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No. 3679

PRESERVICE TEACHER ATTITUDES TOWARDS NONVOCAL INDIVIDUALS
USING HIGH TECHNOLOGY AUGMENTATIVE COMMUNICATION
DEVICES VERSUS LOW TECHNOLOGY
COMMUNICATION BOARDS

DISSERTATION

Presented to the Graduate Council of the
University of North Texas in Partial
Fulfillment of the Requirements

For the Degree of

DOCTOR OF PHILOSOPHY

By

Robin A. Macke, B.El.Ed., M.Ed.

Denton, Texas

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The attitudes of preservice teachers towards individuals who are nonvocal and using either a high technology augmentative communication (HAC) device or a low technology communication board were investigated. A rating scale was devised, consisting of three sub-scales. The three sub-scales measured preservice teachers' estimates of intelligence, academic potential, and social acceptance in the regular education setting. Reliability and validity were established through a pilot study. Preservice teachers viewed videotapes of children using either high technology or low technology augmentative communication devices and subsequently completed the rating scale based on the videotapes. Results indicated that preservice teachers perceived the same child as having greater academic and social acceptance potential when using high technology augmentative communication.

TABLE OF CONTENTS

LIST OF TABLES	v
Chapter	
1. INTRODUCTION	1
Purpose	
Significance of the Study	
Limitations of the Study	
Definition of Terms	
2. REVIEW OF THE LITURATURE	12
Search Procedures	
Microcomputers in Education	
Microcomputer and Other High Technology Assistive	
Devices for Individuals with Disabilities	
Augmentative Communication Devices	
Attitudes Towards Individuals With Disabilities	
Attitudes of Children Towards Disabilities	
Parental Concerns Regarding Attitudes Towards	
Their Children with Disabilities	
Teacher Attitudes Towards Individuals with	
Disabilities	
Programs To Promote Acceptance	
Summary	
3. METHODOLOGY	38
Research Questions	
Survey Instrument	
Sample Selection and Description of Subjects	
Data Collection Methods	
Data Analysis	
4. PRESENTATION OF FINDINGS	50
Demographic Full Study Findings	
MANOVA Findings	
Cell Means and Standard Deviations	
Summary of Findings	
5. DISCUSSION AND IMPLICATIONS	61
Why Attitude Research Is Important	
What We Know About Attitudes	
Implications for the Future	

APPENDIX A	69
APPENDIX B	72
REFERENCES	75

LIST OF TABLES

1.	Coefficients of Stability for Pilot Study	42
2.	Alpha Coefficients for Pilot Study	43
3.	Demographic Data	46
4.	Corrrelations of Demographics with Subscales	52
5.	Cell Means and Standard Deviations	55
6.	MANOVA Findings (Grade, Technology)	56
7.	Univariate F-test for Grade by Technology	57
8.	Univariate F-test for Grade	58
9.	Univariate F-tests for Technology	58

CHAPTER 1

INTRODUCTION

P.L. 101-476, the Individuals with Disabilities Education Act (IDEA), mandates a "free and appropriate education for all students with disabilities in the least restrictive environment" (1990). In keeping with the spirit of this law, a student who has the ability to learn within the mainstream of society or the regular education classroom should have the opportunity to do so. In the classroom, however, teachers express an attitude of concern about their abilities to work effectively with students with disabilities (Gans & Flexer, 1985). Attitudes, in turn, influence teachers' expectations of the children's potential successes or failures in the classroom environment. Children tend to live up to the level of the expectations placed upon them (Bates, 1981; Brophy & Evertson, 1981; Wood, 1989).

This study addresses a very specific topic of attitudes of individuals preparing for a career in teaching towards the communication modes of non-vocal individuals with physical disabilities. The individuals with disabilities identified for participation utilize either high-technology, computer-based augmentative communication (HAC) or a more traditional communication board. In order to explore fully

this topic, several areas are considered for background information (a) teachers' level of computer knowledge, (b) computer usage by individuals with disabilities, (c) the field of augmentative communication, and (d) attitudes in general towards individuals with disabilities.

First, the U.S. Office of Technology Assessment (1988) notes that the vast majority of education majors planning a career in teaching have little or no computer education or training. Despite this low level of training, Feichtner (1989) reports that the average public school has at least one personal computer for every 30 students. Thus, at question is whether preservice teachers will use personal computers with students if those teachers feel inadequately trained.

A second area addresses the more specific area of computer usage by individuals with disabilities. Disabilities place restrictions on children and prevent them from joining in activities with non-disabled peers. Microcomputers are becoming a means for individuals with disabilities to overcome such restrictions and function on a level with normal peers (Wood, 1986). The power and adaptability of microcomputers allow for interactive and individualized educational programs which enhance the learning process (Wood, 1986). Personal computers and other devices are becoming more available for the population of individuals with disabilities (Buckley & Eichleay, 1989;

Morgan, 1983; Sloane, 1989; Vanderheiden, 1982; Withrow, Withrow & Withrow, 1986; Wood, 1986). Kirby, Oescher, Wilson, and Smith-Gratto (1990) note, however, that the purchase of peripherals, which would allow more complete access to microcomputers by the disabled, is lagging behind the established need level in the school systems. In addition, the federal government has mandated that all states provide a range of assistive technologies to citizens by 1995 through P.L. 100-407, the Technology-Related Assistance for Individuals with Disabilities Act of 1988. Under Title I of the Act, the Secretary of Education will make awards to states by means of a discretionary grants program (Blackstone, 1989; Mann, 1991). Considering the low level of expertise in the use of personal computers, a question arises as to whether preservice teachers will feel comfortable with the additional technology involved in providing computer access to students with severe physical disabilities.

A third area of concern is the aspect of augmentative communication. Even the best augmentative communication system is merely a tool to solve problems and will not function if not well practiced by both students and teachers (Blackstone, 1989). Whether children are using a HAC system or a traditional communication board, the teachers' willingness to interact with children utilizing that system will have a significant impact on each child. Blackstone

(1989) notes that "ineffective or inefficient communication profoundly limits social, educational and ultimately vocational opportunities" (p. 61). Thus, several questions arise. Are preservice teachers more comfortable with lower technology communication boards and, therefore, more likely to encourage their use? In contrast, do preservice teachers view HAC systems as more efficient and versatile and, therefore, interact with children using those systems more easily? Further, do preservice teachers view students using HAC systems as being more intelligent or as having higher academic potential?

A final area that influences this study is the more general topic of teacher attitude. Although the population involved in this particular study is limited to preservice teachers, it is important to understand the attitudes of both preservice and currently practicing teachers in the field due to the influence they may have upon one another during field experiences. Further, a knowledge base that includes both preservice and practicing teacher attitudes is important in terms of implications for teacher training programs. The climate of each classroom is set by the teacher. Whether or not children have a wide range of opportunities to interact with any augmentative speech device is, to some extent, controlled by teachers. Therefore, the topic of how teachers view students with disabilities is of interest in this study. Do teachers view non-

vocal children with physical disabilities as being capable of handling the regular education environment? Does the mode of communication used by individuals with disabilities affect how accepting teachers are of them? Does the communication mode affect the expectations that teachers place upon them? Do teachers think non-vocal children with disabilities can be accepted by their peers in a regular education classroom?

In summary, legislation is now mandating that students with disabilities be incorporated into the mainstream whenever appropriate. Further, legislation is providing disabled students in the mainstream with HAC devices. The question arises as to how well prepared teachers are to work with such students and how accepting they are of such students. This study addresses the attitudes of preservice teachers towards non-vocal students with physical disabilities who utilize either HAC systems or traditional communication boards. In order to develop a knowledge base upon which to evaluate the study results, the areas of (a) personal computer usage in classrooms, (b) microcomputers and other high technology devices for individuals with disabilities, (c) augmentative communication, and (d) attitudes towards individuals with disabilities are explored in the review of the literature.

Purpose

The purpose of this study is to examine acceptance of non-vocal students with physical disabilities using HAC systems versus traditional communication boards by individuals who are preparing for teaching careers. Assumptions of intelligence and academic achievement potential, based upon use or non-use of HAC systems, is explored. Further, assumptions regarding the ability of students to be mainstreamed, both socially and academically, into regular education settings, based upon use or non-use of HAC systems is investigated. Demographic variables are examined for possible relationships to the assumptions made by preservice teachers.

Significance of the Study

This study provides information which has implications for regular education training programs. If preservice teachers make assumptions of academic achievement potential and capability of being socially mainstreamed based solely upon a students' use or non-use of HAC systems, those assumptions may be in error. Brophy and Evertson (1981) note that unjustified attitudes and beliefs can often be rapidly changed through awareness. Therefore, this study investigates whether such assumptions are being made in order to add to the knowledge base available for the training of future teachers.

Limitations of the Study

Researchers must be cautious in utilizing information which may not generalize well to other populations or that is biased in some manner. Further, research may be weakened by the lack of power to fully randomize and the risk of improper interpretation (Kerlinger, 1986). This study is limited as such in several areas.

First, preservice teachers were selected as the sample group. This generalizes neither to teachers who have completed their training nor to the general population who may well have had less exposure to school children in general. This study addresses the attitudes of individuals as they prepare for a career in education. As such, it provides information for future development in the area of higher education teacher preparation.

Second, the sample group is comprised of individuals studying regular education or regular education with a special education minor. It is not expected that these findings can be generalized to all education students.

Third, the sample group is drawn from a single geographic region, North Central Texas, and therefore may be atypical of education students in other regions.

Fourth, in considering the implications of this study in terms of changes in teacher training programs, caution is suggested. Ajzen and Fishbein (1977) note the possibility of large attitude-behavior discrepancies in attitude

research. Briefly, one must consider that a stated attitude on the part of preservice teachers may not necessarily be reflected in their behavior.

Fifth, the methodology relies upon a rating instrument using a Likert scale administered to education students following their viewing of a particular videotaped sequence. This videotape depicts either an elementary- or secondary-aged student utilizing either a high technology or low technology means of communication. In affective measures, a degree of "fakability" is present (Hopkins & Stanley, 1981). Bias may be noted in preservice teachers' responses as a result of knowledge of responses expected for one in the education field (Dawes, 1988; Kerlinger, 1986) or from their deductions as to what is being assessed by the nature of the questions. Examinees can have a tendency to give a socially desirable response either intentionally or as a result of self-deception (Hopkins & Stanley, 1981). These reactive responses may be atypical of the preservice teachers' true attitudes (Campbell & Stanley, 1963). Further, Dawes (1988) notes that responses on rating scales may be affected by factors other than actual attitude and caution must therefore be observed to avoid interpreting such data in a literal fashion. For example, subjects may interpret questions differently according to the meaning they attach to such words as "usually" or "seldom," often used in affective measures (Hopkins & Stanley, 1981).

In order to avoid difficulties with some of these issues, the survey instrument was administered anonymously with urging to react honestly. Questions were reviewed by a panel of experts prior to administration (see details in Chapter 3 Methodology discussion) to identify and eliminate any potentially leading questions.

Finally, because of the design of the study, causality will not be easily attributed to the independent variables (Tabachnick & Fidell, 1989). Therefore, any systematic difference between the independent variables and the dependent variables will be noted as relational, without clear causality.

Definition of Terms

Augmentative Communication Device: Any device used to transmit or receive messages by an individual who is non-vocal (Bright et al., 1989). For the purposes of this study, HAC systems will refer specifically to computer-based devices used by individuals who are non-vocal for communication. This would include such systems as Minspeak, Epson's Light Talker, and Zygo's talking notebook.

Communication Board: Any device, not necessarily based in technology, used for communication by an individual who is non-vocal, which includes a symbol system for encoding messages and a way to display or output messages (Silverman, 1980). For the purposes of this study, communication boards will refer to non-technology-oriented devices. Such devices

are usually constructed specifically for an individual. Frequently, a number of pictures, letters, or words are affixed to a piece (or several pieces) of cardboard and then laminated for durability. The student then chooses a selection from the items.

Direct Keying: Entering data into a system by specifically selecting a single item or group of items (Bright et al., 1989).

Higher Functioning: Individuals working at average or above-average intellectual levels.

Input: To put information in (Webster's Ninth Collegiate Dictionary, 1983).

Lower Functioning: Individuals working at below-average intellectual levels.

Mainstreaming: Receiving special education services and/or related services while in a regular education classroom.

Output: Something which is produced (Webster's Ninth Collegiate Dictionary, 1983). For the purposes of this study, communication which is produced as a result of a HAC system or traditional communication board.

Preservice teachers: Individuals preparing for a career in education.

Scanning: To examine point-by-point observation (Webster's Ninth Collegiate Dictionary, 1983). For the purposes of this study, to examine point by point each selection on a

communication device prior to choosing an item (Silverman, 1980).

Technology/Assistive technology: "...any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional abilities of individuals with disabilities," (Technology-Related Assistance for Individuals with Disabilities Act, 1988). For the purposes of this study, high technology refers to increased productivity through usage of a computer device of some nature. Low technology refers to increased productivity by use of a non-machine device.

CHAPTER 2

REVIEW OF THE LITERATURE

Chapter 1 suggests a need to develop a knowledge-based upon which to evaluate this study. In order to understand more fully the findings, the following topics are reviewed: (a) microcomputer use in the classroom, including teacher knowledge about microcomputers; (b) microcomputers and other high-technology-assisted devices for individuals with disabilities; (c) augmentative communication; and (d) attitudes toward individuals with disabilities. Further, the search procedures used are outlined.

Search Procedures

ERIC, PsychLit, and MedLine databases were reviewed for information which addressed the general topics identified above. Further, a hand search of the past three years' issues was conducted with the Journal of Educational Technology Systems, American Speech-Language-Hearing Association Journal, Computers and Education Journal, Journal of Special Education, Journal of Special Education Technology, and the Journal of Speech and Hearing Research.

Microcomputers in Education

High-technology devices, such as standard microcomputers and portable laptop computers, have become a commonly accepted part of our society (Feichtner, 1989; Moore, Yin &

Lahm, 1986; Morgan, 1983; Withrow et al., 1986). Children are regularly instructed in today's schools in computer tasks and skills which were not in existence during the school years of many adults (Buckley & Eichleay, 1989). Children and adults see computer usage on television. Individuals within our society appear to have formed heuristic notions and opinions about the general use of high technology, as well as about those individuals within our society who implement those devices.

The history of microcomputer use in the classroom shows a tendency of "putting the cart before the horse." Program development for the use of microcomputers, particularly in the field of special education, evolved before empirical studies documented the effective use of microcomputers with children (Cosden, Gerber, Semmel, Goldman & Semmel, 1987). Studies are now being conducted, such as Cosden et al. (1987), which address peer interactions of exceptional students in differing educational environments as they use microcomputer systems.

A second representative study would be the meta analysis undertaken by Schmidt, Weinstein et al. (1986), which reviews 26 studies of computer assisted instruction of exceptional children. This analysis indicates support for the concept that high technology is effective in influencing educational outcomes for exceptional students.

In summary, microcomputers are now available in most school systems. Both exceptional children and their normal peers are receiving instruction in microcomputer use. Studies are beginning to show support for the effectiveness of such microcomputer use for the special education population.

Microcomputer and Other High Technology Assistive Devices for Individuals with Disabilities

Technology exists which allows individuals with disabilities to utilize a wide range of devices. Numerous adaptations in terms of both hardware and software have been developed to allow individuals with disabilities physical access to highly specialized programs. These special programs and devices include speech synthesis, Braille displays, and tactile displays (Bensing, 1988; Buckley & Eichleay, 1989; Feichtner, 1989; Sloane, 1989; Vanderheiden, 1982; Wollman, 1980). The "talking glove" ("Robot lets fingers," 1988) provides a communication mode for individuals who are deaf/blind. Unicorn boards, adaptive firmware cards, and various switching devices give the individual with physical disabilities an alternative to traditional keyboarding when entering commands into a microcomputer (Buckley & Eichleay, 1989; Burns & Mistrett, 1988; Sloane, 1989; Wollman, 1980). Technology now allows even severely disabled individuals access to computers.

Input to microcomputers can be achieved in a wide variety of ways and at variable speeds. Direct keying of information by fingers, toes, or pointers attached to various body parts is usually the most time-efficient method (Fairweather, Haun & Finkle, 1983; Mims, 1985; Musselwhite & St. Louis, 1988; Wood, 1986). Expanded keyboards, such as the Unicorn board, allow students a larger area to strike for selection and can accommodate students who have gross motor control, but little fine motor control (Bensing, 1988; Burns & Mistrett, 1988; Feichtner, 1989; Sloane, 1989).

Scanning systems, which highlight in some fashion individual or blocks of selections, allow the students to stop the scanner on the desired item by use of a switch (Burns & Mistrett, 1988; Mims, 1985; Musselwhite & St. Louis, 1988; Woltosz, 1988; Wood, 1986). Switches have been developed to meet the needs of virtually any individual who has even a minute amount of voluntary muscle control. Examples range from very light touch hand/toe/finger/foot switches which respond to extremely small movements through chin, head, elbow, knee, and even eyebrow switches.

Individuals who have only limited use of the head, such as quadriplegics, can utilize infrared switches similar to those used on VCR's and other remote control devices, to input particular selections (Buckley & Eichleay, 1989; Burns & Mistrett, 1988; Feichtner, 1989; Mims, 1985; Sloane, 1989; Thornett, 1988). These switches are often mounted on a head

band or cap. Individuals with more severe disabilities can access the computer by use of eye gaze input, which responds to various changes in the pupil of the eye, such as dilation and eye blinks. Tongue switch input is also an option (Feichtner, 1989; Mims, 1985; Musselwhite & St. Louis, 1988; Sloane, 1989; Wollman, 1980).

Output of these high technology systems also varies in both form and speed (Wood, 1986). Students using such high technology systems can work independently at various content area programs, such as mathematics, simply entering answers into the system for later review by teachers (Burns & Mistrett, 1988; Sloane, 1989).

Speech synthesis simulates human speech quite closely and can be used to participate in discussions. Students can use speech capabilities of the computer to interact with their peers as well. Additionally, devices are available which allow one the capability to pre-program a specific speech or response and then switch back and forth between the speech being delivered and spontaneous speech as needed (Woltosz, 1988). Some systems include the option for male or female speech synthesis and apparent voice age depending upon the user (Dahl, Galyas & Rosengren, 1989). Most systems also contain an option for printed responses when a written answer is appropriate (Fairweather et al., 1983; Feichtner, 1989; Sloane, 1989; Woltosz, 1988).

In summary, technology is available which allows access to computers for even the most severely involved individuals with disabilities. A wide variety of methods can be used to enter commands. Output from microcomputers can be displayed on screen, saved in memory for later review by teachers, printed, or spoken using sophisticated speech synthesis programs.

Augmentative Communication Devices

The revolution in electronic computing began before the end of World War II. However, personal computer devices did not move into the field of speech and language application until the late 1970's (Mills, 1987). As late as 1986, a survey conducted by the American Speech-Hearing- Language Association indicated that only a small percentage of their membership used computers in the treatment of communication problems (Schetz & Sheese, 1989).

In past years, persons who were non-vocal often had little choice in communication modes. The most common method to use was a device known as a "communication board." This generally consists of pictures, letters, words, and/or sentences (selection items) arranged on a board. The complexity level of the items put on the board varies depending upon the functioning level of individuals (Musselwhite & St. Louis, 1988). The size and shape of the board may be different from individual to individual, but all carry the same general purpose of allowing persons who are non-vocal

to generate messages by indicating one or more of the selections (e.g., letters/words) on the communication board (Brothers, 1991; Fairweather et al., 1983).

If students have severe physical disabilities or function at a lower level intellectually, appropriate communication boards may contain only a few selection items. This limits individuals' ability to communicate significantly (Blackstone, 1989; Fairweather et al., 1983).

Students who function at a higher level or who are more physically able may use more complex communication boards. The number of selection items may be increased and may include words and sentences rather than pictures. A further expansion of the communication board system is achieved by having a "master" board, which contains topic areas. For example, a high school student may have a master board with the selection items of "personal needs," "science," "math," and other subject areas. The student selects a single topic. The teacher or aide then provides the student with a secondary board (or series of boards) pertaining specifically to the topic chosen (e.g., science). This increases the repertoire of language available for the student to use and allows for more complex communication (Blackstone, 1989; Fairweather et al., 1983).

As with microcomputers, students can choose items on communication boards in a wide variety of ways. These include pointing with various body parts and using a

pointing stick attached to various body parts (Blackstone, 1989; Fairweather et al., 1983). If students do not have the voluntary muscle control, selections can be made by having an aide run a finger along selections in a sequential fashion until a simple signal is given indicating that the desired selection has been reached (Musselwhite & St. Louis, 1988; Silverman, 1980).

An alternative method of using a communication board is commonly referred to as an "Etran" system. Selections are taped on clear Plexiglas or plastic and held at eye level between children and aides or teachers. Children then gaze at the selection they desire (Blackstone, 1989; Fairweather et al., 1983).

There are two major drawbacks to communication boards of this nature. First is the limited capacity for language selections. The number of boards needed for extensive communication interactions can become cumbersome. Second is the need for a teacher or aide to not only note which selections have been made by the students, but also to provide the output. For example, the aides must speak for children, write down what the children have selected, or act upon a request. This limits the independent functioning of students. Further, the more time and energy required to get a message across, the fewer messages are likely to be attempted by students (Musselwhite & St. Louis, 1988; Silverman, 1980).

In contrast, some students now have the option of utilizing HAC (High Technology Augmentative Communication) systems for communication interactions. Systems such as Epson's Light and Touch Talkers (Musselwhite & St. Louis, 1988), the Kurzweil Voice Input System (Buckley & Eichleay, 1989), and Apple's Talking Power Pad (Sloane, 1989) allow individuals to independently enter selections to a computer based device and produce either spoken or written responses with little, if any, assistance from aides.

As with microcomputers, selections can be entered into a HAC system by means of a wide variety of assistive technologies, including switches to fit nearly any body part, direct keying using traditional or enlarged keyboards, electronic scanning, voice input, and eye gaze. Some devices enhance speed and efficiency of speech/text production by utilizing a semantic-feature-based phrase or sentence recall system, which can be accessed with only three to five keystrokes.

An example of a sentence recall system is LOLEC (Logical Letter Encoding) used with the Epson Touch and Light Talkers. An individual using LOLEC programs one or two single letters to stand for an entire sentence or paragraph in memory. For example, the letters "DW" in the LOLEC mode may retrieve the sentence "I want a drink of water." The letters "DOJ" may retrieve the sentence "I'd like a drink of orange juice." "DC" may recall "I want a Coke." Persons

with disabilities using this type of coding for retrieval select letter cues for sentences that are personally meaningful and therefore more easily remembered for retrieval as the number of items gradually increase (Baker, 1982).

Studies which explore attitudes towards HAC systems are scarce (Saricks, 1989). Studies on HAC systems that do exist tend to address interactive difficulties noted in dyads comprised of one student with disabilities using a HAC system and a non-disabled peer. Typical of the research findings is a study completed by Buzolich and Wiemann (1988) which describes individuals using HAC systems as more passive in conversation. This study further notes that HAC users have reduced numbers of speaking turns, are less contributory to the topic, and less capable of nonverbal communications. Typical children interacting with HAC users tend to structure questions for one or two word responses, dominate the topic, and rarely respond to initiations by the disabled partner (Buzolich & Wiemann, 1988; Calculator & Dollaghan, 1982).

With the multi-purpose application abilities of micro computers, particularly HAC systems, and the wide ability to adapt such devices to individual needs, professionals in the field of special education and rehabilitation are attracted to the potential benefits of both microcomputers and HAC systems for individuals with disabilities (Buckley & Eichleay, 1989; Burns & Mistrett, 1988; Hiner, 1988; Morgan,

1983; Wollman, 1980). A key topic in special education today is complying with mandates to plan for transition of individuals with disabilities as they leave school for the working world. Individuals such as Dr. Stephen Hawking, noted physicist, demonstrate the capability of a HAC system to provide an individual with severe disabilities with the means to continue or begin to pursue a professional career (Woltosz, 1988). Dr. Hawking has used his systems to write professional texts and to give lectures in the area of physics.

Further, some companies, such as Control Data Corporation, are beginning to experiment with the benefits of individuals with disabilities working at home through modem links (Morgan, 1983). IBM funds a training program in 22 states designed to give individuals with disabilities computer programming training. Given the high rates of unemployment among the disabled, this program displays an impressive 77% employment rate of its graduates (Feitchner, 1989; White & Cormier, 1986). These moves in the business world are of particular interest in terms of the guidelines set forth by the Americans with Disabilities Act (1990) which prohibits private employers from discriminating on the basis of a disability.

Studies which review society's reactions to HAC systems are rare (Gorenflo & Gorenflo, 1991; Silverman, 1988). Only one study was located, Gorenflo and Gorenflo (1991), which

examines attitudes towards individuals who are non-vocal. This study indicates that attitudes are more favorable towards an individual using a HAC system as opposed to a communication board or attempts to physically produce speech. This may be due in part to the ability of a HAC systems to allow quicker interactions between children. In some cases, synthetic speech has more clarity as well, thus allowing less stressful communication. The Gorenflo and Gorenflo (1991) study, however, does not address perceptions of intelligence, potential academic achievement, or potential for successful social mainstreaming.

In summary, augmentative communication for individuals who are non-vocal can be achieved in a number of ways, including communication boards and HAC systems. Communication boards range from simple to complex, with a wide variety of methods through which children can indicate what they want to say. Communication boards have drawbacks of limited repertoire of language and lack of independence for the user. HAC systems can also range from simple to complex with a wide variety of input methods. Users of HAC systems enjoy more independent functioning in the area of communication. Further, the available language repertoire is much enhanced by systems, such as LOLEC, which allow users to store sentences or paragraphs under simple, easily remembered codes. HAC systems, in conjunction with other computer systems, allow individuals with disabilities the

option to enter professional careers, which may have been impossible in the past due to the individuals' disabilities.

Attitudes Towards Individuals With Disabilities

There is not a great deal of literature dealing with the specific topic of attitudes of individuals towards non-vocal persons with disabilities using augmentative communication systems. A single study, Gorenflo and Gorenflo (1991) was located, which supports the concept that attitudes are more positive towards individuals using HAC systems than individuals using other modes of communication. Do people view HAC users as more intelligent and subsequently become more willing to interact with HAC users? Is the synthetic speech of HAC users more comfortable for the average individual to listen to than labored attempts at physically produced speech? Can HAC users respond to conversation at a more normal rate of speed? Such questions have not been answered in the literature.

Research on attitudes towards persons with disabilities is more developed. The research has been summarized in the following sections utilizing representative studies. Four categories of research literature are identified (a) attitudes of normally developing peers towards the individuals with disabilities, (b) parental concerns in regard to attitudes towards their children with disabilities, (c) teacher and preservice teacher attitudes towards children

with disabilities, and (d) programs designed to increase acceptance of exceptional children in the classroom.

Attitudes of Children Towards Disabilities

Children with disabilities and their normally developing peers are now in greater contact with one another as a result of P.L. 101-476 (1990). This has sparked interest in the literature in regard to the social relationships that have or have not developed as a result of this increased contact (Leyser, Cumblad, & Strickman, 1986; Royal & Roberts, 1987; Stainback & Stainback, 1982).

Early studies, pre-1950, indicate that children who have mental retardation are often less accepted than normally developing peers (Johnson, 1950). Research conducted in the late 1950's and 1960's indicates a similar trend for children with physical disabilities (Centers & Centers, 1963; Elser, 1959; Marge, 1966). Overall, children with both mental and physical disabilities are viewed more negatively by children than their normally developing peers (Esposito & Peach, 1983; Larrivee & Horne, 1991; Margo, 1983; Parish & Morgan, 1985). A more positive shift in acceptance of children with disabilities has occurred since the original passage of P.L. 101-476, however problems continue to exist (Rees, Spreen & Harnadek, 1991; Stainback & Stainback, 1982).

A study which is typical of the research found in the area of children's perceptions of disabilities was conducted

by Royal and Roberts (1987). Student perceptions of 20 different disabilities were rated in terms of visibility, severity, acceptability, and familiarity. Varying attitudes are noted across both age and gender in the Royal and Roberts (1987) study. More acceptance of children with disabilities is noted in females and less acceptance in younger children.

Horne and Ricciardo (1988) point out that various types of exceptionalities appear to be more acceptable than others. Types of disabilities are arranged in a hierarchical fashion by this study, ranging from most acceptable (e.g., physical disabilities) to least acceptable (e.g., drug and alcohol problems, sexual problems, or involvement with the judicial system). Those disabilities viewed as most acceptable are those over which the disabled person is considered to have no or minimal control (e.g., physical). The least acceptable disabilities are those which are viewed as self-imposed. Mental retardation and mental illness fall in the middle of the hierarchy. The Horne and Ricciardo (1988) study shows a stability of pattern over a 13 year longitudinal study. A very similar pattern is corroborated by Conant and Budoff (1983).

Attitudes of children towards devices used to aide persons with disabilities have also been studied. A negative stigma is attached to the use of prosthetic devices in general (Canestrari & Ricci Bitti, 1978; Worthington, 1977).

As an example, Flexer and Wood (1984) studied the subtle, but negative, effect of a highly visible, body style hearing aid on verbal interactions among children. This study concludes that children may be treated more normally with less visible, ear level aids. Considering that computers are now more readily available in the average home, a question is raised by this body of research. Will computer based HAC systems, similar to what children may see in their own homes or on television, be viewed as more acceptable than a traditional communication board? Will children view a HAC system as less prosthetic in nature and therefore more acceptable?

Another key area of research into attitudes is the factor of personal contact with individuals with disabilities. It is noted in some studies that unstructured contacts are relatively ineffective in producing acceptance (Donaldson, 1980; Thomas, Foreman, & Remenyi, 1985). This view is refuted by other studies, such as Esposito & Reed (1986), which identify positive effects resulting from contacts among young children. Fitzgerald (1985) notes that young children's acceptance of peers with disabilities may be related to children's abilities to interact competently within normal children's preferred activities. The concept of promoting acceptance of individuals with disabilities through contact with normal peers continues to spur debate in the field.

In summary, children view individuals with disabilities less positively than they do their normal peers. Certain patterns of acceptance appear to exist, ranking more physically oriented disabilities as more acceptable. Disabilities viewed as more under the control of individuals, such as mental illness or substance abuse, are less acceptable to normal children. In considering all research on attitudes, however, Devenney and Stratford (1983) inject a note of caution stating "...the study of attitudes is fraught with mine-fields of methodological and conceptual problems," (p. 205).

Parental Concerns Regarding Attitudes Towards Their Children with Disabilities

Parents state a number of concerns in regard to attitudes of normal children towards their children with disabilities. McDonnell (1987) notes parental concerns about the potential for verbal or physical abuse of their children with disabilities. The parents note worries about whether their children would be tricked into harmful activities. The majority of the parents in the McDonnell (1987) study express concern about whether their children would have non-disabled friends or would be isolated from both normal peers and extra-curricular activities.

Parents of children whose disabilities are viewed as "mild" appear to be less concerned about their children's welfare among non-disabled peers. A representative study,

Simpson and Myles (1989) notes that parents of children with milder cognitive or behavioral deficits are supportive of integrative settings with necessary modifications. Social concerns regarding acceptance of the child with a disability and avoidance of ridicule by the child continue to be an issue even in studies wherein the majority of the parents support integrated contact with normal peers (Bates, West, & Schnerl, 1977).

Teacher Attitudes Towards Individuals with Disabilities

Teacher attitude and perceptions are key factors in a child's overall success and development. Given the importance of attitude, it is of concern that regular education teachers indicate that they do not feel adequately prepared to teach some students who are mainstreamed into regular classes (Martin, Bernstein, Daly & Cody, 1988; Phillips, Allred, Brulle & Shank, 1990).

Teacher acceptance of the student with disabilities is one of the most widely associated factors in success of integration programs (Gans & Flexer, 1985; Stephens & Braun, 1980). Unfortunately, it is noted that teachers are more negative towards children with disabilities in the regular education classroom than are non-teachers within society (Phelps, 1974) and teachers further display negative stereotyping (Aloia, Knutson, Minner & Von Seggern, 1980; Martinek & Karper, 1981). Therefore, it is important to address what increases and decreases teacher acceptance of the children

with disabilities. This type of knowledge will allow higher education programs to foster factors which increase acceptance at a preservice level.

Gans and Flexer (1985) note that teachers express concern about their abilities to adapt materials, about classes that are too large for efficient programming, preparation, or consultation. Teachers express concern about their training in the area of integrating students with disabilities and further feel that the normal students are not well prepared for integration experiences. Administrative support, in terms of class size and input into the integration process, is a factor as well (Gans & Flexer, 1985).

Personal teacher factors are also noted to be correlated with acceptance. A general review of the literature supports the statement that elementary school teachers have more positive attitudes towards children with disabilities than do their secondary counterparts (Stephens & Braun, 1980). Results of studies which explore the factors of age and gender of the teacher produce conflicting results (Yuker, 1988).

Powers (1971) describes a "success syndrome" wherein factors are identified which lead to students' successfully interacting with teachers. Characteristics such as positive attitudes, frequent and successful contributions to the class, attempts to answer difficult questions, volunteering

for difficult assignments, and high status with peers are noted. Feldman and Prohaska (1979) and Cantor and Gelfand (1977) note that teachers are more satisfied with their own work and are subsequently more positive with students when non-verbal signs of interest were displayed by students. Teachers rate students as more attractive, likable, and competent when the children are more responsive (Cantor & Gelfand, 1977). Teachers are further noted to prefer students displaying behaviors of control, orderliness, and conformity (Silberman, 1971). These characteristics may be difficult for children with disabilities to display. Other factors which are noted to affect teacher attitudes include genetic factors, physiological conditions (e.g., age, illness), direct experience with children with disabilities, and life experiences (Triandis, 1971).

Both teachers and preservice teachers enter the classroom with specific attitudes. These beliefs may or may not be based in fact. Beliefs form a basis for expectations, which in turn may cause students to behave in a certain manner, thus reinforcing the original belief. For example, students who are viewed as more intellectually capable may be called on to respond more often and be given more challenging work, thus leading to an increase in overall achievement (Brothy & Evertson, 1981). This is of particular interest in view of research which supports the concern that regular education teachers frequently underestimate the

abilities of children with disabilities (Wood, 1989). Doyle, Hancock and Kifer (1972) note that teachers' expectations of IQ correlate to reading achievement on a whole class as well as individual basis. Further, teachers' attitudes tend to be global in nature. Students who are viewed as intellectually inferior are often also viewed as less socially acceptable and may be disliked by the teacher as well (Nash, 1973). Therefore, teachers' attitudes are a powerful influence in the classroom. It is cautiously suggested that the preservice teacher population selected for this study would display characteristics typical of the general non-teaching population at the beginning of their school careers while becoming more typical of teachers in general towards the end of their schooling as they gain more experience with education and children.

In summary, teachers' attitudes towards children with disabilities indicate concern about teacher abilities to adequately instruct children with special needs. Teachers feel unprepared to adapt materials and overwhelmed by large class sizes preventing individual attention. Personal teacher attributes, such as gender, produce conflicting results in studies, with the sole exception of elementary teachers being more positive in attitudes towards individuals with disabilities than secondary teachers. Generally, teachers appear to be less accepting of students with disabilities than of their normally developing peers. Further,

these beliefs and expectations may have an impact upon the students' ultimate achievement potential if they are not given opportunities to perform to their fullest potential.

Programs To Promote Acceptance

As a result of research noting that exceptional children experience social rejection in the mainstream environment, various types of programs are available aimed at increasing the potential for success (Esposito & Peach, 1983; Leyser et al., 1986; McEvoy, Shores, Wehby, Johnson & Fox, 1990). Odom and McEvoy (1988) identify three procedures which have shown effective results. Attitudes of normal peers may be modified by providing them with information prior to their contact with children with disabilities. A second technique is to modify the environment so that activities are more social than isolated in nature. A final technique depends upon specific teacher prompts and contingent praise.

Esposito and Peach (1983) note that the attitudes of young children may be made more favorable towards their peers with disabilities as a result of direct, structured contacts. They further suggest that contact with normal peers will result in children with disabilities gaining a wider repertoire of socially acceptable behaviors, thus reducing the potential for later ridicule.

A more novel approach is proposed by Langer, Bashner, and Chanowitz (1985). These researchers propose that

programs make children aware of numerous distinctions among them. It is suggested that identifying many differences among all of the children will make a single difference (e.g., a disabling condition) of less relative importance. This is in marked contrast to most programs, which strive to identify areas of commonality between normal children and children with disabilities. Langer and his colleagues suggest that individuals be taught to view all other people in terms of their differences. By concentrating on differences, it is proposed that children would then be more likely to see that people are able or unable in respect to a specific task, rather than a more generalized ability or lack of ability. Experimentation with sixth grade students, in which students were provided with activities to identify differences among themselves, supports the Langer et al., (1985) view.

A final representative study explores the technique of multi-media educational programs, which provide normal peers with both information and simulated disabling conditions (Leyser et al., 1986). This educational program is noted to be successful in trial studies, which include planned contacts in addition to the multi-media educational program.

In summary, a number of programs exist which are designed to help promote acceptance of children with disabilities by their non-disabled peers. Programs generally involve some means of information dissemination and

structured or unstructured contacts between normal children and their peers with disabilities.

Summary

Literature is reviewed in order to provide a knowledge base upon which to evaluate the results of a study. Micro computer use in the classroom is generally increasing, despite a suggested lack of expertise in its use by practicing and preservice teachers. The power and versatility of microcomputers tend to increase their ability to be used for individualized instruction. Studies are beginning to support the efficacy of computer use in the classroom.

Numerous assistive devices and adaptations are available, which allow individuals with disabilities full access to microcomputer programs and educational software. Devices are available which allow individuals with disabilities to use virtually any body part under voluntary control in order to enter information into a computer system. More severely involved individuals with disabilities can make use of scanning, eye gaze entry, and other more sophisticated devices as needed.

Augmentative communication provides non-vocal individuals with a means to communicate with the rest of the world. Traditionally, non-vocal individuals often used a communication board. Communication boards vary in size, shape, complexity and other factors. Numerous methods of making selections and producing responses are available, but all

generally require the assistance of an aide. HAC systems provide computer based communication for non-vocal individuals. Entry into the HAC system can also be achieved through a wide variety of methods, similar to those available for microcomputers in general. HAC systems allow the user a greater degree of independence in both entering information and producing responses.

Finally, attitudes towards individuals with disabilities are explored in the literature. Children view their peers with disabilities as less acceptable than other normal children. Generally, children are more accepting of peers who have physical disabilities and less accepting of peers whose disabilities are more psychiatric in nature. Teachers express concern over their ability to adequately teach children with disabilities in the classroom. Further, they cite large classes and lack of input into the integrative process as administrative problems which effect the ability to mainstream children with disabilities well. Parents are concerned about how well their children with disabilities will be received by normal peers. Studies of parental concerns cite issues of verbal abuse, physical abuse, and social rejection as fears parents have as their children with disabilities come into more contact with normal peers.

Programs are available which are designed to promote more acceptance between normal children and their peers with disabilities. Programs generally include an information

dissemination component and some form of contact between normal children and children with disabilities.

In conclusion, although a large body of research exists which impacts upon the specific topic proposed, only one study was located which specifically addresses whether normal individuals are more accepting of persons who are non-vocal using a HAC system as opposed to a traditional communication board or attempts by the individual to communicate physically. This study (Gorenflo & Gorenflo, 1991) does not address the issues of assumptions of intelligence, academic potential, and social mainstream acceptance. It is therefore suggested that further study is warranted.

Chapter 3

Methodology

This study was conducted to determine whether preservice teachers' attitudes towards non-vocal individuals with disabilities differed depending upon whether or not the individual was using a HAC (High Technology Augmentative Communication) device or a low technology communication board. Further, the influence of specific demographic variables on the dependent measures were explored.

A rating scale procedure, using a Likert scale and a factorial experimental design, was chosen due to its adaptability in obtaining personal information about attitudes (Kerlinger, 1986). The rating scale was comprised of three subscales measuring (a) preservice teacher estimates of intelligence, (b) preservice teacher estimates of academic potential, and (c) preservice teacher estimates of social acceptance in the mainstream setting. The rating scale allowed for a large population sampling given the economic constraints of the study, resulting in a higher degree of accuracy (Hopkins & Stanley, 1981; Kerlinger, 1986). The following is a discussion of the research questions posed in obtaining this information, the survey instrument devised for attitude measurement, the method used

for sample selection, the means of data collection, and the data analysis utilized.

Research Questions

Teacher attitude and expectations effect student performance in a variety of ways. The purpose of this study was to examine the attitudes of preservice teachers towards the use and non-use of HAC devices by non-vocal individuals. This study was guided by the following research questions:

1. Do preservice teachers view non-vocal individuals with physical disabilities who utilize HAC devices as more intellectually competent than those same individuals utilizing low technology communication boards?
2. Do preservice teachers view non-vocal individuals with physical disabilities who use HAC devices as more capable of being academically and socially mainstreamed into a regular education classroom than those same individuals utilizing low technology communication boards?
3. Do preservice teacher responses vary in relation to their class standing in terms of number of years of higher education completed?
4. Do preservice teacher responses vary in relation to their age?
5. Do preservice teacher responses vary in relation to whether they view a younger child versus an older child utilizing the devices?

6. Do preservice teacher responses vary in relation to their exposure to knowledge of special education as documented by a having completed a minimum of two college level courses in special education.
7. Do preservice teacher responses vary in relation to personal experience or exposure to individuals with physical disabilities?

Survey Instrument

The survey instrument was developed as a result of the review of the literature. It consisted of three subscales. The first subscale, Intelligence Estimates, consisted of items designed to measure preservice teachers' estimates of a videotaped student's general intelligence. Examples of items include: "This student appears to be of at least average intelligence," and "This student appears to comprehend instruction on an age appropriate level." The Intelligence Estimates subscale is comprised of questions numbered 1, 5, 7, 9, 12, 15, 18, 24, 27, and 30 on the survey instrument (see Appendix B).

The second subscale, Academic Potential Estimates, consisted of items designed to measure preservice teachers' estimates of a videotaped student's academic potential. Examples of items include: "I think this student could handle regular academics for his/her age." and "This student appears to be at least average academically." The Academic

Potential Estimates subscale is comprised of questions numbered 2, 3, 6, 8, 10, 13, 16, 20, 25, and 29 on the survey instrument (see Appendix B).

The final subscale, Social Acceptance Estimates, consisted of items designed to measure preservice teachers' estimates of the videotaped student's ability to be accepted socially in a mainstreamed setting. Examples of items include: "This child will probably be liked," and "This student will probably be able to make friends in regular classes." The Social Acceptance Estimates subscale is comprised of questions numbered 4, 11, 14, 17, 19, 21, 22, 23, 26, and 28 on the survey instrument (see Appendix B).

Content validity of the instrument was assessed utilizing a panel of experts drawn from the special education faculty at the University of North Texas, as well as input from two experts in augmentative communication. In accordance with suggestions made by Kerlinger (1986), panel members were asked to consider the content validity of the instrument in terms of clarity of questions, the relation of the survey to the research questions, the nature of the questions in terms of social desirability with the potential of leading students into certain responses, and the nature of the questions in terms of the potential for suggesting answers to students (see Appendix A).

In order to establish internal consistency, stability and reliability of the instrument, a pilot study was

conducted using 54 students drawn from the population described. A stability reliability was calculated using the Statistical Package for the Social Sciences, Release 4.1 (Norusis, 1990), with an elapsed interval of 14 days between administrations. Test-retest correlations were calculated for each subscale, resulting in the coefficients noted in Table 1.

Table 1

Coefficients of Stability for Pilot Study

Subscale	Coefficient of Stability
Intelligence Estimates	.8137**
Academic Potential Estimates	.8093**
Social Acceptance Estimates	.8932**

**Significant at .01 level of acceptance

Unique assessment problems are noted to be encountered in the affective domain as when one is measuring attitudes. Ajzen and Fishbein (1977) note a large attitude-behavior discrepancy in attitude research. Scales are noted to be vulnerable to self-deception, fakability, and a lack of external criteria (Hopkins & Stanley, 1981). Personality inventories, such as the Minnesota Multiphasic Personality Inventory and the California Psychological Inventory

indicate certain subscale test-retest reliabilities in the 50's and 60's respectively. Personality and attitude assessment is difficult and somewhat imprecise (Hopkins & Stanley, 1981). All three coefficients of stability indicated significance at the .01 level of acceptance for the survey instrument designed for this study. These results were deemed satisfactory for research purposes.

Cronbach's coefficient alpha (conducted on each subscale) was used to address internal consistency. The resulting coefficients, reported in Table 2, indicated adequate consistency. As a result of these analyses, the survey instrument was judged to be adequate for the need.

Table 2

Alpha Coefficients for Pilot Study

Sub-scale	Alpha Coefficient
Intelligence Estimates	.9345
Academic Potential Estimates	.9419
Social Acceptance Estimates	.9663

Sample Selection and Description of Subjects

The sample selected for this study utilized cluster sampling procedure (Kerlinger, 1986), and was drawn from undergraduate education students taking classes at two north

Texas area universities in the Fall of 1992. Subjects were primarily juniors and seniors, who had progressed far enough in their college experience to be identified as preservice teachers by the criteria of involvement in education related courses. A limited number of graduate students were included if they were actively involved in pursuing a teaching credential.

The sample was divided into four cells, depending upon whether videotape A, B, C, or D was viewed. Videotapes A and B depicted the same elementary aged student, using a high technology device (Epson Light Talker) in A, and a low technology device (Alphabet Board) in B. Videotapes C and D depicted the same high school aged student, using a high technology device in C (Epson Light Talker), and a low technology device in D (Alphabet Board). A cell sample of 25-30 was viewed as adequate given the design and the dependent measures (Drew, 1980; Kerlinger, 1986). Following elimination of two cases for incomplete information, a sample size of 146 for the full study was obtained, which met the criteria for adequate sample size.

Demographic data was gathered on all full study respondents in the areas of class standing, age of subject, number of special education courses completed, amount of personal contact with individuals with disabilities, and identification as a special or regular education major. This data was subsequently analyzed using point-biserial and

Pearson's product moment correlation techniques examining the relationship of demographic data with responses to the dependent variables. The demographic items analyzed by point-biserial correlation included: (a) class standing, (b) exposure to special education knowledge, (c) membership in regular education versus special education, and (d) personal experience with individuals with disabilities. Pearson's product moment correlation was used to examine the relationship of subject age with the dependent variables. The demographic data is presented in Table 3.

Table 3

Demographic Data

Demographic	Number
Class Standing	
Junior	40
Senior	94
Graduate	12
Courses in Special Education	
None	82
Less Than Two	32
Two or More	32
Personal Contact	
None	31
A Little	54
Some	34
A Lot	13
A Great Deal	10
Regular Education	72
Special Education	76
Age Range	19 - 50

Data Collection Methods

Students were selected for this study based on the researcher gaining permission to enter classes in which they were enrolled. The 148 students identified were advised that their participation was not required for the class in which they were enrolled nor by the University. The following statement was read to the participating students:

This videotape is being shown in: conjunction with a doctoral dissertation on mainstreaming. You'll be asked to watch the tape and then fill out a short questionnaire on your reactions. Please don't agonize over you answers -just give your reactions. This survey is anonymous, so please be honest. It has been designed so that there is no way for you to be individually identified. A script has been provided with the tape due to any difficulty in hearing the audio portion of the tape.

Following the reading of the introductory statement, subjects were shown a five minute videotape, developed by the researcher. The tapes depicted one of the following scenarios: (a) subject A - an elementary aged student responding to content area questions utilizing an Epson Light Talker activated by a foot controlled joystick; (b) subject B - the same elementary aged student responding to

identical content area questions, with the same responses scripted, using an alphabet board on which she indicated her letter choices by pointing with her toe; (c) subject C - a secondary level student responding to content area questions utilizing an Epson Light Talker activated by a head switch; and (d) subject D - the same secondary level student responding to identical content area questions, with the same responses scripted, using an eye gaze response to an alphabet board.

Finally, the subjects were provided with the survey instrument (see Appendix B), which was completed and collected immediately in order to avoid a problem with low response rate (Hopkins & Stanley, 1981; Jaeger, 1988). The total administration time was approximately ten minutes.

Data Analysis

A two-way, multivariate analysis of variance (MANOVA) was calculated addressing the independent, orthogonal variables of technology level versus age of video subject. Three dependent variables were examined (a) preservice teachers' estimations of the video subject's intellectual capacity, (b) preservice teachers' estimations of the video subject's academic achievement potential, and (c) preservice teachers' estimations of the video subject's potentialsocial acceptance in the mainstream setting.

MANOVA was chosen as a technique due to its ability to analyze a number of potentially unrelated dependent

variables (Tabachnick & Fidell, 1989). Additionally, it was utilized as a means of controlling the margin of error, which could rise to unacceptable levels if several independent tests were performed on the same sample for multiple dependent measures (Tabachnick & Fidell, 1989).

CHAPTER 4

PRESENTATION OF FINDINGS

Preservice teachers' attitudes were examined with respect to their reactions to videotapes of elementary and high school students using high technology and low technology communication devices. A pilot study was conducted on the survey instrument and subjected to statistical analysis. Results indicated the survey to be adequately reliable and a full study was conducted. The findings of this study are presented as follows (a) results of demographic correlations with sub-scales and subsequent analysis on demographics with individual survey questions, and (b) results of the multivariate analysis of variance (MANOVA).

As recommended by Tabachnik and Fidell (1989), data was screened for several factors prior to analysis. Data files were screened for accuracy and out-of-range variables. Missing data points were assessed and judged to be minimal. Two cases out of 148 were excluded from analyses for missing data.

Data was further reviewed to ascertain the extent to which assumptions were met prior to conducting analysis. Although it is not uncommon for assumptions of homogeneity to be violated in the field of behavioral sciences (Hinkle,

Wiersma, & Jurs, 1988) homogeneity of dispersion (variance) was noted to have a probability value of .326, thus removing homogeneity as an area of concern in this study. Sample size was noted to be adequate for the assumption of multivariate normality (Tabachnick & Fidell, 1989) and no outliers were noted.

Demographic Full Study Findings

Correlations were computed among the demographic variables of subjects' ages, class standing, contact with individuals with disabilities, number of courses in special education, membership in the categories of regular or special education major, and the three sub-scales identified as dependent variables. Correlations were conducted utilizing a sum of each sub-scale results for an overall view. Results of correlation coefficients for these items are noted in Table 4.

Table 4

Correlations of Demographics with Sub-scales

Sub-scales	Intelligence	Academics	Social
Class Standing	-.1248	-.0440	.0119
Courses Taken	.0510	.0085	.0712
Contact	.0349	.0679	.0601
Age	.0767	.0059	.0856
Regular/Special	-.0781	-.0462	-.0517

A goal of correlation studies is to assess the strength of the linear relationship between two variables involved in the particular research question (Norusis, 1990).

Correlation further measures the size and direction of the relationship between two variables (Tabachnik & Fidell, 1989).

Correlations among the demographic data and the sub-scales of Intelligence Estimates, Academic Potential Estimates and Social Acceptance Estimates were noted to be non-significant. These findings indicate that a prior relationship of significance does not appear to exist among the subscales. Examination of the demographic correlations

indicates the answers to several of the research questions initially proposed by this study.

Research Question 3

Do preservice teacher responses vary in relation to their class standing in terms of number of years of higher education completed? Responses do not vary based upon class standing.

Research Question 4

Do preservice teacher responses vary in relation to their age? Responses on the dependent measures do not vary in relation to age of the preservice teacher.

Research Question 6

Do preservice teacher responses vary in relation to their knowledge of special education as documented by having completed courses in special education? Analysis indicated no relationship between teacher responses and knowledge of special education.

Research Question 7

Do preservice teacher responses vary in relation to personal experience or exposure to individuals with physical disabilities? No correlation was noted between the level of personal contact or experience and responses to the survey instrument.

MANOVA Findings

A two-way, between-subjects, factorial MANOVA was used for this study. The study was designed with two independent

variables and three dependent variables. The two independent variables were the level of technology used by the videotaped student and the grade level of the videotaped student. The three dependent measures used were the survey sub-scales of (a) Intelligence Estimates, (b) Academic Potential Estimates, and (c) Social Acceptance Estimates. The choice of MANOVA over a series of ANOVA's provided protection against an inflated Type 1 error, or the probability of finding significant differences by chance alone, due to multiple tests on correlated dependent variables (Norusis, 1990; Tabachnik & Fidell, 1989). The goal of research with MANOVA is to identify changes in the dependent variables as a result of manipulation of the independent variables. In the case of this study, MANOVA was utilized to ascertain changes in responses to the survey subscales as a result of viewing one of the four videotapes described earlier.

Prior to conducting the MANOVA, data was reviewed for adherence to assumptions. MANOVA dictates that dependent variables must come from a multivariate normal population. As noted earlier, this assumption was met through adequate sample size (Tabachnik & Fidell, 1989). Further, MANOVA requires that the variance-covariance matrix must match in each group. Testing for homogeneity of dispersion indicated this assumption was also met (exact probability = .326).

Descriptive statistics were also run to identify any unusual or outlying values. Cell means and standard deviations (S.D.) were reviewed and are reported in Table 5. No outliers were noted.

Table 5

Cell Means and Standard Deviations

Variable	Intelligence	Academic	Social
	Mean	Mean	Mean
	S.D.	S.D.	S.D.
Elem/Low Tech	59.47	56.98	49.36
	10.19	10.0	11.47
Elem/High Tech	60.27	59.33	51.80
	7.29	7.16	9.01
High School/Low Tech	56.08	54.10	46.23
	9.33	10.52	10.34
High School/High Tech	61.19	60.63	52.84
	9.65	10.10	9.39

Note Total range of possible scores = 10 - 70.

A visual inspection of the means indicates that preservice teachers overall rated the videotaped students as having higher academic potential and more probability of social acceptance when they were using a high technology

device for communication than when they were using a low technology device.

MANOVA was conducted and the interaction effect examined initially. As no significance was noted at that level, main effects were reviewed. When reporting MANOVA results exact significance levels of the F-statistic are given. The interaction effect results of the MANOVA procedure are noted in Table 6.

Table 6

MANOVA Findings (Grade, Technology)

Effect Tests (Wilks' lambda)	Sig. of F	df	F
Grade by Technology	.542	3,140	.71985
Technology	.008**	3,140	4.1363
Grade	.762	3,140	.38785

**Significance at the .01 level

Examination of Table 6 indicates that there was no significant interaction between the two independent variables of grade (elementary versus high school videotaped subject) and technology level (high versus low technology). Univariate F-tests for each of the dependent

variables were subsequently calculated and reported in Table 7.

Table 7

Univariate F-test for Grade by Technology

Variable	Sig. of F	df	F
Intelligence Estimates	.169	1,142	1.907
Academic Estimates	.226	1,142	1.479
Social Acceptance Estimates	.227	1,142	1.470

There were no significant differences noted for the interaction analysis of grade by technology. Univariate F-tests further supported these findings in terms of the three dependant variables. Table 6 also indicated that there was no significant for the variable of grade. Further univariate F-tests with each dependent variable supported these findings as shown in Table 8. Table 6 does indicate a significant main effect for technology at the .008 probability level. Univariate F-tests conducted are reported in Table 9. Results indicate significance for the two dependent variables of Academic Estimates and Social Acceptance Estimates.

Table 8

Univariate F-test for Grade

Variable	Sig. of F	df	F
Intelligence Estimates	.430	1,142	.626
Academic Estimates	.617	1,142	.251
Social Acceptance Estimates	.546	1,142	.366

Table 9

Univariate F-test for Technology

Variable	Sig. of F	df	F
Intelligence Estimates	.060	1,142	3.585
Academic Estimates	.010*	1,142	6.878
Social Acceptance Estimates	.009**	1,142	6.938

* Significance at the .05 level

** Significance at the .01 level

A summary of the results indicates that both Academic Potential Estimates and Social Acceptance Estimates were significant, supporting an overall main effect of technology

level. A summary of the MANOVA findings indicates further answers to research questions initially proposed.

Research Question 1

Do preservice teachers view non-vocal individuals with physical disabilities who use HAC devices as more intellectually competent than those same individuals utilizing low technology communication boards? Preservice teachers showed no significant difference in their responses to subscales items designed to measure their estimates of the videotaped student's intelligence.

Research Question 2

Do preservice teachers view non-vocal individuals with physical disabilities who use HAC devices as more capable of being mainstreamed socially and academically into a regular education classroom than those same individuals using low technology communication boards. Preservice teachers do view individuals using HAC systems as potentially more capable of both academic achievement and of social acceptance. Significance was noted when both subscales were analyzed.

Summary of Findings

This study was designed to answer specific research questions. Questions were posed as to whether various demographic variables would correlate significantly with the responses of preservice teachers to subscales on the survey instrument. No significant correlations were noted for any

of the demographic items and the three subscales of Intelligence Estimates, Academic Potential Estimates, and Social Acceptance Estimates.

Further questions were posed regarding whether the age of the videotaped student and the technology level used by the videotaped student would have an effect on the responses to the survey instrument. Interaction effects calculated using MANOVA techniques showed no significant relationship and were confirmed by subsequent univariate F-tests. Main effects were not shown for grade level, however, significance was demonstrated when technology level was examined. In both multivariate analysis and subsequent univariate F-test analysis, technology level had significant impact upon how preservice teachers responded to the survey instrument.

CHAPTER 5

DISCUSSION AND IMPLICATIONS

The purpose of this study was to examine preservice teachers' attitudes towards non-vocal students with physical disabilities based on the student's use or non-use of a high technology augmentative communication (HAC) system. Three key areas were targeted for investigation (a) preservice teachers' estimates of student intelligence, (b) preservice teachers' estimates of academic potential, and (c) preservice teachers' estimates of social acceptance in the mainstream. The results of this study indicate that preservice teachers consistently view students using high technology augmentative communication as having higher academic potential and greater potential for social success in the mainstream setting, even though there were, in reality, no differences in the children themselves other than their method of communication. This attitude has the potential for far reaching effects on students who have serious physical disabilities. In conclusion of this study, three final topics will be discussed (a) why attitude research is important, (b) what is currently known about attitudes towards exceptional students and what this study has contributed, and (c) implications for future study.

Why Attitude Research Is Important

This study demonstrated that preservice teachers display a distinct mind set or belief in regard to non-vocal students with disabilities using or not using high technology systems for communication. This knowledge is extremely important in terms of students' with disabilities ultimate success potential in the regular education environment.

Teachers set the emotional climate of the entire class. It has been demonstrated in other studies that teacher acceptance is one of the widely accepted factors that lead to success of integration programs for children with disabilities (Gans & Flexer, 1985; Stephens & Braun, 1980). The effect of teacher attitude on students whom they serve cannot be stressed enough in the educational field. If a teacher demonstrates an attitude of social acceptance, one of the factors explored in this study, students in his or her class will accept the behavior that is being modeled. It is, therefore, extremely important to understand preservice teacher attitudes in order to provide them with accurate information when beliefs are faulty prior to any extensive contact with students.

Of equally significant importance is the concept that beliefs and attitudes form a basis for expectations (Bates, 1981; Brophy & Evertson, 1981; Wood, 1989). Teachers who believe that a child has high academic potential tend to

expect behavior from that student that reflects the potential. Subsequently, they may call on the child more in class, give him or her more opportunities to respond, and perhaps even provide him or her with more challenging work. This challenge to the student may well be reflected in the student's behavior, creating a situation wherein the student lives up to the expectations that are placed upon him or her (Bates, 1981; Wood, 1989). In terms of this study, the implications of such attitudes are extremely significant in terms of a students' ultimate potential in life. If a preservice teacher continues in the attitude that a child with a HAC system has a higher academic potential and more potential for social success than one without, he or she may well behave towards students in very differing ways. The mere fact of possession of a communication device has the capability of deciding a child's future if teachers consistently provide that student with the message that he or she is, indeed, capable and will achieve at higher levels.

Further support is given to the importance of attitude research in the Powers (1971) study. This study identified a success syndrome associated with students whom teachers viewed as acceptable. Frequent successful contributions to the class and attempts to answer difficult questions were cited as factors associated with success. Both of these factors become more realistic for a student who is non-vocal

when a HAC system is available. Similarly, students were viewed as more attractive, and competent when they were more responsive to the teacher (Cantor & Gelfand, 1977).

What We Know About Attitudes

We now know, as a result of this study, that preservice teachers have formed attitudes about students who use high technology augmentative communication systems. We further know that these attitudes are not affected by the grade level of the non-vocal student, nor by various demographic factors examined in regard to the preservice teachers themselves. Age, class standing, knowledge of special education gained through college courses, identification as a future regular education or special education teacher, and personal contact or experience with individuals with disabilities are all insignificant in terms of predicting how preservice teachers view non-vocal students.

Other than this study, what we know about attitudes in terms of acceptance of individuals based on use or non-use of HAC systems is extremely limited. Only one study was located (Gorenflo & Gorenflo, 1991) which addressed attitudes. Although the findings of this study support the Gorenflo & Gorenflo (1991) study in that use of HAC systems increase favorable attitudes towards individuals who are non-vocal, The Gorenflo & Gorenflo, (1991) study does not address the topic of preservice teacher attitudes. Further, research was not located that addressed the specific sub-

scales investigated in this study. This study achieves importance through addressing these new areas which have the potential for far-reaching effects on children. Research is available which addresses attitudes in general towards children with disabilities. We know that an acceptance hierarchy exists with some disabilities being rated as more acceptable than others (Horne & Ricciardo, 1988). We also know that prosthetic devices are viewed negatively by children (Canestrari & Ricci Bitti, 1978). Computer devices, however, have become increasingly more common in today's society. This raises another serious question. If a hierarchy exists and children may, presumably, move up and down the hierarchy, will children with a HAC system, (similar to what many normal peers see in their own homes), be viewed as more acceptable than those with a device that may appear more prosthetic in nature? Preservice teachers in this study viewed HAC users as more socially acceptable and academically competent. This may suggest that a child with a disability appears more normal as a result of use of a commonplace piece of technology.

We have seen in the literature review for this study that contact with peers increases a child's social repertoire and decreases rejection of a child with a disability (Esposito & Peach, 1983). Fitzgerald (1985) further notes that acceptance in young children is based upon the ability to fit competently into normal activities.

If preservice teachers view children with HAC systems as more academically competent and as having greater social acceptance potential, will they in turn be more willing to accept them into regular education classes, thereby increasing the opportunities for interactions with peers? Further, if the HAC system allows the child to function independently in academic areas, will the child with the disability be viewed as fitting competently into normal activities by both teachers and students alike?

Technology for the use of individuals with disabilities is slated for expansion in the future. Already, individuals with severe physical disabilities are able to utilize computer modem systems to function in a more normal career capacity (Morgan, 1983; Woltosz, 1988). Will preservice teachers move into their teaching careers expecting students with HAC systems to achieve and thereby paving the way for a students' access into a professional careers?

Finally, Yaker (1988) reports mixed results when demographic variables of teachers are considered as a factor in attitude research. This study added to the knowledge base in that demographic factors of age, class standing, number of courses in special education, identification as regular education or special education preservice teachers, and personal contact with individuals with disabilities were all non-significant.

Implications for the Future

P.L. 101-476 (IDEA) mandates a "free and appropriate education for all students with disabilities in the least restrictive environment" (1990). In accordance with this law, students with serious physical disabilities may be enrolled at a higher rate in regular education classes. The students in the videotapes in this study did not change in terms of appearance, innate ability, social ability, or actual interactions pictured between the low and high technology videotapes. The responses of preservice teachers did change, however, dependent solely upon which technology level was viewed. Given a potential for an increased number of students from this population being enrolled in regular education classes, it becomes an area in need of much future study. Questions for future research are numerous. For example:

1. Do computerized devices actually enhance the academic abilities of students who are non-vocal or do they simply present the illusion of greater academic potential and then become a self-fulfilling prophecy?

2. Do HAC systems effect the quality of social acceptance in this population? Are communicative interactions purely academic in nature or are there increased numbers of personal communications as well? Do HAC users attend more social events, parties, and dates? Is the potential for increased social acceptance based upon

changes or differences in the student using the device or merely upon the novelty of an unusual toy creating momentary interest?

3. Individuals change with time and experience. Would preservice teachers change their attitudes significantly if a longitudinal study was conducted?

4. The U.S. Office of Technology Assistance (1988) notes that teachers and education majors have little or no computer training. Is this lack of training significant in terms of increasing or decreasing acceptance of HAC users?

A final consideration in terms of implications of this study includes the far-reaching effects of substantiating that the use of hightechnology has serious results in terms students' ultimate social acceptance and academic achievement. HAC devices are not inexpensive, particularly when adaptations are required to accommodate physical limitations. Although schools may have the option of pursuing funding through Title 1 of P.L. 100-407, the Technology-Related Assistance for Individuals with Disabilities Act of 1988, there will undoubtedly be more need than funds. A question arises as to the ultimate responsibility of various parties involved in providing such equipment.

APPENDIX A
CONTENT VALIDITY SURVEY

Appendix A
Content Validity Survey

Attached you will find a copy of a survey instrument being proposed in the process of a research study. Students completing this survey will be drawn from the undergraduate education student population at UNT and TWU. They will be shown a 5 minute videotape, depicting one of the following:

a) An elementary aged, nonvocal child with a physical disability answering content area questions using a high technology augmentative communication device (computer with synthesized speech output).

b) The same elementary aged child answering identical content area questions with similar scripted responses, using a traditional communication board (e.g., pointing to responses on a laminated board of words or pictures).

c) A secondary level, nonvocal student with a physical disability answering content area questions using a high technology augmentative communication device.

d) The same secondary aged student answering identical content area questions with similar scripted responses using a traditional communication board.

The following research questions are being addressed:

1. Do preservice teachers view nonvocal children with a physical disability using high technology augmentative devices as more intellectually competent than the same individual using a low technology device?

2. Do preservice teachers view nonvocal children with a physical disability using high technology augmentative devices as having more academic and social potential for success in regular education classes than the same individual using low technology?

3. Does the age of the video subject affect the responses to 1 and 2 above?

4. Demographic Comparison Data - Do preservice teacher responses vary in relation to: (a) their class standing, (b) their exposure to special education, (c) their personal contact with individuals with disabilities, and (d) their age?

Given these research questions, would you please rate the survey instrument based on the following:

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Completely Disagree</u>		<u>(Please note any comments directly on the survey)</u>
5	4	3	2	1	1. Survey questions are clear and unambiguous.
5	4	3	2	1	2. Survey questions clearly relate to the research questions
5	4	3	2	1	3. Survey questions are posed in such a way as to avoid leading the respondent to a socially desirable answer.
5	4	3	2	1	4. Survey questions are posed in such a way as to avoid leading the respondent to any particular answer.

Please return this survey to:

Robin Macke
4136 Wimbledon Dr.
Flower Mound, TX 75028

Thank you!

APPENDIX B
SURVEY INSTRUMENT

Appendix B
Survey Instrument

Thank you for taking the time to fill out this survey! Please fill in the following information about yourself. Please note there is no space for your name - *this survey is anonymous!*

Demographic Data - please circle your response and/or fill in the blank

1. I am a (**freshman * sophomore * junior * senior * grad student**)
2. I am _____ years of age.
3. I have completed (**no * less than 2 * 2 or more**) college courses in special education.
4. I have had (**no * a little * some * a lot * a great amount**) of experience with an individual with a physical handicap. (Note: Physical handicap is defined as a disability which interferes in some way with how a person lives, functions or works. Personal experience can include teaching, counseling, etc.)

After viewing the videotape, please respond to the following statements as best as you can by circling a number, ranging from:

7 = *Strongly Agree*

4 = *Generally Agree/Rather Neutral*

1 = *Strongly Disagree*

PLEASE CIRCLE VIDEOTAPE : A B C D

- | | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. This student appears to be of at least average intelligence. | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 2. I think this student could handle regular academics for his/her age. | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 3. I think this student could be placed in a regular education class for history. | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 4. This student could get along adequately with other students in regular classes. | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 5. This student could probably handle some kind of post high school education or training. | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 6. This student appears to be at least average academically. | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 7. This student appears to comprehend instruction on an age appropriate level. | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 8. I think this student could probably handle questions at the end of textbook chapters as well as most children his/her age. | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 9. This student seems as smart as other students his/her age. | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 10. This student could probably construct a report on an academic level appropriate for his/her age. | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 11. This child will probably be liked. | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

<i>7 = Strongly Agree</i>	<i>4 = Generally Agree/Rather Neutral</i>	<i>1 = Strongly Disagree</i>
12. This student could probably handle analysis of material at a level like other students of his/her age.	7 6 5 4 3 2 1	
13. I think this child could handle academic tests without having to simplify the content.	7 6 5 4 3 2 1	
14. This student will probably be able to make friends in regular classes.	7 6 5 4 3 2 1	
15. I think this child could discern meanings of discussions at an age appropriate level.	7 6 5 4 3 2 1	
16. This student is probably working at least on grade level.	7 6 5 4 3 2 1	
17. This student could probably attend social events in a regular ed. school.	7 6 5 4 3 2 1	
18. This child appears to have at least a normal amount of basic knowledge for his/her age.	7 6 5 4 3 2 1	
19. I think this child could fit into extra-curricular activities in a regular school.	7 6 5 4 3 2 1	
20. I think this student could probably understand class discussions of academic material on grade level.	7 6 5 4 3 2 1	
21. There are probably clubs at regular schools that this child could attend/enjoy.	7 6 5 4 3 2 1	
22. This student may have a boyfriend/girlfriend when of an appropriate age.	7 6 5 4 3 2 1	
23. This student would probably be liked by teachers.	7 6 5 4 3 2 1	
24. This student appears to be mentally intact.	7 6 5 4 3 2 1	
25. I think this child could understand homework as well as others in the class.	7 6 5 4 3 2 1	
26. This child would probably be respected by his/her peers.	7 6 5 4 3 2 1	
27. Intellectually, this student seems to be pretty much like others his/her age.	7 6 5 4 3 2 1	
28. This student would probably find a comfortable social niche in the regular classroom.	7 6 5 4 3 2 1	
29. I think this student could be assigned textbook material to learn on a level with other students his/her age.	7 6 5 4 3 2 1	
30. I think this child could learn at least at an average pace.	7 6 5 4 3 2 1	

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