1987) and Mind Design edited by Haugeland (1981) look at many of the issues developing in cognition by persons other than psychologists. Artificial intelligence, intentional systems, linguistics and neuroscience are areas being examined by a variety of disciplines. It is interesting to note the struggle in the computer-mind paradigm between what is thought and what is language.

Jason Brown (1977) in his book on neurological disorders speaks of cognition being elaborated through language and Gazzangia (1984) concludes one section on language and cognition by saying that language is the means of reporting mental computations, but is not the system for carrying out

these activities. Both of the sources adhere more to the scientific model, but support there being two independent systems, thought and language.

The work of the neuro-biologists has provided a great deal of information on the structure and operation of the brain. This information has been reported in medical books, popular paperbacks, journals and even the Reader's Digest. Scientist have provided us with very discreet information, such as:

When a word is heard, the sound is initially received in the primary auditory cortex, but the signal must pass through the adjacent Wernicke's area if it is to be understood as a verbal message. When a word is read, the visual pattern (from the primary visual cortex) is transmitted to the angular gyrus, which applies a transformation that elicits the auditory form of the word in Wernicke's area. (Scientific American, Page 113)

Smith (1984) noted that:

What is intriguing, particularly in a book dedicated to the brain, is that the sense organ itself, whether eye or ear, is much more frequently the cause of sensory defect than the cortex or other nervous tissue. The brain seems to have a resilience which mere lenses, tympanic membranes, cochleas and corneas do not. They fail, frequently. The brain, or so it seems, will continue to interpret, analyze, comprehend and decipher what comes its way. (Page 386)

The explorations of science, whether in computer research, physiology or neural-biology, have not shown that there is a necessary relationship between dysfunctional sensory organs and abnormal cognitive functioning. Most of what is shown assumes an adaptability of our cognitive processes to the external world.

The mind and brain are wondrous systems. They are at once autonomous and dependent; they are ever-adapting and predictable. The senses, man's contact with the physical world, seem to play a critical role in the successful survival and evolution of our brains and of man himself.

And yet..... this autonomy, this adaptability may indicate that that which appears to be real (e.g. , that deaf children have always suffered cognitively despite the best of instruction - which indicates some "lesser-ness" about them) may only be cultural, learned and restricted.

Big Bob and the Apple on the first page of this section are the truth. Sometimes it grabs us out of our chairs; sometimes it hits us on the head. And sometimes, after it has done one, or both, of those, we deny it. The latter appears to have been the practice of both teachers and administrators in special education. We need to be tuned to the world of research so that when truth is there we recognize it.

Do what you can, with what you have, where you are.

- Theodore Roosevelt

Society attacks early when the individual is helpless.

- B.F. Skinner

Everyone is the Child of the past.

- Edna G. Rostow

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The picture's pretty bleak gentlemen....
The world's climates are changing, the mammals
are taking over, and we all have a brain about
the size of a walnut.

In most instances the educable retarded child is not known to be retarded during infancy and early childhood. His retardation and growth in mental and social activities can be noted only if observed closely during the preschool years. Most of the time the growth is normal and his retardation is not evident until he shows poor learning ability in school. In most instances there is no obvious pathological conditions that account for his retardation. (Kirk, 1972)

OTHER HANDICAPPING CONDITIONS

This section of research takes a brief look at the two other handicapping conditions present in this case study: Orthopedic impairments (specifically cerebral palsy) and mental retardation. Mental retardation is presented as existing without other conditions present and coupled with a hearing impairment. The perspective, of course, is what these exceptionalities have on cognitive functioning.

Orthopedic and Neurological Impairments

A neurologically impaired individual is one whose handicapping condition is due to lack of complete development or injury to the central nervous system.

Cerebral palsy (cerebral=brain, palsy=motor disability) refers to a motor disability caused by a brain dysfunction.

Kirk (1972) points out that an "important point to remember is that a brain damage which results in the motor disability called cerebral palsy can also cause language, speech, writing, and other disorders." (page 352)

The United Cerebral Palsy Research and Educational Foundation pamphlet states that "In addition to motor dysfunction, cerebral palsy may include learning difficulties, psychological problems, sensory defects," (page 353)

"May" needs to be the operative word here. Kirk (1972) concludes the discussion on cerebral palsy by saying, "There is actually little direct relation between intelligence and degree of physical impairment in cerebral

palsy. An individual with severe writhing or uncontrolled spasticity may be intellectually gifted while one with mild, almost unnoticed physical involvements may be severely mentally retarded." (pages 359-360)

Pre-natal neurological damage resulting in cerebral palsy would not necessarily result in cognitive dysfunctions, nor in any form or degree of retardation. Retardation could be present in the same individual because of the same etiology as the cerebral palsy or for other unrelated, and unfortunate, reasons. For instructional purposes, however, the neurological insult need not be addressed as much academically/cognitively as physically, such as the use adaptive technological devises.

Finally, because brain dysfunctions due to developmental deficiencies or damage can manifest themselves in non-cognitive aberrations when they are present in an individual with another handicapping conditions that do effect cognitive functioning (such as retardation) the result may be only additive and not multiplicative. That is, the physical impairment may add barriers to remediating the mental impairment, but not interact in such a way as to create a learning style unlike a non-physically impaired mentally retarded child. (This argument will be reversed in the section dealing with mentally retarded deaf.)

Mental Retardation

Reams of paper could and have been used in discussions of mental retardation. For the purposes of this paper the cognitive abilities and poten

tialities of the mildly retarded (55-70 IQ, also referred to as the educable mentally retarded) will be the focus.

Definitions seem at times to highlight differences rather than spotlight agreement, however a broad definition of mental retardation that seems to satisfy most of those concerned refers to mental retardation as subaverage general intellectual functioning (as measured by standardized intelligence tests) existing concurrently with deficits in adaptive (social) behavior, and manifested during the developmental period (up to age 18). Kirk (1972), Meyen (1978) and Moores (1982) have definitions that contain these essential points.

Again, the focus is on significantly subaverage general intellectual (cognitive) functioning. What expectations can be reasonably held for these students in our educational system? In general, the mildly retarded child has potentialities for development of (1) minimum educability in the academic subjects of the school, (2) social adjustment to such a point that (s)he can get along independently in the community, and (3) minimum occupational adequacy to such a degree that (s)he can later support himself partially or totally at the adult level. In terms of intellectual and academic characteristics, Kirk (1982) states:

The mildly mentally retarded child performs poorly on verbal intelligence tests. His IQ tends to be in the range from 50 or 55 to 75 or 80. This implies a rate of mental development approximately one-half to three-fourths that of an average child.

Retarded mental development may include slowness in maturation of specific intellectual functions needed for school work, such as being significantly low in memory for auditory and visual materials, generalizing ability, language ability,

conceptual and perceptual abilities, imagination and creative abilities, and other functions considered basically intellectual.

The educable mentally retarded child is not ready for reading, writing, spelling, and arithmetic when he enters school at the age of 6 unless he has special abilities. He does not begin to acquire these skills until he is about 8 years old or even, perhaps, until he is 11. This delay in learning is related to mental age, not to chronological age.

The rate at which the child progresses in school is comparable to his rate of mental development, that is, about one-half to three-quarters the rate of the average child. He should not be expected to cover a year's material in a year's time, as do average children.

At the end of his formal school career his academic achievement will probably have reached second- to sixth-grade level, depending upon his mental maturation and/or special abilities. (Pages 195-196)

Though these descriptions are somewhat simplified and certainly don't take into account the strengths of individuals, the indications that the primary effect of mental retardation is impaired cognitive processing are inescapable. Education strategies in general include a narrowing of both the scope and sequence of the activities of a regular education classroom.

Mental Retardation and Deafness

It is all too common to find children with multiple handicaps. Injury, biological or environmental situations, can cause many individuals identified as having a particular handicapping condition to actually be suffering from multiple physical and mental handicaps. Deafness or hearing impairment is often accompanied by other exceptionalities, mental

retardation being one of the most common. Moores (1982) offers an excellent summation of the educational ramifications of this multiple condition:

The problems of an individual who is both deaf and retarded are not additive. They cannot be understood as representing the sum of the problems of deafness plus retardation. Instead, the deafness and retardation interact in a multiplicative way, presenting unique, qualitatively different patterns. Just as the problems faced by a deaf retarded individual differ from those of a deaf person or a retarded person, the training and qualifications of professionals working with the deaf retarded must be qualitatively different from those working with the deaf or with the retarded. (page 286)

This multiplicative interaction is critical to the success of any educational or remedial program. The child is not the sum of his/her handicapping conditions, but its' product. As stated in the previous research section on deaf education, deafness has historically been viewed as creating a "cognitive" problem. Couple this with an intellectual dysfunction as severe as mental retardation and the expectation and achievement level of the student plummets.

Learning Disability

Because one of the students in this study has been funded in a specific learning category and functionally seems to manifest none of the characteristic behaviors of the other students, the following definition from Kirk (1972) provides the common ground in statements about specific learning disabilities:

The learning problem should be specific and not a correlate of such other primary handicapping conditions as general mental retardation, sensory handicaps, emotional disturbance, and environmental disadvantage.

The children must have discrepancies in their own growth (intraindividual differences) with abilities as well as disabilities.

The deficits found in a child must be of a behavioral nature such as thinking, conceptualization, memory, speech, language, perception, reading, writing, spelling, arithmetic, and related abilities.

The primary focus of identification should be psychoeducational. (Page 44)

Our present society has one motto: "There is a light at the end of the tunnel." I believe that the motto of our groundshift should be: "There is darkness at the end of the light."

That darkness is rich. It is the absence of light. It is the presence of imagination.

- From *Through the Computer Darkly* (Coppola)

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"Well, I've got your final grades ready, although I'm afraid not everyone here will be moving up."

But what the computer can do as a condition of thinking, as a question of consciousness, indeed, as a new metaphor for discovering the emotional expressions, the philosophical expressions of the human in a relationship to a network of possibilities, is yet to be discovered. Or, rather, that the act of discovery in the ground of the computer is yet to happen. In this sense, the computer is not a tool. It is not even a prosthesis of the human ability to compute. It is an environment. It has the same quality as the natural world in which angles, perspective, light and shadow, chiaroscuro, patterns and forms, and structures can be discovered. (Coppola, page 9)

COMPUTERS IN EDUCATION

The early and obvious problem with researching computer-based instruction (and other of the new technological applications) is the lack of both definitive and longitudinal studies. Many of the studies are anecdotal in nature and are not typical of systematic, scientific studies usually required to base descriptive and predictive statements.

Notwithstanding this limitation, many of the early studies appearing in professional journals and textbooks confirm observations and experiences made by the "users" of computer instruction, namely, teachers.

The following four points are offered as an overview of current research in computer applications in early writing and reading activities. They are taken from Apple Learning Series: Early Language produced by Apple Computer, Inc.

1. For young children, learning to write is easier and more enjoyable with computers than with pencil and paper.

- Young children can strike keys on a keyboard more easily than they can form letters by hand. Hence, computers encourage children to engage in the mental activities associated with writing instead of diverting their attention to forming letters with pencil and paper. (Daiute, 1985; Anderson et al., 1985)

- Young children writing with computers can make changes quickly and easily without sacrificing neatness. Children who wrote two stories, one by hand and the other on the computer, made many fewer errors using the computer. When the same children redid their handwritten and

computer-written stories, the handwritten versions had many new mistakes, while the computer versions were virtually without errors. (Levin et al., 1984)

- Computers attract and hold attention of young children, which makes writing more enjoyable for them. As a result, children using word processing have positive attitudes towards writing. (Bruce & Rubin, 1984; Shade et al., 1986)

2. Computer-assisted writing enhances the quality of children's writing, and reinforces social skills.

- When students write with computers, they are more likely to interact during the writing process. Students working in pairs tend to read and discuss each other's writing. As a result, they articulate plans, revise more, and consider more alternatives, which leads to higher-quality writing. (Mehan, Maroules, & Drale, 1985; Bruce, Michaels, & Watson-Gegeo, 1985; Dickinson, 1986)

- Preschool children working on computers for several weeks shifted from self-centered actions to peer-oriented helping and teaching actions. (Shade et al., 1986)

- An important first step in learning to communicate through writing is to develop a sense of audience. The easy accessibility of computer-assisted writing, through both printed output and disk files, increases the audience of student writers. This gives students a stronger sense of purpose in their writing. (Bruce, Michaels, & Watson-Gegeo, 1985; Rubin & Bruce, 1985)

3. Children can substantially improve their writing with computers.

- When children write with computers instead of pencil and paper, they:

- Write longer compositions
- Write more often
- Make fewer mistakes
- Are more likely to revise their work
- Produce higher-quality writing

(Reil, 1985; Levin et al., 1984; Bruce & Rubin, 1984)

4. The benefits of computer use in early language development depend on the learning environment created by the teacher.

- Computers are a supplement to writing instruction, not a replacement for it. Learning occurs when teachers integrate the technology with sound instructional strategies. Teachers need to guide students by modeling revision strategies, encouraging students to take risks, and providing feedback on their writing. (Balajthy, McKeveny, & Lacitignola, 1986; Reil, 1985; Bruce & Rubin, 1984)

- The benefits associated with using computers in language development depend on how the teacher uses the technology in the classroom. Students' writing improves when teachers (1) organize the classroom to facilitate interactions between students and teachers, and (2) create learning environment that encourage active participation. (Bruce, Michaels,

& Watson-Gegeo, 1985; Bruce, Michaels, & Cazden, 1985; Rubin & Bruce, 1985; Riel, 1985.)

AN ADDENDUM

The bulk of this section on computer education has looked at the practical, the behavioral, aspects of computer. We have talked of kids and teachers and taken a "grasp-able" look at implementation. Concentration on this view of computers surely prevents a discovery of the larger questions and speculations about the future of man and technology.

Recalling Coppola's (1987) statement from the first page that computers are an "environment" rather than a tool, we can detect that there are those out there who are looking at computers from psychological and philosophical perspectives. Haugeland (1981), in his book *Mind Design*, takes this even further:

The basic idea of cognitive science is that intelligent beings are semantic engines - in other words, automatic formal systems with interpretations under which they consistently make sense. We can now see why this includes psychology and artificial intelligence on a more or less equal footing: people and intelligent computers (if and when there are any) turn out to be merely different manifestations of the same underlying phenomenon.

(368)

A great deal of interest and research has been stimulated by computer metaphors in intelligence and cognitive (information) processing. Educational classrooms will be both a laboratory and a beneficiary of this research.

SUMMARY OF RESEARCH

The review of the literature presented above is not inclusive of all the work being done in each of the fields. (That is the safest statement made in this paper.) For example, a great body of current literature indicates that computer programs are not solving all the illiteracy problems in our classrooms. Other areas have also yielded volumes of information that has not been addressed.

The research presented touches upon those issues that concern this present work. The historical assumptions about the effects of deafness, what cognitive theorists are saying about structures and functions of the brain, and the positive effects on appropriately designed computer applications are issues important to the exploration taking place.

Exploration is the key word in developing the research approach. In exploratory case studies the data is open to interpretation. This will be influenced by the assumptions of the interpreter. The review of the literature is also influenced by these assumptions. As Yin says,

Budding investigators think that the purpose of a literature review is to determine the *answers* about what is known on a topic; in contrast, experienced investigators review previous research to develop sharper and more insightful *questions* about the topic. (page 21)

Facts do not cease to exist because they are ignored.

- Aldous Huxley

Get your facts first, and then you can distort them as much as you please.

- Mark Twain

Obviously, a man's judgement cannot be better than the information on which he has based it.

- Arthur Hays Sulzberger

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Of making many books there is no end; and much study is a weariness of the flesh.

Let us hear the conclusion of the whole matter: Fear God, and keep his commandments: for this is the whole duty of man.

For God shall bring every work into judgment, with every secret thing, whether it be good, or whether it be evil.

- Ecclesiastes 12:12-14

CHAPTER 3

METHODS AND TECHNIQUES

INTRODUCTION

In his book, Case Study Research, Robert K. Yin (1984) presents a design model for case study research. He defines a case study as:

an *empirical inquiry* that:

- investigates a contemporary phenomenon within its real-life context; when
- the boundaries between phenomenon and context are not clearly evident;
- and in which
- multiple sources of evidence are used. (page 23)

This methodology lends itself to research work in a classroom conducted by the classroom teacher. The real-life nature is not disturbed and, given the proper link between propositions and interpretation of data, multiple sources of evidence help to separate phenomenon and context.

This case study was a natural progression from the early subjective observations made by the researcher. It was evident that what was being viewed contained significant information about learning styles and abilities in a hearing impaired classroom. On the other hand, "why" questions were not evident. To explore rather than to explain was indicated.

QUESTIONS AND PROPOSITIONS

Since the case study developed for this research was exploratory, the questions posed here and for which the focus of the research remained was not why or how, but what. A change agent, total curricular involvement of microcomputers and other video media, was introduced after a two month base period. Based on this change, one question, and the propositions generated by it dominated this research.

How do efficient acquisitions systems in the classroom effect academic behavior, social behavior, independent activity choices or student, peer and adult expectations?

Three propositions directed the data collection / analysis of this research. They are based on increased information acquisition, storage and retrieval capabilities of the students involved in the research:

As knowledge (cognitive structures) increases in these students:

- the rate of academic production will increase as measured by word output on two selected writing activities.
- times of independent activities will be focused on productive (academic or social) projects as measured by observation of behaviors during an unstructured period each class day.
- self-concept will improve as measured by student, peers and significant adults giving anecdotal accounts during interviews, discussions or conference

Standardized inventories and protocols will not be used because of reliability concerns and their applicability to this population.

This will be a multiple case study as each student will be observed and data collected on their individual activities. The same data will be gathered about each student (see below) so that single- and cross-case interpretations can be made. A hypothesis-generating variation of the explanation-building process used in analysis will be employed. This is used not to conclude a study but to develop ideas for further study.

In the next few pages each student involved in the study will be presented, giving an overview of their placement history, other relevant information, and their present academic functioning. After that, some anecdotal information will be offered to offer clarification as to when and how the room makeup came to be and any interactive dynamics within the student group that shaped the progress of this study.

Name: Terry
Birth Date: 6-17-77
Funding Category: 441
Guardian: Mother

Terry presents a textbook example of people supplanting procedure in special education placement. As will be shown, Terry's placement history in our district has followed the course of most insistence by his mother.

Terry began kindergarten at age 5 years 3 months. He had a poor year, especially noted were group behavior problems, and was retained. He repeated kindergarten in Fall, 1983. By March, 1985 his work was such that he became a focus of concern. He was referred to the multi-disciplinary team (MDT), which consists of counselors, psychologists, nurses, teachers, reading specialists, principals and others who may have interest or expertise, and was found to be mildly mentally retarded. He was placed in a self-contained special education room in May, 1984. He completed the school year and returned to the same classroom for the 1984-1985 school year.

In March of 1985, Terry's mother withdrew him from the special education program (against the district's advice) and he was placed in a regular education room. Within two weeks he was referred by his classroom teacher

to be staffed for a behavior disorder room. Given his past history (plus the consciousness of his mother's attitude) he was given temporary placement in a resource room with a full-time aide. In June of 1985, he was again tested and found to be not mentally retarded, but, in fact, suffering from a hearing loss! (Not surprisingly, this mollified the mother's concern about Terry being classified as mildly mentally retarded. It was obvious that "hearing impaired" was a more acceptable funding category.) He began the 1985-1986 school year in a resource room at his home school. His behavior became so disruptive and his progress so negligible, that in December, 1986 he was moved on the authority of the district's placement facilitator (against the advice of the entire MDT staff who did not view Terry's primary handicapping condition as hearing impairment) to a self-contained hearing-impaired room.

Terry's academic level remains very low. His language and reading abilities remain in the pre-primer / primer level, while math is somewhat higher (2nd to 3rd grade).

Name: Gary
Birth Date: 6-05-77
Funding Category: Multiplehandicapped
Guardian: Mother and Father

Gary's funding category was determined by extensive testing and medical referrals before pre-school placement. Because of cerebral palsy and IQ scores he qualified under Washington Administrative Code to be classified as multihandicapped.

Gary began preschool in a room with mostly mildly retarded students. The district's classroom that contained orthopedically impaired students was inappropriate because the students were more involved mentally. He continued to progress from preschool into the regular self-contained program in rooms funded for mild mental retardation.

Beginning in the school year 1983-1984, Gary began to use sign language as expressive communication (receiving auditorially). This was seen as a positive academic and communication channel because his cerebral palsy prevented him from speaking and the electronic voice output devices were crude and hard for him to use. This training in manual communication continued through the next two school years (including requests by the classroom teacher for extra support services in sign language).

Because he was progressing through various classrooms (all funded mild mental retardation), placement staffings were held each of the next

two academic years. In both of them at least one of the MDT members cautioned against placement in a self-contained room for the hearing-impaired and urged purchasing one of the newer voice output devices. Despite these recommendations, Gary was placed in a classroom for hearing impaired at the start of the 1986-1987 school year. He remains in that class and is still funded multihandicapped.

Gary functions academically at the first grade level in all subject areas. Both his classroom teacher and communications disorder specialist have expressed concern about his regression in the use of English syntax in written communication and feel the more conceptually based sign language usage may be furthering this regression.

Name: Mary
Birth Date: 8-22-76
Funding Category: Deaf
Guardian: Mother

Mary is an eleven-year-old deaf girl whose placement history has been predictable and appropriate. Because of the severity of her hearing loss, services were sought and provided early.

There are indications that medical and audiological services were sought prior to Mary's third birthday, however the first evidence of an educational entity addressing the problem was in November of 1979 when Mary was 3 years 3 months. The school district in the Lacey, Washington area tested Mary across broad areas of intellectual and physical functioning. She was referred by her parents. Mary was found to have a profound sensorineural hearing loss with the expected receptive and expressive language deficits. The intellectual and cognitive tests administered, although not totally reliable because of age and standardization considerations, gave no indications of anything but average functioning.

The next school year Mary moved to her present location and was placed in a room for the hearing impaired. Nothing significant happened in terms of assessments or academic placement until the normal three year reevaluation in April, 1983. During this evaluation the psychologist, who

could not communicate in sign language, found that Mary was functioning on an intellectual level above her chronological range. Despite a few cautions about visual-motor integration, the report showed a child with no significant cognitive problems except deafness. The classroom teacher questioned this assessment because of cognitive difficulties Mary was experiencing in the classroom.

The three year reevaluation completed in June of 1986 indicated results radically different. On the request of the classroom teacher Mary was given the cognitive tests by a psychologist trained in sign language and deaf education. Mary was found to be functioning academically two to three years behind her chronological age. These results were more in line with the classroom teacher's observations and were in part attributed to her home environment which had deteriorated over the years.

Mary was placed in her present classroom at the beginning of the 1986-1987 school year. She continues to be severely academically delayed in reading and language. She is doing math at about the 5th grade level.

Name: Geri
Birth Date: 9-27-77
Funding Category: Hearing-Impaired
Guardian: Mother

Geri's placement history offers another illustration of how support services for a sensory impaired student are not always what they seem. Good intentions can also pave the road to poor education.

Geri began her involvement in special education in a preschool program in an adjacent school district. She was assessed as hard of hearing at the age of three on referral by her mother. She was placed in a half-day program in the 1980-1981 school year. She came to her present placement in September, 1981. She was in a half-day self-contained room for the 1981-1983 school years. The following year (1983-1984) she participated in the self-contained program for one/half day and the regular kindergarten for the other.

Based on her perceived experience in successfully completing the kindergarten program it was decided by the mother and the special education teacher that Geri would be placed in a regular first grade program for the 1984-1985 school year. She completed that year, but her regular education teacher felt that she needed more support in a resource-like room setting. The following year (1985-1986) the self-contained teacher for the primary hearing-impaired served as a resource to the regular education teacher

and progress seemed to be being made, so much so that she was to be placed the following school year in a regular education room without support services.

1986-1987 proved to be a watershed year for Geri and regular education. Her cumulative lack of progress in basic skills, that should have been addressed earlier, had by this time become undeniable. The IEP conference in the spring of that year indicated a desire on the part of the mother for full time hearing impaired self-contained placement because of her concern for Geri's academic progress.

Geri is currently on level in math and approximately one and one-half years behind in language and reading. Her difficulties appear to be caused more by the lack of appropriate instruction than any inherent cognitive or intellectual process

Name: Larry
Birth Date: 6-14-75
Funding Category: Multihandicapped
Guardian: Mother

Larry's placement and medical file indicates that he, at various times, has been diagnosed as hearing impaired, ataxic (cerebral palsy), mentally retarded and seriously emotionally disturbed. He has had a heart operation and has cranio-facial deformities that has led to speech difficulties.

Larry's difficulties began before he was born. While in her sixth month of pregnancy with him his mother required hospitalization for a period of one week because of bleeding and pain. Hospital records indicate obvious problems noted at birth. After birth, and because of the evident physical handicaps and difficulties within the family structure, Larry was removed from his home and placed in a foster home in Oregon. Larry has a brother who is three years older and was at this time evidencing severe emotional problems.

Larry lived in various foster homes over the next two and one-half years. He had extensive medical, audiological, intellectual and behavioral assessments and recommendations. He was found to have mild cerebral palsy, a severe conductive loss in his right ear and a mild conductive loss in

his left ear, an IQ of about 55 and severe emotional problems. He came to be served by the Portland Regional Program for the Hearing-Impaired.

In the Fall of 1983, Larry rejoined his mother in her home and started school in his present location in January, 1984. He was found to be from 3 to 5 years behind in all academic areas in a reevaluation in March, 1985. Since that time he has continued in the hearing impaired program and his three year reevaluation (February, 1988) continues to indicate a child functioning well below his chronological age. Generally he is pre-primer to primer in reading, non-functioning in written language and 1st-2nd in math.

Lest it appears that no good things are happening to this child, a study of the behavioral notes from his first contact with professionals to the present clearly indicates a marked change, from a physically aggressive, disruptive student, to one whose present summary statements indicates a friendly, hugging student.

Name: Carrie
Birth Date: 11-16-76
Funding Category: Deaf
Guardian: Mother and Father

Carrie's inclusion into the world of special education did not begin until she was two years, five months old. Prior to that time she was, by all observations, a normal, healthy child. In April, 1979 Carrie became sick with meningitis and subsequently lost her hearing. Prior to that time she had normal speech and language acquisition.

In June, 1979, Carrie, after having been assessed earlier in the Spring, was included in a early childhood home instruction program sponsored by the University of Washington (The family lived in northern Washington at this time.). This was a model program for hearing impaired infants and their families. The assessments included a full battery of cognitive, behavioral and physical tests that concluded that Carrie was a mentally bright child (Approximate IQ - 125) who had suffered no other ill effects from the meningitis (although there was some concern about vestibular damage that has not manifested itself to date). This program continued through January of 1980. In the summer of 1980 the family moved to southwest Washington and Carrie began her present placement in the Fall of 1980.

She began in this district at age three and has continued in the program until the present time. Her three year reevaluations have indicated a constant pattern of growth with no cautions thrown in by assessment members of the MDT staffs involved. Academically she is at or above her chronological age in all areas and is a strong learner. Socially, because she has always lacked a peer group, she is immature. Suggestions for placement at the Washington State School for the Deaf have been rejected by her parents.

Name: Shari
Birth Date: 10-22-78
Funding Category: Hearing Impaired
Guardian: Mother and Step Father

Shari's personal history has been as critical to her as the hearing loss she suffered pre-natally. Her family was in turmoil at the time of her birth and broke up shortly thereafter. She stayed with her father who eventually moved to Texas where she began her educational experience. Her placements during this time are sketchy at best, but it appears she began in the public school system in a preschool program and at some point attended a state school for the deaf. She was exposed to sign language during this time.

Shari's custody changed approximately two years ago. She moved to Washington to live with her mother and step-father. Whatever personal problems existed apparently have been resolved and the home appears quite stable and healthy. Her current family has never used sign language, but are not against its use in the classroom.

In September, 1986 Shari was placed in her present school. She was assessed as being deaf in her right ear and having a severe loss in her left ear. She was placed in the primary self-contained hearing-impaired room and seemed to be progressing satisfactorily. This school year saw a change in the population of the room from hard-of-hearing/deaf to behavioral disorders and multihandicapped (non hearing-impaired). Her classroom

teacher began recommending a placement change (to her present room) in October, 1987 because of audiological indications of a further hearing loss and more appropriate instructional focus. This placement finally was accomplished in February, 1988.

Shari is currently in the third grade, but is functioning between one and two years behind in her basic skills. The reason for this is not apparent because she appears to be intelligent and enthusiastic.

This classroom, as with most special education classrooms in public schools, is not a stable, never changing, entity. Instead it is an always growing, sometimes harmonious, sometimes discordant, living manifestation of the variability of humankind.

Three student (Carrie, Larry and Mary) have been with the hearing impaired program the longest. Because of their similar ages, they have often been together over the last four years.

Carrie and Mary, despite broad differences in ability, are the best of friends. Larry, who was the terror of the school, is now the favorite of most of the adults in the building.

Geri can be likened to a lamb, always fearful and ill at ease. Did failure in the regular education classroom do that?

Terry is our bully. Sullen and morose when challenged, he is perceived as a danger by the others.

Shari is new. She is light and innocent. Making no demands, she has confused her instructors with her obvious abilities and painful deficits.

Gary is very immature. He still has "accidents" in his pants and cries at the least provocation. He is seen by a variety of specialist every week. His mother still uses baby talk with him, but insists we treat him "like a man".

Mary can be frustrating. All cognitive indices point to normality, yet her comprehension of the world is minimal to nonexistent. She comes from a strange environment of no effective communication and seems to love it very much.

Larry gets angry because he misunderstands and misinterprets - all the time. He lives in a home that is not conducive to his special needs. His

brother has spent most of his school career in behaviorally disordered rooms and yet was Larry's caretaker after school for a year or more.

Terry evidences severely retarded academic growth and that fact has never been accepted by his father who, whenever he is around, tells Terry he is as smart as anyone and shouldn't be in special classes.

Carrie is very, very smart. One day she may also be very, very angry. Her parents don't want her to be deaf, have never really accepted her deafness and continue as of this time to deny her the right to associate with other deaf children.

Geri is confused about her predicament and is aware enough to know she is confused. She pretends silliness and is ever on guard for retribution.

Gary's physical and mental aberrations contribute to severe communication problems.

Such is the problem. With all the nuances of individual differences and handicapping conditions, this class offers a challenge for instruction.

INSTRUMENTS AND PROCEDURES

Yin (1984) mentions in his book three principles that can maximize the benefits of the protocols used in a case study.

First, while case studies have been successful using just one source of information, multiple sources helps the reliability of the conclusions offered.

Secondly, a large, well organized, data base gives more credence to the analysis. The more information indicating an outcome the more likely that outcome will be true.

Finally, a solid chain of evidence -from proposition to data to conclusion - that can be followed by readers of the research gives reliability to the results.

Six sources (documents, physical artifacts, archival records, interviews, direct observations, participant-observations,) will be used to gather data for the analysis of the research project.

Documents and Physical Artifacts

The bulk of the data collected will be documents and physical artifacts of the activity in the room. The students will be generating paper work (in all subject areas) which might be either handwritten or hard copy from the computer printer. For example, each day of the school year the students will be given 15 minutes to write whatever they wish with the lone stipulation that it cannot be either repetitive or copied. This work can then be analyzed for a variety of outcomes, i.e., relevance, word output, etc. This category also includes letters and surveys to be sent to parents on a regular basis requesting information about their child's performance and attitude and any other communication from them.

Archival Records

The principal data gathered in this category will be the histories (both medical and placement) of the student as would be found in their files. This data will support other information gathered using the other sources.

Interviews

Interviews will occur in two ways:

First, both open-ended and focused interviews will be held with the parent(s) of each student four times during the year. First, at the start of the year; second, at the end of the base period; third, in January and; fourth, during the IEP conferences in late April. This does not preclude any other conference the parent or teacher might initiate during the year.

The second interview type is much less formal. It involves the staff at the school (certificated, classified or volunteer) and any observations they initiate about the students in the classroom either individually or as a group. An example may be an irate bus driver or custodian or a delighted principal or playground aide.

Direct Observation and Participant-Observer

These are included as one category because sometimes the line drawn between them is very thin. Direct observation would indicate those times when the researcher/teacher is in the room and not actively working with any student or at least not the one being observed. The use of computers allows for this freedom to exist in a room that would remain involved in the learning process.

Participant-observer is the more common role of the researcher / teacher and special precautions are needed to protect the situation from bias. Most of the time the staff assistant serves as an observer during these occasions and conversations and taped recordings are made as soon as it's practical.

Audio tapes and tally sheets were made daily to chronicle the observations.

STORAGE

The data gathered above was stored either as hard copy, soft copy or audio tapes. Student-generated text was saved either handwritten or as computer printouts. Interviews were taken on notes and transcribed after each sessions. The quick hallway interviews were recorded on audio tape as soon as possible. Effort was made to accurately preserve the flavor of these discussions. These were transcribed to hard copy weekly.

Observations, as stated above, were noted daily on audiotape and tally sheets. These were also transcribed weekly.

ANALYSIS

As will be described in more detail in Chapter V, the data was analyzed for both literal and theoretical replication. In essence, this is a method proposed by Yin (1984) where similar and dissimilar results might support the same conclusion. Attempts at pattern-matching and hypothesis building were used to link the gathered data to the three original propositions. Proposition 1 (amount and relevance of work) was linked most directly to student writing samples. Propositions 2 and 3 (independent activities and self-image) were linked to the interviews and observations.

The opposite of a correct statement is a false statement. But, the opposite of a profound truth may well be another profound truth.

- Niels Bohr

One precedent creates another. They soon accumulate and constitute law. What yesterday was fact, today is doctrine.

-Junius

The folly of mistaking a paradox for a discovery, a metaphor for a proof, a torrent of verbiage for a spring of capital truths, and oneself for an oracle is inborn in us.

- Paul Valery

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When imprinting studies go awry

All men, Aristotle said, by nature desire to know. It may not be true that, born with that native propensity, all persons in fact continue to nourish it. But certainly there are but few who do not regard knowledge as desirable, as a good to be prized, and a good without limit - the more the better.

It is generally understood that those who have knowledge about anything are in possession of the truth about it. Individuals may at times be incorrect in their claim that they do have knowledge, but if they do, then they have some hold on the truth. (Adler, 1985)

CHAPTER IV

RESULTS

INTRODUCTION

This research project was conceived as a multiple-case study. Each student generated data to be presented and analyzed on an individual basis. A cross-case analysis is also possible based on the three propositions that generated the data collection protocols.

Before looking at the findings, a more specific look at how the data was gathered and analyzed for each proposition is necessary.

Proposition 1 - the rate of academic production will increase

This proposition was generated by a subjective observation that the more students knew the more they did. (Or, those that knew more, did more.) The proposition states that this will be found in an empirical study by analyzing the amount of work the students did in specific time blocks when no external controls (such as direct instruction or group activities) were applied. This was done by analyzing two writing activities the students did daily for which there were time constraints, but the amount was not controlled. The students set their own pace.

The first activity was a free writing time (15 minutes daily) where the students would take out pencil and paper and write whatever they

pleased. The only rules were that they could not copy from a text or other source and could not do repetitive work, such as the alphabet or a name. They could write as much or as little as they wanted.

The second activity was more directed, but the students still had control of their pace. Each day each student would go to one of the computers in the room and write factual sentences and an interpretive story about a series of related picture provided for them. This was a daily 30 minute activity. Again, if they were behaving themselves (on-task) then little was demanded of them.

The two above activities differed in one important aspect. The free writing material was never "corrected" or in any way reviewed during a student/teacher conference. The interpretive writing was used as a vehicle for teaching a variety of language skills. Daily, when possible, the teacher would work with the student on such language skills as grammar or spelling, fact or fantasy, or whatever issues were indicated by the computer writing.

This first proposition yielded quantitative data. Results for each activity could be measured by word count per sample per month. Obviously, the assumption here is that greater output indicates the acquisition of knowledge and the building of schemas. When the students know more they say more. Qualitative data could also be generated from these samples. More on this in the next chapter.

Proposition 2 - times of independent activities will be focused on productive (academic or social) projects.

Three sources of evidence were used to analyze this proposition:

First, a totally unstructured period of classroom time was given on a daily basis usually of no more than 15 to 20 minutes. The only rule was that it was not a "horseplay" time. No wrestling or chasing was allowed. Any other activity was permitted. When the data collection on this activity was originally conceived a tally sheet was made up that contained eight possibilities (coloring, drawing, reading, talking, writing, playing with toys or games, using a computer or nothing [or the absence of something]). Had this been continued, quantitative data could have been generated for this proposal, but this was discarded after the first few weeks as being too limiting. Instead, after each independent activity period, an audio record was made and transcribed later indicating the activity each student chose.

Secondly, contact was made with other people in the school who observed these students at times when they were not in the classroom. Lunch and recess times were the most common as these students were not in a mainstreamed environment often.

Finally, a third source of evidence was the home. Interviews, notes and phone conversations were used to record behaviors that were related to this proposition. Parents were enthusiastic and open in relating information that was helpful in tracking free activity periods. Clearly, the opportunity for unstructured activities in the home is great.

Because the sources of evidence did not yield results on a continuum of activity scale the reporting of this data is narrative and anecdotal.

Proposition 3 - self-concept will improve as measured by student, peers and significant adults.

Basically, the same sources of evidence used in proposition 2 were used to establish a link between classroom activities and the student's self-concept. The observations made in the classroom by the teacher were supplemented by student's comments about their peers.

School personnel also contributed information.

The third source of evidence, the home, became increasingly important to this proposition, if for no other reason than the dissonance between the home and other sources of evidence.

As will be shown, this proposition proved allusive at best. The short duration of the study and the lack of clearly defined benchmarks contributed to this difficulty. As in proposition 2 the reporting of the data will be narrative and anecdotal.

INDIVIDUAL RESULTS

Now our attention is turned to each case. The evidence gathered from the various sources will be presented on an individual basis and then as a group discussion.

Terry, the student tested as mildly retarded early in life, actually manifests a rather striking learning disability. The written word is incomprehensible and, as such, can not be reproduced during writing activities.

Proposition 1 -

As can be seen in the charts on the preceding page, Terry showed a consistent gain in his free writing throughout the year, but his directed writing progress shows little gain. A glance at his writing samples indicates an unintelligibility that persisted throughout the year. This lack of writing skill showed no apparent connection to the amount of writing (in other words, a more methodical approach elicited the same results) and this inability to communicate was only manifested in written work. Orally he was as aware and conversant as any student in class.

The fact that the work typed on the computer was corrected by the teacher with the student had no apparent effect on either sample activity.

Terry - Free Writing

I got a nw bik it is a Bmx
raing bik and i got a
msgub hat sus wodr and
i got a remot knothal
thadr it is kod the cat

Februrary Writing Sample

Terry - KidWriter

THE BOYS ARE HAVING A
RAS . THE SO
THE BOYS MAT A SO
MAN TYA PLAD IN THE
SUO

December Writing Sample

Terry - Jack & Julie

the alofit is sing wodr
the dog got ot his ubly
the dog is soling
not fo log the okig sid
the wody

June Writing Sample

Figure 1. Terry's Word Count and Writing Sample

No discernible difference, no progress in spelling, syntax, punctuation, etc. was noted throughout the year.

Also noted in audio tapes and transcripts were repeated notations that Terry responded well to each of these activities, causing few disruptions while engaged in writing. In fact, three entries indicated that the observer felt the increase in word count in the free writing activity was due to the student's desire to gain favor with the teacher.

Proposition 2 -

The data collected in support of the second proposition offers a slightly clearer indication of the effects of efficient information systems on Terry's cognitive processes. Those systems (primarily computers) that offered only visual information produced no identifiable change in Terry's independent activities behaviors. Those systems (primarily video tapes and films) that offered both audio and video input had a consistent effect on those same time periods.

Repeatedly throughout the year the observations of these free periods indicate no change in behavior unless a film or video disc project had been recently completed. At those times, disruptions decreased and positive interactive social behavior dramatically increased.

During times of play (recess) several notations indicated an "acting out" of films he had recently seen and heard.

At home, he seldom offered any comments on school activities other than those generated by audio technology.

Additionally, when those periods of time clearly reflecting connections with film or other audio presentations are filtered out of the transcribed notes, there is no change in the types of behavior exhibited by Terry during these unstructured times. Drawing (usually ships, planes or gobots) dominated these times. Almost two thirds of these periods throughout the year were devoted to this activity. Disruptive, antisocial behavior was also often noted.

At home his free time was exclusively TV time. Not surprisingly, Terry's information base was broad.

Proposition 3 -

Finally, Terry's self-image apparently underwent little change throughout the year. His mom repeatedly offered that he was feeling better about himself since he came to our school, but neither the observer or any other member of the school staff noticed this. There are no notations that Terry noticed it either.

The other students in the room also saw no change in the manifestations of Terry's dim view of himself. In the transcripts it was noted toward the end of the year that two different students asked the teacher why, if they felt better about themselves because they read or talked better, that Terry didn't. Carrie, the observant one, offered that Terry hadn't grown like them, but that was because he was not like them.

Gary, the most seriously retarded student in the study, not surprisingly, exhibited the least change. The interaction of his mental retardation and cerebral palsy combine to make acquisition, retention and output a slow process.

Proposition 1 -

At first glance, Gary's charts indicate a fluctuating output, but upon closer inspection the total numbers changed little throughout the course of the year. Gary's free writing samples indicate little change in output or content. This was not wholly the response to pen and pencil tasks beyond his physical abilities. Notations in the weekly logs indicate a lack of interest in expressing his feelings or thoughts.

Gary's production increased somewhat in computer activities because he was comfortable with them (having been exposed to many new electronic devices). Still his highest average output during a half hour period was slightly more than 30 words.

Gary's behavior changed little during the variety of classroom activities in which he was involved. Notations indicate that free or directive writing periods were neither more or less attended to than other

Gary - Free Writing

Dad and me going to
railroad

November Writing Sample

Gary - KidWriter

The bird is lokking at
The duck. The cat is
eating.

January Writing Sample

Gary - Jack & Julie

The boy is sad.
The boy is hole the
ulmlla
The boy is ran
The boy is wet.
The boy is ran into the
tent.
The end.

April Writing Sample

Figure 2. Gary's Word Count and Writing Sample

activities. Typically, Gary behaves in a withdrawn manner with slowed reaction time to any stimulus (with the one exception of the fire drill which elicited a fearful, panicky response). Gary posture was indicative of someone in thought while his work lead to a contrary conclusion.

Proposition 2 -

As with the first case, data generated by the second proposition was contraindicative. That is, insignificant data supported the effects of efficient delivery systems on independent activities as proposed.

The preponderance of evidence implied that the changes implemented in Gary's directed activities had no influence on his undirected activities. He was observed throughout the year reacting to the real or imagined teasing of Terry and Larry. Entry after entry in the log showed Gary sitting alone, surreptitiously waiting to react to whatever he perceived as a negative communication from the other two boys. His most meaningful activity was scribbling undecipherable pictures. He also "rocked, tapped, feigned sleep and attended to his nose" on more than a few occasions. He read three times, wrote twice and joined two of the girls in a game once.

On the playground he started out alone and ended that way. He was usually not disruptive nor needed to be punished often. When that did occur it was associated with communication problems with the other boys and was of such a violent nature that he was removed from the playground area.

There is no clear picture as to whether his free time behaviors change at home. Two different stories were presented by the parents. The mother claimed on each interview occasion that he was reading more or relating

with his siblings more frequently, more meaningfully. The father, on fewer but consistent discussions, indicated no change in Gary's home behavior.

Proposition 3 -

Unlike most other students in this study, the observer had trouble understanding what Gary's self-image was and, in fact, there were times when an absence of any self-image seemed to be the answer. Whatever it was, it changed little.

In no transcribed notes, interviews or observation are there references such as "Gary was mad at himself today" or "Gary really felt good about himself after he did so-and-so." These messages were noted often with the others in this study, but not Gary. His anger or joy was most often outer-directed. "Gary scratched Larry today when Larry refused to share a picture with him" and "Gary enjoyed Mary's bumped head this P.M." were typical entries. These latter entries could be manifestations of inner turmoil, but the lack of the type of entries mentioned earlier presents a puzzle.

At home, the level of concern never indicated concern with psyche. Physical needs and abilities were the focus of interviews, notes and phone conversations.

Mary was one of the original students for which this exploratory case study was designed. There was a rich history on Mary's progress through classrooms and definite indications that she was slipping further and further behind, not because of academic deficiencies, but growing out of her home and social environment. Efficient delivery systems, coupled with more attention to Mary's expressive needs might have an effect on this student.

Proposition 1 -

As can be seen on the preceding page, Mary's rate of work increased dramatically throughout the year. Her free writing word count steadily rose from the mid 40s to an average of 80 words per sample when she left school in March. (She was one of two who left early.)

Her computer time, begun in November and ended in March, indicates a rise from 20 to 60 words per sample using one software program, rising then to just under 140 when transferred over to a regular word processor.

Notes indicated that Mary enjoyed these activities and, after the Christmas break, inquired a few times as to whether the teacher had read

Figure 3. Mary's Word Count and Writing Sample

the free writing samples. They contained information about her family or neighborhood friend and she wanted to share this with the teacher.

Mary only worked on the regular word processor for the last two and one half months, however in the month before she left a noticeable rise in output and enthusiasm was noted in both the word count and notes. The quality changed little, but the amount jumped up. The note of February 10th indicated that "Mary burnt up the keys for a second day in a row."

Proposition 2 -

Mary was one of a trio of students that showed a definite change in behavior during unstructured activities through the course of the year. The change basically evolved from time spent waiting for the time to pass so a more structured activity could begin to efficiently enforcing her own structure when no other existed. As the year went on she was observed more often reading, writing, doing homework, drawing pictures (increasingly relevant to the activities in the room or her home life) and playing games (usually card or board games) with others. However, as will be noted with two others in this study, she also increased her involvement in social interaction with peers and adults almost to the exclusion of other activities. The free time became for an exciting time to share thoughts and experiences, primarily with her two friends, but also with the teacher and staff assistant. One notation in late February indicated that when she arrived at school that morning she inquired as to whether there would be a free time that day because she had something neat to tell the other girls. Another note indicates that she interrupted one vocabulary development

lesson to communicate to another girl that she would talk to her later about what her and the teacher were talking about at that time.

Only two pieces of information were provided by other staff members that are relevant to this proposition. Both noted that Mary and the others sure had become "Chatty Cathys" on the playground and had to be reminded that this was a play time too. The often stood or sat (depending on the wetness of the grass) and discussed whatever during the recess and lunch periods.

As noted above and in preceding chapters, Mary's home life was not conducive to Mary's academic health. Lack of communication, strange hours, poverty - all played a role in Mary's present predicament. Because of this, the reliability of information gathered during interviews and phone discussions were suspect. Even at the very beginning the mother claimed that Mary read 4 or 5 books a week or, more interestingly, watched mother while she read 30 books a week. For what its worth notes indicate that Mary made efforts to engage her mother in conversations increasingly as the year went on.

Proposition 3 -

One indicator that Mary's self-image was changing was her attention to her dress and hair and obvious pride when new clothes were given to her by the school counselor because the family had no money to buy these things for her. Because of her age Mary's body was changing and she liked all the things that were happening to her. When one of her friends remarked to the teacher that Mary is "growing and learning, both" , Mary beamed.

A January note indicated that Mary "was proud of getting 100% on her basic math facts sheet today" and asked to take it home to show mother. An asterisk at the bottom of the note indicated that this was the first time this had happened.

A playground aide noted Mary helping some kindergartners who were arguing (though she needed pantomime to communicate) and bragging to her friends later about how good a "mother" she would be when she got married.

Mary's mother always aimed to please so a grain of salt was applied to her comments like, "My! Mary is sure a happy little girl this month." Again, at least the pattern follows the more reliable other observations.

Geri inclusion in this study offered a good opportunity to test the third hypothesis. Her self-image was very low when she joined the class in the Fall. As noted earlier, she had been mainstreamed for all or part of the time since kindergarten. Because of the level of hearing loss she had been failing gradually, but steadily the last few years, falling further behind for reasons that were not clear to either her or her mother. The first two propositions would be important for academic and social reasons, but the third had personal significance.

Proposition 1 -

A look at the charts indicates that while Geri made modest, but steady gains in her free writing and KidWriter samples, she really increased her word count during the interpretive writing time.

Geri's free writing time showed rapid gain in word count the first four months. A look at the actual samples and notes transcribed at that time indicates that though quantity did not increase after that, quality did. This was measured by her attention to grammatical forms, spelling, etc.

Hi today we take about math. I got six rang. I had a good time. I am nine years old. I like alot about school. I will tall yoy about wate I like about school. I like PE, math, Abc, compeater, lunch, resess alot about school. I like best is the compeater best.

October Writing Sample

I went to the sea. It was fun. I saw a fish in the water. I saw a duck. The bird was looking for a fish to eat. I was on the water scoder. My mom was in the sail boat.

February Writing Sample

Julie knew it was February. She went to the hen houes. Julie was so happy with the eggs. She put then in the basket. Then she saw the mother hen. The mother hen did not see Julie. Jill came and saw Julie put dye in the bowl. Julie had three eggs on the counter. Julie had so much fun.....

June Writing Sample

Figure 4. Geri's Word Count and Writing Sample

From the very beginning, Geri wrote about family and other personal situations. This continued for the most part throughout the year. The clarity and amount increased, the subject remained fairly constant.

Geri's use of the KidWriter program again reflected real-life situations. She would build pictures and develop stories based on what she had recently seen or done. For a period of six days she develop the same scenario and told different stories based on the same picture. The 50 word count she ended with stressed the text page capabilities of the piece of software so Geri was moved to another program to do interpretive writing.

An interesting phenomenon occurred during Geri's use of the program. The way it was organized the student would write 30 minutes daily interpreting a series of related pictures. They could finish a story in one day, or it might take a week. Whenever the story was finished the student was not to start a new one until the teacher and student had corrected and discussed the work. Geri started in this pattern through the first four samples. A slow rise can be noted. At this point the teacher was absent from the room for four days and, because of a lack of communication by the teacher to the substitute, Geri continued on to do the next 4 stories. An actual decrease in work count can be noted for samples 5 through 8. The teacher returned to the classroom, discovered the err and in one marathon 45 minute session the teacher and student corrected and discussed all four stories. Word count skyrocketed after that. The next sample had almost 150 words, then over 200, close to 400, finally more than 550. Geri's right to expression had been released.

Proposition 2 -

Geri's independent activity time paralleled that of Mary. The year began by her feeling the need to "look busy". Gradually, she began to involve herself in time-consuming tasks such as coloring, reading or writing. Notations indicate that she gravitated to the other two girls and initially assumed the role of observer and interpreter for those in the class that could not communicate in sign language. Geri's ability to communicate was limited at first as she had not been asked to use it in the last few years, but with her perseverance and the other girls' patience she was accepted into their group. As with Mary, Geri eagerly anticipated the days' free period as a time to question, explore, comment, or listen. Geri often was the contact person with the teacher and was observed sharing information with the other two that had be obtained from the teacher.

Again, as with Mary, Geri's independent time outside of the classroom was spent in discussion with the other two on the playground. Because she was somewhat more physically active and had more hearing than the other two, she would join the other children on occasion in playground activities. More often than not she could be found sitting with the other two, quietly signing her thoughts and feelings.

Geri's at-home free activities changed totally as the year progressed. In the beginning her activities usually consisted of arriving home after school, either playing by herself outside or watching TV, having dinner, a forced homework period, playing in her room alone, and then bedtime. This evolved over the first few months to arriving home, doing homework, getting out a book and reading until dinner, dinner, then getting out a book and reading until bedtime. At times she would discuss her readings with her

mother. Mostly, it was read, read, read. (As an aside, when Geri started the year she was almost 2 years behind in reading. When she finished, she was on grade level. She has maintained that grade-appropriate level since.)

Proposition 3 -

Geri's self-image was her biggest problem to success. Early transcribed notes are full of "I hate this.", "I don't want (or can't) do this." and "This is boring." The teacher favorite comment, first noted in March and continued intermittently until the end of the year, became "Is it recess time already?" The notes also indicate not so much a growth of positive comments as a complete ending of negative comments.

The staff that had know Geri in the mainstream situation offered an increasing amount of comments as the year went on. Typical were: "She sure has a good attitude now." "She seems to have her head on straight." "Geri seems much happier this year." It was noted that her previous regular education teacher said on five occasions, "What have you done to Geri?"

Geri's mother and sister offer the final comment. At dinner one evening in April, Geri said, "I couldn't do it (succeed in a mainstreamed classroom) because I couldn't hear, not because I couldn't think like they thought." They, her mother offered, were the regular education teachers.

Viewing the charts on the following page and remembering Larry's history as presented earlier one might assume these were two different people. Larry is definitely an overachiever. While the gains and the writing samples are not outstanding, they are noteworthy for a student with this one's disabilities. He, like Gary, evidences clear mental retardation. Unlike Gary, he does have a more positive self-image.

Proposition 1 -

Larry's free writing showed the most consistent gain. Unlike Mary and Geri, but like Terry, Larry's gains were totally in quantity, not quality. He also had a tendency to write the same things for days at a time. The December writing sample shown here was a consistent theme throughout the year. An example of an increase writing sample would be increased variations, not expansion, of a theme. It was repeatedly noted that Larry spent the first few minutes of this free writing period looking around,

i heve a cHriSTmas Tree
at home
my mom Love me all day
and today.
my Dad Love me all day
and today.
my dog is oLd
my cat is dead Befor
my Tree is dig.
The boy is big.
The girl is pratty.
My Mom is a good woman.

December Writing Sample

The girls leve at home.
The boys leve at home.
The bird flying. my mom
love me. my dad love me.
i hava a birI at home.

January Writing Sample

Once upon a time, there
was a little girl. The girl
is happy. The girl is waik.
The girl is looking at the
egg. The girl is at her
house. The girl is cooking.
The chicking is not out.
The girl is not go to get
the egg. The chicking is
mad at the girl. The girl
is sos happy. The girl is at
home.

May Writing Sample

Figure 5. Larry's Word Count and Writing Samples

trying to see what others were writing. He then would return to his old themes.

Larry's output on Kidwriter grew steadily, but not much. From slightly under 10 words per sample to less than 30 shows progress, slow progress. Notes indicate that Larry liked this program, but spent a disproportionate amount of time perfecting his pictures and too little time writing. His stories were germane to the pictures but followed no discernible theme.

Finally, Larry's ability at interpretive writing is as erratic as the graph indicates. His enthusiasm ebbed and flowed all day in everything and this unpredictability had a great effect on these writing times. Throwing out the high and low scores, Larry produced 40 to 60 words per story consistently.

Proposition 2 -

Larry's predominate behavior during the unstructured time was largely disruptive, especially aimed at Gary. Comments almost daily about Terry, Gary and Larry indicate that this unstructured time was something they never adapted to or used productively. Their most constructive behaviors usually involved anything that kept them not only away from each other, but out of eye contact. Larry's most commonly acceptable behavior was coloring, but at times he would sit and observe (listen to, watch) the three girls as they talked. No one behavior dominated either the beginning or end of the study. Observation lead one to believe that no planning or foresight was employed as a strategy for these sessions.

Two totally opposite reactions were noted by other staff people in the building.

Those whose job it was to watch him during lunch or recess found him to be very mean and disruptive at times. There are repeated entries that attest to the confusion as to which of the three started the problem and which got the worst of it, but Larry appeared to them to give more than he got.

Other staff members, cooks, janitors, secretaries and the principal loved Larry. He was the original Huggy Bear. He always had a smile and a hug for these people. To them, he could do no wrong.

Larry home life is chaotic. He is allowed to run free after school and when he's in the house his brother, who has been in a behaviorally disordered classroom for years, is often his guardian. It was difficult at best to converse with the mother, so little additional information was gained. The few comments that do exist are accompanied by notes of caution. Generally these indicate that the statements made by the mother may be self-serving and unreliable.

Proposition 3 -

There is little to be said here. No notes indicate any comment made by others about Larry's self-image, either as to its characteristics or change. Like Terry and Gary, Larry was more concerned about others than himself. Mary made the only comment that might reflect on Larry's self-image. She said, "Larry is just Larry. Maybe we will become others. Larry will stay Larry."

Carrie is an exceptional child. Born hearing, and very bright, she became deaf at age two and one half. Her intelligence and early language development have enabled her to stay at grade level academically. This "normalcy" of achievement presents challenges for instruction different from the other students. Allowing Carrie to progress at a rate appropriate to her ability might not occur if traditional information processing techniques are used.

Proposition 1 -

Carrie's word count level is much higher than the other students in the free writing samples but varied from day to day. A look at her writing samples clearly show that her work is on a different level than others in this study. High quantity and quality combine in this student in such a way as to make quantity alone a meaningless issue. Carrie's writing is reflective of her life and meaningful to her and anyone who reads them. Notes indicate that Carrie work habits were as good as her output. Starting and stopping promptly were behaviors noted on many occasions.

Last night Larry called me. He said, "Tell Carrie I love you. I will work hard tomorrow." My mom had a hard time understanding Larry. Larry had to say it 3 or 4 times for my mom to understand him. He was on the telephone for 5 minutes. When my mom and dad and I were at church.....

March Writing Sample

Once upon a time there lived a rabbit and three bears. The three bears were called, "The UnTricked Bears." They were never tricked by anything. One day the boss of The Untricked Bears came to them and said that if they could catch a fast hopping rabbit, they would be the kings of the whole forest that they wanted. So the first bear set out to catch the rabbit, but he returned without a rabbit.

The rabbit he has been chasing tricked him so he was fired. The second and third and the boss had the same thing happen to each one. The rabbits are always faster and trickier than bears are. The rabbits are really the true untricked animals. So people ended up calling them "THE UNTRICKED RABBITS." THE END!

March Writing Sample

Figure 6. Carrie's Word Count and Writing Sample

Carrie's interpretive writing also indicates a high average output (approximately 200 words per sample). The sample from March is an example of her language and thinking skills. It is presented in its entirety. As with the free writing activity, the output varied in quantity, but not quality. Notes indicate that during the corrective sessions most of the time was spent in discussion and expansion of the ideas presented in her paper.

Of all the students in this study, Carrie was the only one who wrote regularly for her own enjoyment. She kept journals and diaries of her summer and home activities and fit most comfortably into a pattern of daily writing.

Proposition 2 -

Carrie is the third girl that formed the independent activity discussion group. She was clearly the leader and originator of this activity, but just as clearly treated the others as equals in the group process. Notes indicated that Carrie "instructed" more during the onset of the activity and "discussed" more as time went on. Typical of this was a note from mid October that listed the ways Carrie was organizing the group (this was at a time when the observer did not know where this group was going): "1. Take turns 2. Look at each other 3. Don't laugh". In January a note indicated that Carrie only "watched the others talk. She didn't join in."

Notations periodically of "Carrie musing again" indicate what was first perceived as daydreaming, but came to be regard as serious reflection on a lesson, activity or event of the day. Carrie would often stare off into space while considering her feelings about something.

Carrie, having been a student at this school for several years, was familiar to the staff. Because of her smiling disposition and intelligence she was very popular with the adults. Carrie had never been a problem during recess periods so elicited little response of any nature. She was, it should be remembered, a member of the "Chatty Cathy" bunch.

Carrie parents noted no change in her free-time activities during the year. Further inquiries revealed that the Carrie almost always used her free time productively, reading or talking to others. TV, because of its audio nature, held little interest for her.

Proposition 3 -

Carrie obviously and rightfully feels good about herself. She has a good knowledge base and language structure. Her parents and friends are supportive. Self-image was not an issue to be addressed by the study

References of Carrie's opinions about others' self-image offer an indication that Carrie has a mature attitude about her own. "I use to feel that way" or "I was never so bad" comments appear too often to be idle curiosity. Her musings (see above) extended to the personal feelings of others.

Carrie parents always expressed surprise that Carrie's attitude could be anything but positive about herself and her life

Shari is the newcomer in class, having moved from one room in the building to her present placement in February. Shari has a history that is as important to her educational functioning as her physical disability. Shari's informational and heuristic deficits are acute and her hearing loss alone does not explain this. Indications of early childhood social deprivation may offer a clue for these deficits.

Proposition 1 -

Shari was involved in this research for four months and her data is as unpredictable as it is incomplete. Both in free and interpretive writing there was little overall gain in output. Shari either "worked furiously" (March 17th) or "spaced out again" (April 27th). Her free writing samples, like Larry's, had a repetitive theme. The April writing sample is typical. Her writing was unimaginative yet she communicated feelings and attitudes quite well in sign and speech. An April entry noted an excitement in a Spring break activity that never showed up in any of her writings.

Figure 7. Shari's Word Count and Writing Sample

Proposition 2 -

References to Shari's independent activity behavior seldom mentioned a change from her usual coloring. Only after Carrie and Mary left and Geri turned her attention to Shari was there a significant change in her behavior. An entry in late March said, "Shari coloring while discussing an Easter special on TV with Geri." Again in May, "Shari and Geri drawing, coloring and discussing summer." She did other things, but significantly her free behavior altered little in four months.

Other staff people commented that Shari loved to run and chase during recess. She was the active one and no entries indicated any change in this.

Shari's parents (mother and stepfather) made one observation about Shari's wanting to ask questions about issues raised during television shows. This apparently was new behavior as the parents seemed genuinely pleased.

Proposition 3 -

Shari's self-image, despite severe deficits in school, remains quite positive. "I like me the best" was her answer to Larry who asked her to name her best friend in the class. As with her other activities no basic changes were noted in the way she approached life in the classroom. Shari is a happy child and four months of raised expectations and efficient delivery systems did not change that.

Shari's parents who are eager for her to succeed and might be guilty of looking for too many silver linings, neither questioned nor commented about Shari's ego during any of the interviews or conferences of those four months.

GROUP RESULTS

Each of the cases above was considered an independent case study viewed from the perspective of a change agent. The data was gathered in the same way, generated by the same propositions, but each child's response was held as important in its own right. Any or all of the studies could have been completed independent from the others.

Before turning to speculations as to the meaning and hypothetical import of these findings, a cross-case comparison of the only quantitatively expressed proposition further supports the conclusions which are to follow.

Looking at the two graphs on the left and the one on the top right (graphs of data charted individually earlier) and the graph on the lower right (which measures reading "contracts" completed) it can be seen that the three students whose only handicapping condition was hearing impairment consistently did more work at an increasing rate than their counterparts. This was true even when they started together, as in the KidWriter graph.

These four areas represent periods of time where ones ability, knowledge and attitude could be reflected in quantitative ways. How much was done was a decision left to the student. The responses of the child

Figure 8. Group Output Work Comparisons

differed along the lines of their handicapping condition without a need to explain one or two abnormalities. Those three students were the top three on the three graphs for which measures were gathered about them. The fourth graph (Kidwriter) reflected this same result for the two of these for which data was recorded.

Notations in the transcripts also noted observations about the changes in these students as opposed to the lack of change of the others. Even before a formal analysis was begun, subjective responses in the notes indicate an expectation of these results. In this classroom, the hearing impaired behaved differently than the others, academically, socially, cognitively

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C'mon, c'mon - it's either one or the other.

"Is it truth you want then, eh," said the old man as he shuffled to the shelf.

"Your sure you're not lookin' for, ah, what's that word? Oh, yes - validity. Use ta call that punch," he muttered under his breath.

"You know," he said, brightening. "Lies can look pretty damn good, too. If ya dress 'em up right. I can give you lies. Got plenty of them. Dress up like ideas. Even got a few that look damn close to theories. Boy, now, them is lies!

"But you want truth," he said as he took the old rag from his pocket and began beating the dust from the book jackets. "What ya gonna do with it? You don't think your gonna prove something do you? You know, truth sometimes come popping outta its bag looking like Groucho and makes a fool of ya. You know that don't ya?

He was almost at the end of the shelf now and was mumbling or chuckling, you couldn't tell which.

"A Ha! Here it is! I knew there was still some truth up here. You know if'n I show you this, you gotta look it right in the face. Else you ain't facin' truth, you're only covetin' it."

As he turned, his eyes shining like reflected sun, he held a mirror.

"That, that is truth. What you see, not what you want. What you find, not what you hunt for." (Nicolay, 1989)

CHAPTER V

CONCLUSIONS SUMMARY AND RECOMMENDATIONS

CONCLUSIONS

Truth is seldom wholly pleasant. It can be the only support suppositions need to become doctrine, but it has no absolute affinity to it. In this study, truth does not spread like a blanket, but that was not the expectation. Its presence is sensed and that provides focus. From the truths observed in the data gathered, hypothesis can be advanced which give direction for further investigation.

Data, raw and subjectively gathered, can be codified and methods can then be applied to expose truth to reason. Robert Yin (1984) offers two methods (among others) of analyzing data in a multiple case study that are a good beginning point for this chapter.

The first is literal replication. Basically, this is data produced in two separate case studies that support a central theory. That is, two studies given the same population-type, and having the same propositions, generate the same data base leading to the same conclusions.

The second method is theoretical replication. This refers to the same data-generating propositions applied to dissimilar populations yielding different data bases. The differences in the analyzed data still support a central theoretical premise.

For example, suppose a researcher believes that federal low-rent housing units that provide fire and burglar alarms in all apartments changes the socialization patterns in those units. A study is conducted which include a number of units in various locations. Some of these have the alarms, some do not. If the data yielded similar results (by whatever measure) for units with the alarms this would be literal replication. If those units without the alarms yield different, less positive socialization results, this would confirm the original belief. This is theoretical replication.

These constructs are helpful in explaining the two distinct populations in this case study. Group one (Larry, Gary, and Terry) have documented and funded disabilities of the brain, mental retardation and a learning disability (with no known postnatal causes). Group two (Carrie, Mary and Geri) evidence no exceptionality other than hearing impairment with no documentation of any insult to the central nervous system. The seventh case (Shari) was not in the study long enough to classify in either group and, in fact, may form a third group because of suspected significant social/nurturing deprivations in the first three years of life, a situation unlike any of the histories of the others.

Literal Replication

Group one cases generally showed no changes in either behavior or output that would have reflected a schema-building theory. Certainly, Terry's free writing sample average shot up, but it was gobbly-gook. Nothing

increased but the amount of times he formed letters and meaningless words on the paper. Larry's also went up, but it was always more of the same. Repetition, not imagination. And Gary, physically and mentally affected, hardly showed any response to the classroom activities. For all, free times were never meaningful. Watchful would be a word to characterize their attitudes during these periods. Subjective observations, having credence because of the agreement from different sources (triangulation), consistently point to the same problems, behaviors, and actions throughout the year. One would conclude that little was learned and less changed.

Group two presents an opposite picture. Sample after sample indicates a growth in both quantity (Geri and Mary) and quality (all). What they did more of. Their stories were increasingly filled with the world around them. They enjoyed knowing. ("Mary got a big kick out of answering a riddle posed by the teacher. Talked about it all day." - January 12) They crafted a free time experience that helped all three of them interpret the world around them. And they all ended with positive attitudes about school, themselves and each other.

Theoretical Replication

The first theory is that the more efficient we can teach them the more they will know, the more they know the more they will do, the more they do the more we can teach them efficiently.

The second theory is that the hearing impaired (to whatever degree), if they have no other disability, do not have any kind of brain or central nervous system dysfunction that would prevent normal cognitive acquisition, storage or retrieval of information given the proper methodology.

The third theory is that certain kinds of disabilities of the brain would prevent, under any methodology, anything but minimal learning. Both quantity and quality would be affected.

If these theories are used to develop propositions to generate data from case studies of these two populations (which they were) then the two different populations would generate different data (which they did) according to Yin (1984). The difference in the outcome of these two group supports the same theoretical assumptions. The two populations did not substantiate two different theories, they both substantiated all three.

Why is that important?

First, historically the hearing impaired have fought a constant battle of being viewed as mentally retarded. Even in more enlightened times hearing loss has been seen as creating a "lesser-ness." For example, a great deal of research indicates that deaf individuals have more difficulty in sequencing events, thus assuming some etiological barrier to this skill. This type of thinking pervades this field. Breaking down assumptions, establishing new theoretical bases can begin to break the cycle of low expectation - low achievement so common in our schools of deaf education.

Secondly, it provides directions for further speculation and research. Can these findings be replicated elsewhere? What would the effect of even

more sophisticated technology have on this population? What are other ways to substantiate these theoretical assumptions?

Finally, information about learning styles, achievement levels, and expectations may help in placement and funding decisions in our schools.

This project was begun as a subjective observation about the education of the hearing impaired. Two assumptions focused this observation. First, hearing impaired individuals have great language and reading deficits not because of the impairment itself, but because of the educational orientation to it. Secondly, that particularly computers but also the great video media revolution now in our local stores could (will) somehow help us to resolve the first problem.

The problem with subjectivity is that it is hard to impart, at least clearly and meaningfully. The experimental research paradigm is powerful for no other reason than its ability to communicate effectively the outcome of its research. There was not the luxury for an experimental design in this case, however. A classroom is a vibrant, real-life experiment occurring all the time. This study hoped to take advantage of that with minimal disruption.

A sense of some empirical justification of the earlier subjective feelings comes with the completion of this case study. The evidence from every source used, consistently indicated these opinions were at least hypothetical constructs, capable of generating further theory-building experiments. There is no doubt for this teacher that because of directed use of computers in reading, language, speech and math instruction that Geri regained her self-image and her two year delay in academic achievement.

Mary, functioning in a "weird" environment, to say the least, has begun reaching out and expressing herself. Carrie maintained an astounding rate of achievement because there was a media there to support her growth potential.

Larry, Gary and Terry did nothing in this study that surprised the researcher. They benefited from the computer and video applications because materials at their level of achievement could be produced easily, many of the computer programs were "fun" and the video technology is so pervasive in our culture that kids are irresistibly drawn to and soothed by it. Their deficits are physiological and will not be overcome by technology or methodology alone. (Lest this appears to be a throwing off this population, it is not. Education continues to be helpful and enrich the lives of these students.)

Standardized test scores, not mentioned earlier because they were not part of the data collection process for reasons of their unreliability, supported the conclusions drawn above. The hearing impaired group scored above the projected IEP gains. The other group scored at the gains projected which were less by half than those projected for the first group.

The results from this study carry with them some implications for current educational practices in classrooms of hearing impaired.

Computer and video technology need a directedness not now evident. Purpose, developed through small research projects, in terms of specific programs and styles of implementation, should guide classroom applications.

Placement decisions, which have a profound effect on the make-up of a classroom, should be guided by new information on expectation and achievement of the various populations served.

More sophisticated technology should be placed at the disposal of the classroom teacher.

Mainstreaming considerations should also be guided by the professionals in the handicapping areas to prevent the disasters in self-concept that can occur.

This study indicates that there are some other possible explanations for the low achievement of hearing impaired students than those historically held. It should be used as a point of reference. Questions raised by readers of this study should be answered by designing descriptive or explanatory case studies that look more specifically into the relationship of cognition and technology. Research work being conducted on computer technology and thinking activities may have application to the hearing impaired world.

Both a strength and weakness of this study was its exploratory nature. It was weak in that, while the propositions generated the data collection, the outcomes couldn't be foreseen. It is still possible to argue that this study indicated nothing. That other factors, uncontrolled and unaddressed, helped to create and guide the data base is possible.

The strength of this study was its openness to any outcome. Indicators for future work was the hoped-for product of this work (This will be addressed again in the recommendations section to follow.) It was felt in the beginning that there was not enough direction or information to

develop explanatory research. There are now indications where that kind of research should be applied now.

This study was begun because the researcher felt that the amount of work completed, behaviors during unstructured activities and self-image are important indices of the learning process. Scores of language chapter tests, math papers, etc., may not offer the clearest windows to the mind. Subjective expectations were empirically established to the extent that prediction and direction was applied to the theoretical constructs.

SUMMARY

This multiple-case study research was initiated to test the hypothesis that hearing impaired children are not learning impaired and that efficient information delivery systems could positively impact their rate of learning and style of thinking.

Robert Yin's Case Study Research: Design and Methods (1984) paradigm was used to develop, implement and analyze the study. His volume in a series on applied social research methods provided systems for developing questions, forming propositions, establishing units of analysis, linking the data gathered to the propositions, and reporting the results.

Originally, the case was set up with an expected population of five children whose only documented disability was hearing impairment. From the time the study was proposed to the time it was begun the population shifted with the deletion of one hearing impaired student and the addition of

two multihandicapped students. A seventh student joined in mid-year who evidenced a disability other than hearing impairment, but this is not documented.

A central question,

How do efficient acquisition systems in the classroom effect academic behavior, social behavior, independent activity choices or student, peer, and adult expectations?

and three propositions

- the rate of academic production will increase
- Times of independent activities will be focused on productive (academic or social) projects
- Self-concept will improve as measured student, peers and significant adults

guided the research.

The study was implemented during one school year. During the study computers were used for direct instruction, drill and practice, simulation and materials generation. Word processing was used by all students on a daily basis. Students worked on computers singly, in groups, and with or without an instructor.

In the classroom, two daily periods of writing and one (almost) daily unstructured activity period were the focus of the data-gathering generated by the first two propositions. These writing periods allowed the students to develop their own pace. For one of the writing time periods, the student wrote with pencil and paper. They could write anything they wanted. The second writing period was on the computer, writing interpretive stories from pictures supplied by the teacher. Samples were kept of all these writing periods. The unstructured activity period only had the stipulation

that it was not a physical play period. Observations were recorded as to the behavior/activity of each student for the entire period.

Outside the classroom, frequent conferences and interviews were held to gather data primarily for proposition three. Both the staff at the building and the families of the students were consulted. Notes were taken and transcribed later.

The results of this study showed that the students who had only the disability of hearing impairment had significantly different experiences throughout and at the end of this study than those who evidenced intellectual difficulties. Generally, their work output was greater, increased more and reflected a qualitative change. The data gathered from the unstructured activities period also clearly show a dissimilar behavioral pattern. The hearing impaired students "grew" into increasingly more productive (in terms of thinking activities) behaviors while the other group showed, for all practical purposes, no changes at all. The analysis of the third proposition was more problematical. The findings are not as clear as the first two propositions because the reporting and recording of data was subject to interpretation. What indicators there are would support the proposition that increased learning has a positive effect on self-image.

RECOMENDATIONS

There were enough indications in this study that technology can help remediate difficulties in the education of the hearing impaired that further applications should be sought and implemented. It is evident that these

findings should be disseminated and discussed with other educators of the hearing impaired. Especially targeted should be administrative personnel who are responsible for policy decisions in various public and state programs. The costs are minimal compared to what is being wasted.

As stated earlier, these findings should also have an impact on decisions made by placement officers. Mixing students with unlike potentials and educational needs are not in the spirit of the least restrictive environment philosophy.

Research efforts should focus on three areas:

1. A study should be started with a longitudinal focus. The population should be a preschool or a parent-infant training program. The effects of computers and video over time will help to shape policy and expenditures in the future. If results similar to this study are achieved then many of the assumptions and methodologies of the past will be destroyed.

2. A study begun with older, more established hearing impaired students or adults to chronicle technologies ability to impact or alter more deeply ingrained behavior and attitudes could also give us additional insights into the effects of hearing impairment on cognition over time.

3. A study using the highest technologies reasonably available with a elementary-aged population could give further support to the positive effects of technology on cognition. The technology used in the present study, while admittedly new to some, is not a reflection of the high end technology being used by government and business

Implementing the first recommendation with a descriptive focus could yield significant theoretical information for future work.

REFERENCES

COMPUTER APPLICATIONS

- Anderson, R.C., Hiebert, E.H., Scott, J.A., & Wilkinson, I., 1984, *Becoming A Nation of Readers: The Report of the Commission on Reading*. Washington, D.C.: U.S. Department of Education.
- Balajthy, E., McKeveny, R., & Lacitignola, L., 1986-87, Microcomputers and the Improvement of Revision Skills. *The Computing Teacher*, 14(4), 28-31.
- Bruce, B., Michaels, S., & Cazden, C., 1985, *Two Papers on the Role Computers Play in Education*. Center for the Study of Reading, Reading Education Report #62
- Bruce, B., Michaels, S., & Watson-Gegeo, K., February 1985, How Computers Can Change the Writing Process. *Language Arts*, 143-149
- Bruce, B., & Rubin, A., 1984, *The Utilization of Technology in the Development of Basic Skills Instruction: Written Communication*. Cambridge, Massachusetts: Bolt, Beranek, and Newman, Inc.
- Chrosniak, P.N., & McConkie, G., April 1985, *Computer-Aided Reading with Reading-Discouraged Children*. Paper presented at the Annual Meeting of the American Educational Research Association, Chicago; Summarized in Collis, B., 1986, Research Windows, *The Computing Teacher*, 13(7), 37.
- Collis, B., 1986, Research Windows, *The Computing Teacher*, 13(7), 37.
- Coppola, A., September, 1987, Through the Computer Darkly. *Academic Computing*, 6-9
- Daiute, C., 1985, *Writing & Computers*. Reading, Massachusetts: Addison-Wesley Publishing Company, Inc.

- Dickinson, D.K., 1986, Cooperation, Collaboration, and a Computer: Integrating a Computer into a First-Second Grade Writing Program. *Research in the Teaching of English*, 20(4), 357-378
- Haugeland, J., ed., 1981, *Mind Design*. Montgomery, Vermont: Bradford Books, Publishers, Inc.
- Levin, J. A., Riel, M., Rowe, R.D., & Boruta, M.J., 1984, Muktuk Meets Jacuzzi: Computer Networks and Elementary School Writers. In S.W. Freedman (Ed.), *The Acquisition of Written Language: Revision and Response*. Hillsdale, New Jersey: Ablex.
- Mehan, H., Maroules, N., & Drale, C., June 1985, Some Cognitive and Social Benefits of Peer Interaction on Computers. In *Computers in Classrooms: A Quasi-Experiment in Guided Change*. Final Report to National Institute of Education *NIE 6-83-0027.
- Meyers, L. F., 1984, Unique Contributions of Microcomputers to Language Intervention with Handicapped Children. *Seminars in Speech and Language*, 5(1), 23-34
- Pogrow, S., & Buchanan, B., September, 1985, Higher-Order Thinking for Compensatory Students. *Educational Leadership*, 41-43
- Riel, M. M., June 1985, Functional Learning Environments for Writing. In *Computers in Classrooms: A Quasi-Experiment in Guided Change*. Final Report to National Institute of Education *NIE 6-83-0027.
- Rosegrant, T. J., April 1986, *It Doesn't Sound Right: The Role of Speech Output as a Primary Form of Feedback for Beginning Text Revision*. Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco.
- Rosegrant, T. J. (In press). Using a Microcomputer to Assist Children in Their Efforts to Acquire Beginning Literacy. In J. Hoot (Ed.), *Word Processing and Early Literacy*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc.
- Rubin, A., & Bruce, B., 1985, QUILL: Reading and Writing with a Microcomputer. *Advances in Reading/Language Research*, 3, 97-117

Shade, D. D., Nida, R.E., Lipinski, J. M., & Watson, J.A., 1986, Microcomputers and Preschoolers: Working Together in a Classroom Setting. *Computers in the Schools*, 3(2), 53-63

Vernot, D., Fall, 1987, Thirteen Concerns Teachers Still Raise about Computers. *Instructor*, 17-18

DEAFNESS

Caroll, J., 1964, *Language and Thought*. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Davis, H., & Silverman, S. R., 1978, *Hearing and Deafness* New York: Holt, Rinehart and Winston

Fine, P., ed., 1974, *Deafness in Infancy and Early Childhood* New York: Medcom Press

King, C., & Quigley, S., 1985, *Reading and Deafness*. San Diego, California: College Hill Press

Kretschmer, R., ed., 1982, *Reading and the Hearing-Impaired Individual*. Volta Review, Vol. 84, No. 5, September

Kretschmer, R., & Kretschmer, L., 1978, *Language Development and Intervention with the Hearing Impaired*. Baltimore: University Park Press

Martin, D., ed., 1985, *Cognition, Education, and Deafness*. Washington, D.C.: Gallaudet University Press, 1985

Meadow, K., 1980, *Deafness and Child Development*. Berkeley: University of California Press.

Moore, D., 1982 *Educating the Deaf: Psychology, Principles and Practices*. Palo Alto: Houghton Mifflin.

- Moore, D., Weiss, K., Goodwin, M., 1978 *Early Education Programs for Hearing-Impaired Children: Major Findings*. American Annals of the Deaf, December
- Quigley, S., & Paul, P., 1984, *Language and Deafness*. San Diego: College Hill Press
- Rainer, J., & Altshuler, K., 1967, *Psychiatry and the Deaf*. U.S. Department of Health, Education, and Welfare
- Rogers, D., & Sloboda, J., eds., 1983, *The Acquisition of Symbolic Skills*. New York: Plenum Press.
- Russell, W. K., Quigley, S., & Power, D., 1976, *Linguistics and Deaf Children: Transformational Syntax & its Application*. Washington, D. C.: A.G. Bell Association of the Deaf.
- Savage, R., Evans, L., & Savage, J., 1981, *Psychology and Communication in Deaf Children*. New York: Grune & Stratton.
- Schirmer, B., March 1985, *An Analysis of the Language of Young Hearing Impaired Children in Terms of Syntax, Semantics, and Use*. American Annals of the Deaf, Vol. 130. No. 1.
- Sharpe, S., March 1985, *The Primary Mode of Human Communication and Complex Cognition*. American Annals of the Deaf, Vol. 130. No. 1.
- Slobin, D., 1979, *Psycholinguistics*. Palo Alto: Scott, Foresman and Company
- Streng, A., Kretschmer, R., Kretschmer, L., 1985, *Language, Learning and Deafness*. New York: Grune & Stratton.
- Watson, D., ed., 1973, *Readings on Deafness*. Deafness Research & Training Center: New York University School of Education.

OTHER HANDICAPS

- Brelje, H. W., & Wolff, B., June 1969, *The Mentally Retarded Deaf Child*. Summary Report: 1969 Summer Institute Multiply-Handicapped. Department of Health, Education, and Welfare. Office of Education, Washington, D. C.
- Ekwall, E., & Shanker, J., 1983, *Diagnosis and Remediation of The Disabled Reader*. Boston: Allyn and Bacon, Inc.
- Haslam, R., & Valletutti, P., ed., 1975, *Medical Problems in the Classroom: The Teacher's Role in Diagnosis and Management*. Baltimore: University Park Press, 1975
- Hewett, F., 1969, *The Emotionally Disturbed Child in the Classroom*. Boston: Allyn and Bacon, Inc.
- Kirk, S., 1972, *Educating Exceptional Children*. Boston: Houghton Mifflin Company
- Meyen, E., 1978, *Exceptional Children and Youth: An Introduction*. Denver, Colorado: Love Publishing Company
- Naiman, D., ed., September 1975, *Needs of Emotionally Disturbed Hearing/Impaired Children*. A Special Study Institute Sponsored by Bureau for Physically Handicapped Children, New York State Education Department.

COGNITION

- [No Author or Editor Listed], 1979, *The Brain - A Scientific American Book*. San Francisco: W. H. Freeman and Company
- Adler, M, 1985, *Ten Philosophical Mistakes*. New York: Macmillan Publishing Company

- Berger, D., Pezdek, K., & Banks, W., 1987, *Applications of Cognitive Psychology: Problem Solving, Education and Computing*. Hillsdale, N.J.: Lawrence Erlbaum Associates.
- Bleck, E., Nagel, D., ed., 1975, *Physically Handicapped Children: A Medical Atlas for Teachers*. New York: Grune and Stratton,.
- Boden, M., 1978, *Purposive Explanation in Psychology*. Sussex, England: The Harvester Press.
- Brown, J., 1977, *Mind, Brain, and Consciousness: The Neuropsychology of Cognition*. New York: Academic Press, 1977
- Bruner, J., 1983, *In Search of Mind: Essays in Autobiography*. New York: Harper and Row.
- Bruner, J., 1969, *On Knowing*. Cambridge, Massachusetts: Harvard University Press.
- De Bono, E., July 1986, *De Bono's Thinking Course*. Macmillan Executive Summary Program,.
- Estes, W., 1982, *Models of Learning, Memory and Choice: Selected Papers*. New York: Praeger Publishers,.
- Eysenck, M., 1984, *A Handbook of Cognitive Psychology*. Hillsdale, N.J.: Lawrence Erlbaum Associates,.
- Fodor, J., 1983, *Modularity of Mind*. Cambridge, Mass: MIT Press.
- Fodor, J., 1975, *The Language of Thought*. Cambridge, Massachusetts: Harvard University Press.
- Gardner, H., 1987, *The Mind's New Science: A History of the Cognitive Revolution*. New York: Basic Books, Inc..
- Gazzaniga, M, ed., 1984, *Handbook of Cognitive Neuroscience*. New York: Plenum Press.
- Ginsburg, H, and Oppen, S., 1969, *Piaget's Theory of Intellectual Development: An Introduction*. New Jersey: Prentice-Hall, Inc.

- Lachman, R., Lachman, J., & Butterfield, E., 1979, *Cognitive Psychology and Information Processing: An Introduction*. Hillsdale, New Jersey: Lawrence Erlbaum Associates
- Lakoff, G., & Johnson, M., 1980, *Metaphors We Live By*. Chicago: The University of Chicago Press.
- Leahey, T., & Harris, R., 1985, *Human Learning*. Englewood Cliffs, N.J.: Prentice-Hall, Inc..
- Miller, G., 1973, *Communication, Language and Meaning*. New York: Basic Books, Inc.
- Neisser, U., 1967, *Cognitive Psychology*. New York: Appleton-Century-Crofts.
- Neve, C., Hart, L., & Thomas, E., 1986, Huge Learning Jumps Show Potency of Brain-Based Instruction. Phi Delta Kappan, October.
- Norman, D., 1982, *Learning and Memory*. W.H. Freeman and Company.
- Norman, D., 1969, *Memory and Attention: An Introduction to Human Information Processing*. New York: John Wiley & Sons.
- Perkins, D., May 1986, *Thinking Frames*. Educational Leadership.
- Restak, R., 1979, *The Brain: The Last Frontier*. New York: Warner Books.
- Sagan, C., 1979, *Broca's Brain: Reflections on the Romance of Science*. New York: Ballantine Books.
- Sagan, C., 1977, *The Dragon of Eden: Speculations on the Evolution of Human Intelligence*. New York: Ballantine Books.
- Seltman, M., & Seltman, P., 1985, *Piaget's Logic: A Critique on Genetic Epistemology*. Boston: George Allen & Unwin.
- Smith, A., 1984, *The Mind*. New York, Penguin Books.

- Sternberg, R., & Bhana, K., October 1986, *Synthesis of Research on the Effectiveness of Intellectual Skills Programs: Snake-Oil Remedies or Miracle Cures*. Educational Leadership.
- Wilson, K. , 1980, *From Associations to Structure*. New York: North-Holland Publishing.
- Yin, R, 1984, *Case Study Research: Design and Methods*. Applied Social Research Methods Series, Beverly Hills: Sage Publications.