INTEGRATION OF STUDENTS WITH DISABILITIES INTO A
CONTEMPORARY TECHNOLOGY EDUCATION PROGRAM:
A CASE STUDY

DISSERTATION

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

For the Degree of

DOCTOR OF EDUCATION

By

David T. Pullias, B.S., M.Ed.
Denton, Texas
December, 1992
INTEGRATION OF STUDENTS WITH DISABILITIES INTO A
CONTEMPORARY TECHNOLOGY EDUCATION PROGRAM:
A CASE STUDY

DISSERTATION

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

For the Degree of

DOCTOR OF EDUCATION

By

David T. Pullias, B.S., M.Ed.
Denton, Texas
December, 1992

The impacts resulting from the integration of students with moderate-to-severe disabilities into a contemporary technology education program are described in this study. The research centered around questions that addressed impacts on students with disabilities, on regular students, on teachers, and on parents of students with disabilities.

The study took place in a ninth-grade technology education class and involved two students with moderate-to-severe disabilities. One subject was a 15-year-old male student who was autistic, had a speech handicap, and was mildly retarded. The other student was a 17-year-old male who was emotionally disturbed and learning disabled.

Data were collected through classroom observations, videotaped sessions, and interviews with teachers and parents. Notes taken during observations and from videotaped sessions were transcribed, coded, and analyzed. Interviews were also transcribed. The transcripts were reviewed, and significant data were transferred to interview synopsis sheets for incorporation with the other findings.
No major problems were found with the integration of the students with disabilities into the technology education program. The students with disabilities caused no discipline problems and were readily accepted by the regular students. However, because the students with disabilities were not actively involved in many of the activities of the class, much of their time was spent off task. The findings reveal that the technology education teacher, who was provided only minimal orientation prior to the placement of the students with disabilities in his class, used regular students as well as individual attention to direct the students with disabilities.

A strong need for in-depth, ongoing communication was indicated between special education staff members and mainstream teachers. The importance of providing an orientation for regular students before students with disabilities are placed in mainstream classes was also evident from this study.
Copyright by

David T. Pullias

1992
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>2. BACKGROUND AND REVIEW OF LITERATURE</td>
<td>20</td>
</tr>
<tr>
<td>3. DESIGN OF THE STUDY</td>
<td>40</td>
</tr>
</tbody>
</table>

## 1. INTRODUCTION

- Background and Significance of the Study
- Purpose of the Study
- Questions to be Answered
- Definition of Terms
- Description of the Study
- Site Selection
- Selection of Population
- Collection of Data
- Analysis of Data

## 2. BACKGROUND AND REVIEW OF LITERATURE

- Education Reform and Industrial Arts
- Technology Education
- Special Education Legislation
- The Regular Education Initiative
- The Concept of Inclusion or Integration
- Inclusion and Technology Education
- Vocational Education Funding and Special Education

## 3. DESIGN OF THE STUDY

- Introduction
- Site and Population
- Site
- Gaining Entry
- Population
- Setting
- Collection of Data
- Observations and Field Notes
- Videotaping
- Coding Data
- Interviews
- Summary
Chapter 4. ANALYSIS OF DATA AND FINDINGS .............. 63

Introduction
Analysis of Field Note Data
  Sorting the Field Notes
  Refining the Field Note Data
  Grouping the Refined Field Note Data
Analysis of Interview Data
  Technology Education Teacher Interviews
  Special Education Teacher Interviews
  Parent Interviews
Discussion of Findings
  Teacher Strategies
  Behaviors of Regular Students Toward Students With Disabilities
  Interactions of Students With Disabilities With Regular Students
  Behaviors Exhibited by Students With Disabilities
  Interaction With the Lab Environment by Students With Disabilities
  Productivity of the Students With Disabilities
  Reactions of the Parents of Students With Disabilities
Summary

Chapter 5. SUMMARY AND DISCUSSION ................. 111

Background
Review of Findings
Interpretations of Findings
Implications
Recommendations for Future Research

APPENDIX .................................................. 131

A. Permission Form
B. Floor Plan
C. Observation Calendar
D. Data Collection Schedule
E. Categories for Data Analysis
F. Category Synopsis Form
G. Category Analysis
H. Example of Synopsis of Teacher Interviews

REFERENCE WORKS ................................. 149
CHAPTER 1

INTRODUCTION

Background and Significance of the Study

Over the last decade a great deal of emphasis has been placed on educational reform in the United States. A report by the National Commission on Excellence in Education (1983) had a major role in generating the education reform movement, and prompted numerous other reports calling for improvements in American education. The main theme of most of the reports and proposals has been for a return to the basics, more rigor, and a discipline-oriented curriculum. As a result, vast program and curriculum revisions have taken place.

Many states have conducted studies and passed legislation to reform public education. Texas House Bill 246 (1983), which is one example of this type of legislation, called for additional requirements in mathematics, science, English, economics, and foreign language and for major revisions in all curriculum areas. In the reform process, it was mandated that industrial arts programs be replaced with technology-based curricula in order to better reflect a technological society.

In November 1975, a sweeping federal law concerning the education of individuals with disabilities, Public Law 94-142-
-the Education for All Handicapped Children Act, was passed. This legislation dictated that every state provide education for persons with disabilities, ages 3 through 21, in the least-restrictive environment possible. The law requires that to the maximum extent appropriate, students with disabilities be educated with children who are not disabled. It also specifies that removal from the regular environment is to be permitted only when the nature or severity of a disability is such that education in regular classes with the use of supplementary aids and services cannot be achieved satisfactorily. Although the placement of students with disabilities in least-restrictive environments is commonly referred to as mainstreaming, the federal law does not refer to this term (Cicchelli & Ashby-Davis, 1986). Much concern and debate have arisen because of the vagueness of the meaning of the term mainstreaming. According to Biklen (1985), the federal legislature's failure to define mainstreaming has left schools relatively free to create programs for compliance as they see fit. As a result, the question of appropriate and least-restrictive environments for students with disabilities continues to plague educators.

Over the last few years, the Reagan administration's proposal called the Regular Education Initiative has captured the attention of educators in both special education and regular education. This proposal called for the total integration of special education students into regular
classrooms. The Regular Education Initiative builds on the concept of mainstreaming, and puts the term in a much stricter context. The term **inclusion** is now used to identify the concept proposed by the Regular Education Initiative. Those who support inclusion feel that all students should be treated equally, and that there should be no segregated programs for students with disabilities (Kaufman, 1989; Stainback & Stainback, 1984, 1989).

With the transformation of industrial arts to technology education and a high technology curriculum, the mandate that all students with disabilities be provided an education in the least-restrictive environment, and the concept of inclusion, concerns and questions have arisen over whether or not technology education courses are appropriate for students with special needs, especially those with moderate-to-severe challenges. The feeling on the part of some educators and parents is that a high technology environment and the equipment used are too overwhelming for students with disabilities. Their fear is that students with disabilities will not experience success, that they will become frustrated, and that what confidence they have will be destroyed (Brinker, 1985; Johnson & Betts, 1989; Scott, 1985). Others who contend that just the opposite is true, believe that exposure to technology can assist students in overcoming disabilities, and that even small successes in a high technology environment can make students feel better.
about themselves (Scott, 1985). They emphasize that mainstreaming allows students with disabilities to develop a few skills that apply to the "real world." Many technology education teachers have expressed concern that they are not trained to deal with students with disabilities and fear that they will not be able to manage them (Johnson & Betts, 1989). There are definitely misconceptions, misunderstandings, and a lack of agreement regarding the integration of students with disabilities into contemporary technology education courses.

At this point, educators are very anxious over the emphasis being placed on the inclusion of students with disabilities in regular classes. Vocational educators are doubly concerned due to the fact that federal funding for their programs is dependent upon the percentage of special populations enrolled in vocational classes. Many of these educators are fearful of having to deal with students with disabilities. This study focused on the single vocational program area of technology education (industrial technology), formerly referred to as industrial arts, and the impacts that occur when students with moderate-to-severe disabilities are placed in the program. The study is significant because it provides educators with insight into what to expect when students with disabilities are integrated into contemporary technology education classes. No studies were found of students with disabilities in new technology education
programs. This may be because the programs have been implemented recently.

**Purpose of the Study**

The purpose of this study was to describe the impacts of integrating students with moderate-to-severe disabilities into a contemporary technology education program. The impacts on students with disabilities, regular students, teachers, and parents of students with disabilities were addressed.

**Questions to be Answered**

The following questions provided direction for gathering and reflecting on data related to this study.

1. What types of strategies do teachers use with students with disabilities in a modern technology education lab?

2. What behaviors are exhibited by regular students toward students with disabilities in a technology education lab?

3. What types of interactions do students with disabilities have with other students in a technology education class?

4. What kinds of behaviors are exhibited by students with disabilities in a technology education class?

5. How do students with disabilities interact with technology in a modern technology education lab?
6. How productive are students with disabilities in a modern technology education lab?

7. How do the parents of students with disabilities react to their children being part of a technology education program?

Definition of Terms

For the purpose of this study the following definitions are provided:

Students with moderate-to-severe disabilities are students who are unable to function in a normal school setting without special education assistance. In the case of this study, the disabilities include emotional disabilities, autism combined with mental retardation, learning disabilities, and speech disorders.

Technology education is a technology-based educational program which replaces the traditional industrial arts curriculum area. In many cases, technology education has not been clearly defined. The intent is to provide a curriculum based on today's technology and to phase out the crafts-oriented concept.

Contemporary technology education is technology education that reflects modern technology such as computers, robotics, biotechnology, telecommunication, lasers, and hypermedia (computer controlled multi-media).
Mainstreaming is the concept of allowing students not previously included to be included. The success of mainstreaming is dependent upon the ability of students who are different to adapt to the minimum requirements of a group.

Inclusion is the concept that students with disabilities attend classes with their same-age peers and be provided with the support necessary for them to benefit from their educational experiences. In contrast to mainstreaming, inclusion calls upon the class to broaden the requirements for membership so that all belong. The classroom must fit the student—all students.

Integration is used synonymously with the term inclusion.

Description of the Study

This study involves describing the interactions, behaviors, and relationships that result from integrating students with moderate-to-severe disabilities into a contemporary technology education class. Because this study was descriptive in nature, its purpose was best served by using the observational case study method. According to Borg and Gall (1983), the case study approach has long been used in educational research. The case study method "involves an investigator who makes a detailed examination of a single subject or group or phenomenon" (p. 488). Case studies are
used to examine a bounded system of a program, an institution, or a population (Marshall & Rossman, 1989). Bogdan and Biklen (1982) described observational case studies as a method in which participant observation is the primary data-gathering technique; the focus of the study is on a particular organization or some aspect of the organization. Borg and Gall stated that observational case studies have as their focus a group of individuals who interact over a period of time, and concern ongoing groups. The preceding descriptions of the case study method, and the observational case study in particular, are definitely congruent with the purpose of this study. All names of people and places have been changed for use in this study.

Site Selection

The site selected for this study was a junior high school located in a suburb of a major city. Approval for the study was granted by the school principal approximately 4 1/2 months in advance of the project. A meeting with one of the assistant principals, two special education teachers, and the technology education teacher was held to discuss plans for the study. Although the neighborhood immediately surrounding the 30-year-old school is a middle-class, predominantly white community, the demographics of the school reflect students from a wide variety of ethnic and economic
backgrounds. One of the reasons for selecting this site was the fact that it does have such a diverse population.

One of the most significant reasons for selecting this particular junior high school was that it houses a technology education program implemented in the fall of 1989 that has gained wide recognition. The program operates in a lab that projects a very futuristic and exciting image. Technology education was implemented to replace the industrial arts program which consisted primarily of woodworking and drafting. The equipment, tools, and materials in the old shop were sold in an auction, and the facility was completely renovated to accommodate a modern technology lab. The lab contains many computers and related technologies such as laser disk players, modems, scanners, CD-ROM players, a small wind tunnel, a laser printer, and plotters. Most of the computers are on a local area network which provides access to software and printers. Students at the school can explore the areas of communication, production, transportation, biotechnology, and energy and power. Extensive use of computer simulations and a number of computer software programs allow the creation of original presentations. High technology, such as robotics, computer controlled machines, aerodynamic testing, hydroponics, material strength analysis, and telecommunications, is studied by the students. This setting provided an ideal environment in which to address the
purpose of this study. The fact that this type of program cannot be found in very many school districts helps to make this study unique. The school's program truly projects an image of contemporary technology.

The instructional methodology used in the lab promotes problem solving, creativity, and teamwork. The students work primarily in teams, with the instructor being a true facilitator. The teams engage in activities and problem solving using instructional modules provided by the teacher. Very little lecturing takes place in the lab, and cooperative learning is prevalent.

Selection of Population

Although it has been fairly common to see students with mild disabilities enrolled in technology education classes, educators have been reluctant to place students with moderate-to-severe disabilities in traditional industrial technology classes due to safety factors and the inability of the students to manipulate tools and equipment. With the implementation of new, computer-based technology education labs, the reluctance is still there, but the reasons for the reluctance have changed. Even though there is no longer heavy, dangerous equipment in the labs, the fear is that students with disabilities will not be able to cope with the technology and methodology utilized in the lab. With this
fact in mind, it was essential that the proper student population be selected for this study.

This study revolved around a ninth-grade technology education class into which two students with moderate-to-severe disabilities were integrated. One student had emotional and learning disabilities. The other student had autism and mild retardation in addition to a speech disorder. In order to facilitate the placement of selected students with disabilities in the program, and to allow the teacher to utilize a smaller class in which to integrate the students with disabilities, the special education staff, assistant principal, and technology education teacher were asked to recommend the class to be used. The class had an enrollment of 14 students, 6 white students, 5 African-American students, 1 Hispanic student, and 2 Asian students. Because it was a ninth-grade class, many of the students had been in the program the previous year.

Collection of Data

The three types of data collection used in this study were field notes, interviews, and videotaping. The use of multiple data-gathering methods permitted triangulation of data, which, according to Marshall and Rossman (1989), is the act of bringing more than one source of data to bear on a single point. Marshall and Rossman further suggested that using more than one data-gathering technique can greatly
strengthen the usefulness of a study for other settings, and can serve to corroborate, elaborate, or illuminate the research. Miles and Huberman (1984) postulated that if a researcher self-consciously sets out to collect and double check findings using multiple sources and modes of evidence, the verification process is largely built into the data-gathering process, and little more needs to be done than to report on the procedures. The key informants for this study were the students with disabilities and their teammates, the teacher in the technology education class, special education teachers, and the parents of the students with disabilities.

The primary method used for collecting data was observation and field notes. The class selected for the study was observed three times a week during the first two 6 weeks of the spring semester. The participant observer functioned as an observer while participating in the setting enough to gain rapport with the group and to develop a better understanding of the group's functions and relationships, as described by Borg and Gall (1983). The first 2- to -3 weeks were spent in becoming a part of the setting by letting the students become accustomed to the presence of an observer in the class.

Field notes were used to record activities in the classroom during each of the observation sessions. Each set
of field notes was dated and each page was numbered. The field notes contained both descriptive and reflective data. The descriptive data provided a detailed account of activities within the setting during the observation. In the descriptive part of the field notes, as suggested by Bogdan and Biklen (1982), the objective was to be as descriptive as possible, presenting details of what was observed rather than a summary or evaluation. The reflective portion of the field notes allowed for the documentation of personal feelings, hunches, ideas, and impressions (Bogdan & Biklen, 1982). The field notes were stored in a computer, and printed copies were kept in a binder, in chronological order. The field notes were coded after each observation, and a brief analysis was done in relation to the research questions. As this procedure was carried out during the study, a reduction of the data occurred. According to Miles and Huberman (1984), data reduction is the part of analysis that sharpens, sorts, focuses, discards, and organizes data in such a way that final conclusions can be drawn and verified. Data reduction involves choosing which data to code, which to pull out, and which to summarize, and reveals what the evolving story appears to be.

Interviews were used to gather first-hand data from the various subjects in the study. The purpose of interviewing the students was to gain an understanding of how they perceived the activities within the setting. The interviews
provided the students an opportunity to express their feelings and interpretations of what was happening in their own words. Attempts were made to interview the students with disabilities and the regular students at regular intervals. The student interviews were kept as informal as possible in an effort to encourage honest responses.

Periodical interviewing of the technology education teacher produced data from someone in the setting who was also, to some extent, an observer. This strategy also assisted in supporting the findings. Among the most logical sources of corroboration, according to Miles and Huberman (1984), are the individuals with whom one has talked and whom one has observed. The periodic interviews helped reveal the teacher's feelings, perceptions, and attitudes regarding the impact that the inclusion of handicapped students had on the class, and on himself.

The parents of the students with disabilities were interviewed to determine their perceptions of the impact of inclusion in the technology education class on their children. These interviews also helped to determine the students' feelings regarding the technology education class, as they were expressed at home. The parent interviews also provided information concerning the parents' feelings about their children's inclusion in the technology education program.
Interviews with special education teachers provided data from the staff involved in helping the special students work with their disabilities. Information was also obtained regarding how inclusion in the technology education class affected the special students' methods for dealing with their disabilities. The interviews with special education teachers were intended to reveal their feelings concerning the disabled students' inclusion in the technology education lab, and to serve as another source of corroboration.

Transcripts of all the interviews were stored in a computer, and printed copies were kept in a binder, in chronological order. The interview transcripts were inserted into the collection of observation field notes at points where the dates corresponded. This helped to facilitate data analysis. Interview transcripts were coded and brief analyses were done in relation to the research questions.

Another method used for gathering data was videotaping. At various times during the study, activities in the technology education class were recorded on videotape for use in corroborating what was recorded in the observation field notes. As stated by Borg and Gall (1983) "recordings can be replayed as often as necessary, thus making it easier to develop observational categories, and to test the reliability in which observers can use these categories in rating behavior" (p. 478). Videotaping also provided an opportunity
to study classroom interactions in more depth, because it allowed events to be reviewed for careful study.

Coding for the field notes, interview notes, and videotape notes was developed to correspond to the research questions. Various categories were identified and each was given a code number. While the categories initially identified closely resembled the research questions, new categories and new questions were determined as the study progressed. By allowing ideas to develop and realizing that the mind has the capacity to reorganize and reconstruct, richer research questions can evolve (Marshall & Rossman, 1989).

Analysis of Data

Data analysis is the process of systematically searching and arranging data that have been accumulated in order to increase the researcher's understanding, and facilitate presentation of the findings (Bogdan & Biklen, 1982). Analysis should not be reserved for the conclusion of data gathering. Marshall and Rossman (1989) stated that, "in qualitative studies, data collection and analysis go hand in hand to promote the emergence of substantive theory grounded in empirical data" (p. 113). As data are collected and analyzed, the emphasis of the study may shift and directions that vary from the original concept may be pursued.
To facilitate ongoing analysis, a coding system was used to apply to the field notes that were generated as a result of observations, interviews, and video recordings. Codes are retrieval and organizing devices that allow the analyst to quickly spot, pull out, and cluster all segments related to a particular question, hypothesis, concept, or theme (Miles & Huberman, 1984). The codes used were letter designations which represented categories related to various research questions. These categories included student interactions, emotional reactions, student/environment interactions, student productivity, teacher/student interactions, disciplinary occurrences, and attitudes (of students, teachers, and parents). These were but a sampling of possible categories, and categories continued to emerge as the data collection progressed.

Following each observation, interview, and videotaping, field notes describing what was observed and said in the setting were recorded on a standard form which also indicated the date, time, site, and/or informant, the number in the sequence of notes, and the page number. Occasionally it was appropriate to include sketches of floor plans and room arrangements. The form on which the notes were transcribed provided a wide margin on each side to allow coding and note writing. Each unit of information was identified in the left margin with the appropriate category code. This involved examining each sentence and paragraph in the transcribed
notes carefully and determining to which codes the material pertained, as well as deciding when one unit of data ended and another began (Bogdan & Biklen, 1982). As expected, one unit of information had more than one code, in many cases. In the right margin, notes that might be necessary for clarification were written. These remarks added meaning and clarity to the field notes (Miles & Huberman, 1984).

Copies of the field notes with the codings were made, and the originals were filed away as masters. Because the transcription of the notes was done on a computer, the original files were stored on a computer disk. At the conclusion of the data collection the chunks of coded information were sorted using one of two methods. One strategy was to cut out each portion of information from copies of the coded field notes and separate them into stacks of like coding. Each stack of coded information was fastened in chronological order to wide computer paper. This enabled a brief synopsis to be recorded adjacent to each piece of information.

After the sorting was completed, the information in each category was examined to determine apparent patterns and themes. A form was developed for recording the synopses for the segments of information coded for each category. The category forms were then grouped according to the research questions to which they were related. Data pertaining to each research question were recorded on separate forms.
Conclusions were drawn from analysis of the data that were recorded for each of the research questions.

Upon completion of the data analysis, the findings were described in tabular form. According to Miles and Huberman (1984), the chances of drawing and verifying valid conclusions are much greater using displays than merely narrative text. They state that narrative text alone is extremely weak and cumbersome. From the table for each research question, narratives were developed in an attempt to provide answers to each of the questions.
CHAPTER 2

BACKGROUND AND REVIEW OF LITERATURE

Education Reform and Industrial Arts

Over the past 10 years a great concern has arisen across the United States regarding the quality of education offered in public schools. The report by the National Commission on Excellence in Education (1983) probably had the greatest impact on the education reforms that have been taking place throughout the country during the past few years. The commission’s report has generated many studies to assess the quality of education in the United States which have, in turn, led to legislation directed at education reform by many state governments. In one such report, the Education Commission of the States (1983) recommended that governors, state legislators, boards of education, educators, and business leaders collaborate to develop and promptly put into effect plans for improving education in public schools. The major focus of the resulting reforms has been an added emphasis on mathematics, science, languages, and social sciences, commonly known as the basics in education.

During the national reform movement, the area of vocational education received extreme scrutiny. The program area of industrial arts, included in the scope of vocational
education, was one specific area that met with severe criticism. In many cases industrial arts was either revised or eliminated.

Feirer (1983) was concerned that, in the report by the National Commission on Excellence in Education, no reference was made to industrial arts or vocational education as an essential part of secondary education. He also predicted that if the report was taken seriously, industrial arts and vocational education would be scrutinized very closely.

Reece (1984), in his review of legislation in Texas, noted that an assault on vocational education in Texas began in June 1983. He quoted Ross Perot, chairman of the Select Committee on Public Education, as saying that leaving vocational education in the public school curriculum "is like leaving a little bit of cancer in the human body" (p. 40). Vocational education in this context included industrial arts. Perot was most concerned that vocational education had not changed with the times and was not of value as it existed at that time.

A recommendation by the Southern Regional Education Board's commission (1985) stated that:

Industrial arts courses beginning with the ninth grade should be redesigned to include content related to modern technology, such as electronics. The widely offered traditional industrial arts courses focus narrowly on woodshop or metal trades and do not meet the needs of today's society. (p. 5)
In addressing the future of industrial arts, Benson (1984) stated that the most significant factor leading to the demise of the program was that in many schools it was looked upon as manual training, offering courses not much different from those in the 1950s. He went on to say that if significant changes did not take place soon, industrial arts would not survive over the next few years. Benson (1984) declared that:

We must move ahead with vigor, enthusiasm, and a carefully designed research base. The quest must be to develop programs that answer the call for excellence, programs that are so dynamic that they speak for themselves through increased student enrollment and relevant experiences. We have come to the crossroads many professionals approach every ten years or so. It is imperative that we choose wisely, have the courage to act boldly, and follow through to achieve success. (p. 5)

The call was for industrial arts to give way to a technology-based curriculum that would better reflect a technological society.

Technology Education

A few educators across the United States had already seen the need to reform industrial arts programs, and had begun an attempt to formalize technology programs and to redefine industrial arts. One such project, The Jackson's Mill Industrial Arts Curriculum Theory (Hales & Jones, 1981), defined industrial arts as "a comprehensive educational program concerned with technology, its evolution, utilization, and significance with industry, its
organization, personnel, systems, techniques, resources, and products, and their socio/cultural impacts" (pp. 1-2). The Jackson's Mill Theory recognized the role of technology as being a knowledge base as well as an adaptive system. The Jackson's Mill project has been a major influence in redefining the area once known as industrial arts.

Face (1981) urged educators in the industrial arts field to begin immediately to figure out how to study the concept of technology, the impact of technology, and the consequences of technological decisions. He advocated the study of these aspects of technology rather than the processes of technology. Martin (1985) stated that general instruction in technology in public schools should focus on the development and enhancement of technological literacy. Technological literacy was defined by Hersh (1983) as:

> the competence required to engage in complex thinking. It entails possession of the appropriate knowledge and skill to access a continuously changing base of information. Knowing how to use machine technology, such as computers, is important because computers help to store and manipulate information. But the focus must ultimately be on engaging critical thought and teaching people how to continue learning. (p. 4)

The point that many in the profession have tried to make over the last few years is that nowhere in the educational experience of public school students do they have an opportunity to learn about technology. Technology education should provide this opportunity. Glines (1986) stated that even the most highly rated technology programs at that time
were approaching obsolescence. He went on to say that the technology education programs were not appropriate for the 1990s and the early 21st century. Annison (1983) argued that work being done in industrial arts in the early 1980s tied directly to what was important between 1930 and 1950. He contended that industrial arts was out of step with the country's needs; industrial arts focused on something that affected less than one-fifth of the children in the United States. Individuals in the industrial arts profession were more worried about the heritage of the discipline than they were about the future of children (Lauda, 1984).

In 1984, the Texas Legislature passed an education reform bill that virtually eliminated the curriculum that existed in Texas public schools at that time and mandated that all curriculum areas be overhauled to get back to the basics (Texas House Bill 246, 1983). One of the goals of this legislation was to eliminate courses that were considered to be "soft," and of no academic value. Industrial arts was one such curriculum area. The feeling of the legislature, the State Board of Education, and the state commissioner of education was that there was no longer a need for such courses as woodworking and metalworking. It was mandated that industrial arts be replaced with a curriculum that would better reflect a modern technological society.

In the latter part of the 1980s a few programs began to emerge throughout the United States that were shedding the
traditions of the past and were striving to provide a curriculum that reflected modern technology. Traditional industrial arts programs, which had once focused on developing manipulative skills and knowing about industrial materials and processes, began giving way to technology education programs which emphasized a broad approach to technology through instruction and activities that were designed to develop technological literacy (Johnson, 1989). In the fall of 1989, the school district in which this study took place began a new technology education program that was a radical departure from the old industrial arts offering. The new program, housed in a high technology setting, provides experiences in areas ranging from robotics and lasers to communication and electronics (Pullias, 1991). The program is computer based and provides access to such resources as a computer network, scanners, laser printers, computer-aided drafting stations, an audio studio, a video studio, a photography darkroom, modems, facsimile machines, satellite antennas, and a generous selection of computer software. The goal of the new technology education program is to help students learn how to function effectively in a world of advancing technology.

Special Education Legislation

At the same time the emphasis on technology education was taking place in American schools, educators were still
wrestling with the special education legislation that had become law in 1975 (Public Law 94-142). The concept of educating students with special needs in the least-restrictive environment was being promoted. The law mandated that, to the maximum extent appropriate, handicapped students are to be educated with children who are not handicapped. As pointed out by Biklen (1985), Public Law 94-142 (1975) does not define the words "least-restrictive environment," but the concept is implied. As a result, practitioners, namely principals, teachers, and parents, were called upon to provide an operational definition. Because of misunderstandings concerning the meaning of least-restrictive environment, bitter conflicts have frequently arisen over the appropriateness of specific placements for children. Few special educators or psychologists have taken courses emphasizing the legal framework governing special education (Margolis & Tewel, 1990). According to Margolis and Tewel, it must be recognized that there is no clear, absolute definition of least-restrictive environment. What is least-restrictive for one student may be overly restrictive for another.

In the early 1990s the practice of mainstreaming has stemmed from the concept of the least-restrictive environment. There are those who consider mainstreaming to be synonymous with the least-restrictive environment. Because there is no clear-cut definition for mainstreaming,
it has come to mean different things to different people and has taken many forms (Biklen, 1985). Kirk and Gallagher (1989) defined mainstreaming as "the process of bringing exceptional children into daily contact with nonexceptional children in an educational setting" (p. 41). Madeleine Will (1984a), former Assistant Secretary for Special Education and Rehabilitative Services, defined mainstreaming as moving children in the direction of the main current. She further stated that for some children with disabilities, the main current may mean the regular classroom; for others, it means self-contained classrooms. It seemed that the concept of mainstreaming, even though vague, had a more concentrated goal than the concept of the least-restrictive environment. Mainstreaming had the more definitive role of moving special needs students into regular classrooms.

Salisbury and Smith (1991) identified three levels at which students with disabilities can be mainstreamed, or integrated, with children in regular classroom settings. They see level one as being "physical integration," which involves merely placing the students with disabilities in the regular setting. At this level there is no assurance that students will be included in school activities or interactions with nonhandicapped students. Level two is "social integration," which primarily serves to integrate students with disabilities for socialization and communication purposes. The third level, "academic
integration" or mainstreaming, "occurs when the student with disabilities is served in a typical preschool or regular education setting, with instructional responsibility, resources, and planning shared among regular and special education staff" (p. 27).

The Regular Education Initiative

During the Reagan-Bush administration, proposals now known as the Regular Education Initiative began to emerge. The Regular Education Initiative basically supports the philosophy that the best way to serve students with special needs is to improve education for all students to the point that students of every description are served in regular classes with no students being given specific labels. One of the major proponents of the Regular Education Initiative was former Assistant Secretary Will (1984a). Her goal was for each child to have the best integrated setting possible, in his or her home school and near his or her family. One of her concerns was that more and more students with disabilities were receiving their education outside the regular classroom (Will, 1984b). Even though Will stated that mainstreaming did not suggest that all students with disabilities be placed in regular classrooms (Will, 1984a), Regular Education Initiative advocates promoted the idea that education outside the regular classroom is not required for anyone. They maintained that all students can be instructed
and managed effectively in regular classrooms (Kaufman, 1989). According to Kaufman,

advocates of the REI reject the current so-called "segregationist" special education and propose a new "integrated" model in which all students are special. The proposed new special education will be completely, or mostly, invisible because it will retain only the best of the outmoded and flawed dual system of special education and general education. (pp. 258-259)

Kaufman (1989) viewed the Regular Education Initiative as a political move to cut expenditures for special education under the guise of achieving excellence in the education of special needs students. He feared that by removing the labels from special education and placing all students with disabilities in regular classrooms, special education would lose its identity and be removed from the consciousness, resulting in a reduction in the quality of education provided students with disabilities.

Silver (1991) expressed a similar concern. He suggested that the Regular Education Initiative can cause special education to suffer the same consequences that the mental health field experienced in the 1960s. This was the period of "deinstitutionalization" to address the problem of patients spending so much time in mental hospitals that they lost any ability to adjust again to a regular environment. The goal was to gradually move patients back into the mainstream by way of group homes, halfway houses, sheltered settings, and day hospitals. Many of the individuals with chronic mental illness could be moved into these facilities
and then into the community. The money saved was to be transferred to cities and other communities, but it did not happen. As a result, the communities could not handle the patients who were discharged to community services that were never provided. Silver maintained that the situation caused by deinstitutionalization has contributed to the growing number of homeless people that currently inhabit city streets. He predicted that the same process will happen if the Regular Education Initiative is taken seriously.

McLeskey (1990) disagreed with Kaufman's (1989) assessment of the Regular Education Initiative, and stated that, with his interpretation of the Regular Education Initiative, Kaufman has created a monster. McLeskey stated that "education of students served by special education, like the education of all others in the system, is a legitimate target of reform" (p. 319). He further claimed that encouraging collaboration between special education and regular education can help to bring the best of special education into the mainstream of regular education.

It appears that there is some disagreement among professionals in special education as to the feasibility of total integration of students with disabilities into regular education classes. McLeskey (1990) alluded to this by stating that heated debates over the Regular Education Initiative can lead to internal division and cause
professionals to miss the opportunity to contribute to the broader debate on school reform.

The Concept of Inclusion or Integration

In spite of disagreement over the acceptance of the Regular Education Initiative, leaders in many school districts embrace the concept. The administrators of the school district included in this study declared the Regular Education Initiative concept of total integration of students with disabilities into the mainstream to be a district goal. The term used for this integration is inclusion. The goal of inclusion is to have all children welcomed into each classroom (O'Brien & Forest, 1989). The Regular Education Initiative Task Force in the Richardson Independent School District, Richardson, Texas, defined inclusion as a "concept that calls upon the class to broaden the requirements for membership so that all belong" (Richardson ISD, 1990, p. 3). According to Regular Education Initiative advocates, the resulting new general education will be successful for all children because teachers will know and take pride in the fact that they are expected to teach every child assigned to them (Kaufman, 1989). Biklen (1985) stated that one of the factors associated with effective schools is that "all students tend to do better when they participate in heterogeneous school groupings than when segregated by ability" (p. 55).
Some researchers feel that while the concepts of least-restrictive environment and inclusion are to be celebrated, there are still obstacles that hinder their full implementation. As stated by Wang, Reynolds, and Walberg (1986), the continued segregation of many programs and the inconsistency in the system for classifying and placing students are the two primary barriers. Wang et al. indicated that "current practices still leave a good deal of separateness, disjointedness, and inefficiency" (p. 31). Wang et al. emphasized that restructuring school programs to more completely integrate students with special learning needs can be accomplished most effectively by using all forms of knowledge on how to best deliver instruction. According to Wang, Reynolds, and Walberg (1988), the number of students identified as having special needs and placed in special education has increased to the point that a "second system" of education has been created. They contend that this second system is a result of the removal of selected students from regular classes. Wang et al. (1988) stated that this "pull out" approach "reinforces a tendency to overlook regular educational programs as one source of these students' learning problems. It also neglects the regular classroom as a possible site for improvement efforts" (p. 248). They proposed that true integration is the solution to the problem. True integration involves modification of the regular classroom to meet the needs of all students. These
advocates of integration proposed the integration of the
categorical programs and regular programs, improvement of the
effectiveness of regular education, and reduction of the
classification and labeling of students.

The concept of inclusion calls for the modification of
regular classrooms to meet the needs of all students, as
opposed to students having to adjust to regular classrooms.
True inclusion does not support labeling students, but
advocates one educational system for all students. The
belief is that all students can benefit from regular class
activities even though the individual goals for some may be
quite different (Davern & Schnorr, 1991).

Not all professionals in the field of special education
agree that all students with disabilities should be
integrated into regular educational programs. Thousand and
Villa (1990) stated that certain persons in the profession
question the placing of students with intensive educational
needs in regular classrooms. They quote Brown, Long,
Gruenewald, and Jorgensen (1989) as saying that "the major
placement issue of the day is whether students with severe
intellectual disabilities should be based in regular or
special education classrooms in home schools" (p. 12).
Jenkins, Pious, and Jewell (1990) determined that while the
regular education initiative should apply to most students
with handicaps, students with severe disabilities should not
be included. Others contend that inclusion involves all
students regardless of their degree of disability (Stainback & Stainback, 1984, 1989), and that strategies can be developed to meet the needs of all students.

A number of studies have been carried out dealing with the integration of students with disabilities into regular classrooms; however, most of these studies have dealt with students with mild disabilities. The majority of the studies researched took place in a traditional classroom setting, as opposed to a technology education environment. The findings of a few of these studies are presented in the following paragraphs.

In a study involving sites from across the United States, Brinker (1985) found that, even though retarded students were not the preferred interaction partners of students who were not retarded, the presence of nonretarded students created more social opportunities for severely retarded students than would exist in a segregated setting. Alves and Gottlieb (1986) conducted a naturalistic study of student-teacher interactions in a mainstreamed classroom and concluded that students with disabilities, compared to students without disabilities, received fewer opportunities for active involvement in academic activities. In an ethnographic study to examine the socialization of exceptional children in integrated settings, Peters (1990) found that positive integration of physically handicapped children into a regular classroom setting is much less
dependent on "handicapping" characteristics than on factors and processes involved in socialization. Smith (1983), who studied the approaches to classroom management of classroom teachers and learning disability resource teachers, concluded that classroom teachers displayed a more punitive approach to classroom management. This finding supports the beliefs of some educators that classroom teachers do not have the skills or knowledge required to deal with students with disabilities. Many educators fear that regular teachers will not alter their management styles to accommodate the needs and feelings of students with disabilities. Deitmen (1988) concluded that as the total number of supportive services increases, attitudes of vocational/technical instructors toward handicapped students become more positive.

Inclusion and Technology Education

With the emergence of the inclusion philosophy, concerns have been raised regarding the placement of students with disabilities in the new technology education programs. Questions have consistently been raised pertaining to the placement of students with disabilities in industrial arts classes, but they have centered primarily around students with mild disabilities. These questions have been compounded by the fact that there are likely to be more students with moderate-to severe-disabilities placed in the new technology education classes. Additionally, these programs focus on
high technology which, some fear, may not be an appropriate setting for students with disabilities. Scott (1985) stated that, "as industrial arts programs move to more 'technology-based' instruction, there is renewed interest and concern about serving students with disabilities in such programs" (p. 5). Johnson and Betts (1989) stated that both special educators and technology educators have expressed concerns that lower ability students may not be able to succeed in technology education. Questions have been raised concerning difficulties related to students with disabilities meeting academic challenges, dealing with students with disabilities in large classes, lab safety, methodology, and resources (Scott, 1985). Another area of concern involves the interaction of students with disabilities and students who are not disabled. Some fear that integration will have a negative effect on students with disabilities, especially students with severe disabilities (Brinker, 1985).

While some technology educators express concern over integrating students with disabilities into technology education programs, others feel the programs hold great value for students with disabilities. Scott (1985) stated that "it is wrong to assume that the handicapped or any other learner could not benefit from participation in technology education programs" (p. 5). According to Scott, the academic knowledge and technological literacy that students with disabilities can gain in technology education programs are aspects of the
program that can be of greatest benefit for students with disabilities as they prepare for life.

In addressing concerns about teaching students with disabilities in technology education classes, Johnson (1986) reminded technology educators that the teacher characteristics necessary for success with handicapped students do not require additional study or training. He stated that, because teachers work with a variety of unique student needs each day, they already have many of the skills necessary for working with the handicapped. He referred to the characteristics of creative ideas, subject area skills, and a positive attitude. Johnson also noted that these characteristics are a teacher's most valuable resource for teaching all students, which can result in overall program improvement.

According to Kregal (1989), regular vocational programs provide the most "normal" placement for students with disabilities and have the greatest potential for preparing students for the world of work. He goes on to say, however, that the least-restrictive environment may not always be the appropriate environment for a student. Kregal emphasized that students' right to an appropriate education takes precedence over their placement in the least-restrictive environment. Kregal also suggested that vocational program requirements could be modified to adapt the courses to students with disabilities.
Vocational Education Funding and Special Education

This study is important not only because the inclusion movement has gained such momentum, but also due to the fact that the Carl D. Perkins Vocational and Applied Technology Education Act (Public Law 101-392, 1990), which provides federal funding for technology education, mandates that funds be targeted to vocational and applied technology education programs that serve the highest concentration of individuals who are members of special populations in the most integrated settings possible. The term special populations includes individuals with handicaps, educationally and economically disadvantaged individuals, individuals of limited English proficiency, individuals who participate in programs designed to eliminate sex bias, and individuals in correctional institutions. The subjects of this study were classified in the group described by the Carl Perkins legislation as individuals with handicaps.

No studies of the impacts of integrating students with disabilities into a modern technology education setting were found. The absence of studies concerning the integration of students with disabilities into new technology programs is primarily attributable to the fact that the programs are new and not many of the programs are set up in a truly high technology environment.
Three students with moderate-to-severe disabilities were informally observed in a new technology education class during the 1990-1991 school year. One student had autism, one had Down's syndrome, and the other had cerebral palsy. After witnessing the gains that these exceptional students made in the setting, the changes in attitudes on the part of parents and teachers, and the relationships that developed between the students with disabilities and students without disabilities, it was determined that a formal study should be undertaken in order to document the impacts that develop from integrating exceptional students into new technology education classes.
CHAPTER 3

DESIGN OF THE STUDY

Introduction

The purpose of this study was to describe interactions, behaviors, and relationships resulting from the integration of students with moderate-to-severe disabilities into a contemporary technology education class. Because industrial arts programs are being phased out in public schools and are being replaced with technology education programs that emphasize experiences in a high technology environment, the goal for this study was to describe what happens when students with moderate-to-severe disabilities are placed in a high technology environment. These impacts were studied in the setting in which they occurred and the actions and reactions of students in the class were observed first-hand.

It was determined that the qualitative method, particularly the case study design, was most appropriate for accomplishing the goals of this study. As stated by Bogdan and Biklen (1982) "qualitative researchers go to the particular setting under study because they are concerned with context. They believe that action can best be understood when it is observed in the setting in which it occurs" (p. 27). The case study design was selected because
the primary means of data gathering was participant observation and the focus was on a particular group.

The primary data gathering technique for this study included first-hand observation and field notes. However, other techniques were used occasionally to support and corroborate the findings. Videotaping sessions helped to confirm data gathered by first-hand observation, and interviews with the technology education teacher, parents of the students with disabilities, and the special education staff at the school helped to provide valuable insight.

The procedures used to carry out the study are described in this chapter. A description of the site and population studied and a description of the methods used for collecting and analyzing the data are included. Names of all places and persons have been changed for the protection of those involved in the study.

Site and Population

Site

The site selected for this study was Morgan Junior High School, which is located in a suburb of a major city. The 26-year-old school contains grades seven, eight, and nine. The neighborhood immediately surrounding the school is a predominantly white, middle-class community; however, the demographics of the school have changed dramatically over the past 5 years due in large part to the merging of a
neighboring junior high school with Morgan. The primary reasons for selecting this site for the study were
(a) the diversity of the student body, and (b) the fact that it houses a very progressive technology education program that has gained wide recognition. During the 1991-1992 school year, Morgan Junior High had a total enrollment of 690 students. Of the 690 students, 254 were in the seventh grade, 198 were in the eighth grade, 220 were in the ninth grade, and 18 were in special classes. At Morgan, 48% of the students were white, 27% were African-American, 19% were Hispanic, and 6% were Asian. Twenty-three languages were represented in Morgan Junior High School. Of the students enrolled in Morgan during the 1991-1992 school year, 104 were classified as limited English proficient. The school was staffed by 1 head principal, 2 assistant principals, 60 classroom teachers, 3 counselors, 1 librarian, and 8 paraprofessionals.

Gaining Entry

Approximately 4 1/2 months prior to the planned beginning of the study, a meeting was held with the principal of Morgan Junior High to discuss the project and to secure his permission to pursue the study. Being a central administrator for the school district facilitated entry into the school to conduct the study. The principal was agreeable
and recommended that further planning be done with one of
the assistant principals.

A meeting was scheduled for August 30 with the assistant principal, who suggested that a special education staff teacher also be included. In the meeting, the plan for the study was described and was received favorably and enthusiastically by the Morgan representatives. Input was then requested as to which students with disabilities and which technology class would be most appropriate for the study. The special education staff member was asked to recommend three students for the study, and the technology teacher agreed on the number. Three students were identified so that one or two students could drop out if necessary without terminating the study. The special education teacher and the technology teacher also mutually agreed on the class period that would be most appropriate. It was determined that the study would commence on January 21, which was the first day of the second semester.

Population

Late in September, a conference was conducted with the special education staff at Morgan Junior High School to discuss the students recommended for participation in the study. The three students suggested for the study were considered to have moderate-to-severe disabilities. John was a ninth-grade African-American student who was emotionally
disturbed and learning disabled. John was 16 years old when the study began, but had his 17th birthday a week later. Until shortly before the study, he was also considered speech handicapped. Behaviors considered to be a result of John's emotional handicap were difficulty concentrating, verbal outbursts, avoidance of responsibility, denial of his behavior, the appearance of being confused, and making irrelevant remarks. John told elaborate stories and was unable to distinguish fact from fiction. He also had a tendency to withdraw and isolate himself from others, and to blame others when he was in trouble. John had few coping skills and was confused and frightened by his lack of control over his life.

It has been determined that John's learning disability was real, and not a result of his emotional disturbance. Tests showed that John read at the third-grade level, his written expression was at the second-grade level, and his mathematics ability was at the fifth-grade level. His intelligence test score was 79.

John had been in the technology education program since the first of the school year. This was the only regular class in which he was enrolled. He had been placed in the vocational skills program and was in a self-contained setting for the other six periods of the day. John was originally placed in the behavior adjustment program, but being with the behavior adjustment students affected his self-esteem to such
an extent that he had to be moved to the vocational skills class.

John had been expelled from school 2 years prior to the study for possessing a loaded weapon in school. John was then under the oversight of a parole officer who checked on him periodically. John had a difficult time with being in school. He admitted that he greatly disliked school and threatened to drop out numerous times. His teachers predicted that when John reached 17 years of age he would likely drop out of school. (A student can legally drop out of school at age 17.) During the 7th week of the study, John did drop out of school.

The second student selected for the study was Dan, a 15-year-old who was autistic, had a speech handicap, and was mildly mentally retarded. His full-scale intelligence score on the MSC-R was 62, and his adaptive behavior composite was 5 years and 1 month. Dan had a moderate receptive and expressive communication disorder and had difficulty in conversations in all areas. His functional language usage was very poor. Dan possessed a marked lack of awareness of the feelings of others and had an impairment in his ability to make peer friendships. He was very insistent on following routines in precise detail. He "escaped" by writing stories.

Dan was placed in the technology education class for the first time at the beginning of this study, which meant he entered the class at the beginning of the second semester.
This was the only regular class in which Dan was enrolled. Dan's autism assessment report indicated that he evidenced disturbances of speech and language, relatedness, perception, developmental rate, and mobility such that he could not be adequately educated in regular classes without the provision of special services.

Barbara, who was the third student selected for the study, had Down's syndrome, was mentally retarded, and had a speech disorder. Barbara did not have an opportunity to participate in the study due to the fact she and her mother moved out of town unexpectedly at the beginning of the second semester.

A release form was developed to be signed by the parents of the students with disabilities giving permission to use their children in the study (see Appendix A). In meetings with each of the parents, the study was explained and information was obtained regarding each of the students. Upon completion of the meetings, the parents signed the release forms and copies were given to the research department of the school district and the University of North Texas. Copies were also kept on file.

The class selected for the study was a ninth-grade technology education class. The class had an enrollment of 14 students, comprised of 6 white students, 5 African-American students, 1 Hispanic student, and 2 Asian students. There were 13 male students and 1 female student in the
class. Because it was a ninth-grade class, all of the students had been in the class since the first of the school year, or one full semester.

The special education vocational skills teacher occasionally brought four or five of his students in to use the lab during the class period. For the most part, the students with disabilities were not involved with students in the regular class, and rarely interacted with the regular students. However, they did utilize some of the computers and materials in the lab.

**Setting**

The primary setting for this study was a technology education lab at Morgan Junior High School. As district supervisor for the technology education program, I had been in the lab numerous times, and was well acquainted with the teacher.

The technology lab, which was previously a woodshop, was located in the opposite corner of the building from the main office and was across the hall from the gymnasium. Anyone entering the technology lab first had to pass through a small entry area. This area had colored posters and signs on the wall to describe the activities in the lab. The area also contained a showcase made of plexiglass in which apparatus such as a small robotic arm and other mechanical devices were displayed.
The lab provided a colorful environment which had a high technology appearance. The lab was brightly lit with lighting fixtures that were flush with a new acoustic ceiling. The walls of the lab looked freshly painted. The upper one-half of the walls was painted white and the lower one-half was painted light blue. The floor was carpeted, and ivory colored vertical blinds covered the windows which spanned the wall at the far end of the lab. The main portion of the lab was 47 feet long and 36 feet wide. The floor plan is shown in Appendix B.

The furnishings in the middle of the lab consisted primarily of five work areas, called islands. Each island had as its pivotal point a vertical standard called a pylon, which was 7 feet 9 inches tall. The pylons were triangular in shape. From the ceiling, and entering into the top of each pylon, were sources for air, electricity, video, and the computer network. Around the top of each pylon, colorful signs indicated the activities that took place at the island. A video monitor hung in each pylon. Three workstations, one on each of the three sides of the pylon, were placed around each of the pylons. The workstations ranged from 29 inches to 40 inches in height, depending upon their functions. The workstations were equipped with computers. The workstations were made of metal and were painted red and light blue, and most of the tops were bright aluminum. The seating at the workstations was upholstered secretarial-type chairs which
were on casters. A mobile bookshelf in the middle of the lab housed numerous reference books.

Around the perimeter of the lab were other types of workstations. Along one wall, four small hydroponic gardens were located next to a large display case with a glass front. Displayed in the case was a large number of boxes in which the various software programs used in the lab were packaged. This enabled visitors to get an idea of what software the students were using in the lab. Along the wall, under the windows, a long workstation contained two computers, a small computer numerically controlled lathe, and a small robotic arm. Across the lab from the hydroponic gardens was a table on which a laser printer, a dot matrix printer, and a color ink jet printer were located. Also on this table were racks containing computer disks, arranged by period, on which students stored data they created. To the left of this table were two additional computer workstations. To the right of the printer table was an area for the teacher's desk and cabinets. In the teacher's area was the file server for the computer network which was located on top of a cabinet which housed laser disk players, a CD-ROM player, a VCR, and switchers to enable downloading output from these devices to the various islands in the lab.

At the end of the lab where the entry door was located was the lecture/demonstration area. When this room was a woodshop, this area was occupied by wire cages used for
project storage. The cages were replaced with six tables which were 30 inches wide and 6 feet long. Around each table were bright blue plastic molded chairs with casters. Also in the area was a white marker board, a projection screen, the teacher's lectern, and a television set on a stand fastened to one wall. The students routinely met in this area at the beginning and end of each period for discussion, and to allow the teacher to see that everyone was present and that equipment and materials were properly put away.

The work done by students in the technology education lab was done in teams of two to four students. Cooperative learning played a major role in the classes, and the teacher assumed the role of facilitator. In this role, the teacher spent very little time lecturing to students, but directed students in discovering answers and solutions for themselves. As an example, rather than spending time presenting a lesson on how to use the computers in the lab, which were predominantly Apple Macintosh computers, students were paired and given modules from which to work to learn how to use the computers. The modules were notebook-like documents that provided information, examples, and activities related to the topic. The large number of modules in the lab addressed various topics, and played a major role in the students' learning. Having students utilize the modules allowed the teacher to spend time with individual students during the major portion of each period.
Collection of Data

Because the study was descriptive in nature, it was determined that the observational case study method best suited the purpose of the study. The primary method used for collecting data was classroom observations and field notes, for which an observation schedule was developed (see Appendix C). Observations took place over a 12-week period beginning with the first day of the spring semester of the 1991-1992 school year. Three observations were scheduled to take place each week, for a total of 36 classroom observations. At set intervals, the activities in the class were recorded on videotape and interviews were conducted with the parents of the students with disabilities, the special education staff at Morgan Junior High School, and the teacher. Bringing together more than one source of data helped to verify the findings as suggested by Miles and Huberman (1984). A data collection schedule, developed for the 12-week period, was used to guide the data gathering process (see Appendix D).

Observations and Field Notes

A total of 34 classroom observations were conducted. Although 36 observations were originally scheduled, 4 observations rather than the 6 originally planned were conducted during the last 2 weeks of the negotiated 12-week period because of a perceived need to ease out of the study. By this point in the study, duplication of the data being
collected was becoming commonplace. A need to leave the
the study more gradually was also evident due to feelings of
attachment toward the class.

Arrival at the school at least 45 minutes early each day
the class was to be observed provided an opportunity to visit
with teachers in the teachers' lounge, to talk with the
special education staff, and to have discussions with the
teacher of the technology education class. These visits
provided an opportunity to gain a feeling for the climate of
the school, and to occasionally discuss specific students
with the staff. This period of time spent visiting with the
teachers also led to acceptance by the staff.

During the first 2 weeks of the study, some of the
students seemed curious as to why another adult was in the
class. Other students had seen the observer in the school
before in a supervisory role and did not seem to be as
curious. By the end of this 2-week period, the students
seemed to accept the fact the class was being observed and
the observations were not disruptive to the class routine.
The teacher appeared to be unaffected by the fact that the
study was taking place in his lab.

Arrival in the technology lab for each observation was
always in advance of the class to be observed. During the
first few observations the observer remained in a location
that was out of the main flow of the class in an effort to
help reduce the impact on the class. As the semester
progressed the observer became more intertwined in the activities of the class. On two occasions students asked why the class was being observed. The answer given was that the class was being observed to gain information regarding the technology education program. The students were very much aware of the fact that the program had gained national attention. Because educators from all parts of the United States had continually visited the lab during the last 2 1/2 years, the students felt comfortable with outsiders in the lab.

All of the work done by the students in the class was done in teams of four to five students. Each team was given a different problem to solve. In turn, each team leader assigned each team member a responsibility for part of the problem solution. The two students with disabilities who were subjects of this study were assigned to the same team. Although this arrangement had not been suggested, it helped to facilitate the observation process.

During each observation notes were made describing the activities of the class, particularly the involvement of the students with disabilities. Each class was observed for the entire period. The focus of the observations was primarily on one team of students; thus, as the semester progressed, the observer positioned himself closer to the team's activities. It was important not only to observe and
record the actions of the team, but also to hear and record conversations.

After each observation, the notes that had been taken were transcribed and other information was added from memory. The notes were transcribed using a computer and word processing software. The field notes were transcribed with as much detail as possible. An attempt was made to avoid generalities in recording the data and to describe in detail the activities, behaviors, and interactions that took place. Bogdan and Biklen (1982) emphasized the importance of being as descriptive as possible and of avoiding summaries or evaluations.

The field notes were transcribed onto a form that included the observation number, the date, the observer's name, and the time the observation took place. The number of the observation was placed at the bottom of each transcribed page. The observation number was followed by a number indicating the number of the page for the set of notes. For example, the numbers 12-3 at the bottom of a page indicated that the page was the 3rd page of transcribed notes for the 12th observation. This system ensured that the pages could always be identified as belonging in a particular set of notes and could be reordered if they were accidentally rearranged. Original copies of the transcribed notes were stored on a computer disk, and hard copies were kept in chronological order in a three-ring binder.
Videotaping

At certain set intervals in the data-gathering process videotape was used to record activities in the technology education class. A total of five sessions were recorded; the first was during the 11th scheduled observation. The videotapes proved to be valuable in reinforcing data that was gathered through personal observations. The advantage in using the video recordings was the capability it provided to view the tapes several times in order to get a better grasp of what was taking place in the class. However, it took much longer to transcribe the data from the videotapes because of the option of viewing portions of the tapes more than once. The ability to observe the class first-hand while the action was being recorded on videotape was a benefit. This allowed for recall of the activities of the entire class and the climate of the class as the videotapes were viewed and the data transcribed.

In preparation for each session that was to be recorded, the video camera was set up prior to the students entering the lab. Having the students become comfortable with having a video camera in the lab was not an issue due to the fact that video cameras are set up in the lab permanently for the students' use in developing materials and presentations. Even so, the camera used was set up in a corner of the lab out of the main flow of activity. Although the taping was focused, for the most part, on the team that included the
students with disabilities, the camera was occasionally panned in an effort to capture a feeling for the entire setting.

After each videotaping session, the tape was played and transcribed notes were taken directly on the computer while watching the videotape. On a few occasions certain behaviors were visible on the tape that were missed by the observer while in the class. These instances were usually subtleties that helped to give meaning to other actions. On one such occasion, one of the regular students had sat down beside the autistic student and had said what appeared to be something derogatory to him. The student with autism then stood up and told the regular student to go back to his group. However, the videotape revealed that the regular student merely asked the autistic student what he was doing. The videotape revealed that the reaction of the autistic student had nothing to do with what the regular student had said. It was apparent, however, that the regular student had asked the question as a means of teasing the autistic student, knowing how the student with disabilities would react. The videotapes proved to be very useful in corroborating data and for reflecting.

Coding Data

It was necessary to categorize each part of the data that was collected to determine patterns that might emerge.
Information provided by Bogdan and Biklen (1982) served as a guide for categorizing and coding data from the observations and videotapes. As the notes were transcribed, a new paragraph was begun each time a change occurred in what was observed. This allowed the transcribed notes to be arranged in manageable pieces of related information. Comments, which were the observer's feelings and speculations, were also recorded in the transcribed notes under the parcels of information to which they pertained. The comments were recorded in italics and were preceded by the letters O.C.

Prior to the beginning of the observations, certain categories were identified that might indicate patterns of behavior, events, and interactions that might occur in the setting during the study. The intent was to identify categories that would relate to the questions addressed in the study. To do this, statements were developed that reflected each question. For example, one of the questions to be answered was, What kinds of interactions do students with disabilities have with other students in the technology education class? To address this question, categories such as (a) socialization with regular students, (b) reaction to regular students, and (c) requests for assistance from the regular students were identified. Some of the categories selected at the beginning of the study were the result of the informal observation of students with disabilities enrolled
in a high school technology education class during the previous year.

As the study progressed the categories took on a different look. Patterns that began to develop in the data collected caused certain categories to be eliminated, some to be added, and others to be combined. Each category was given a number which became the category code. To illustrate, the number 3 was the code for the category identified as "request for assistance from regular students." A list of the categories appears in Appendix E.

The category codes were attached to the appropriate pieces of information in the transcribed field notes. No codes were assigned to the field notes until after the 2nd week of observations to allow patterns to begin to develop. This also provided an opportunity to modify the list of categories to best represent the data. The form on which the field notes were transcribed contained a wide left margin to allow room for the appropriate codes to be placed beside the information in the field notes. As the codes were placed beside the segments of information, brackets were drawn around the exact portion of information being coded. Also written beside each segment of information was the page number of the notes on which the information appeared, with a circle around it. This ensured chronological sorting of the data later.
During the coding process some data were identified as not pertinent to the study. With more than 200 pages of field notes, it was accepted that a certain amount of data that were collected would have no bearing on the focus of the study. This data reduction was done by crossing through any data in the field notes that would not be used in the final analysis. Data reduction involves choosing which data to code and which to pull out (Miles and Huberman, 1984).

Interviews

Various persons associated with the study were interviewed at appropriate times during the study in an attempt to gain additional insight into what was unfolding as the data gathering progressed. Prior to the beginning of the data collection, the parents of the students with disabilities were interviewed to familiarize them with the study and to determine their feelings regarding the use of their children as subjects of the study. During these initial interviews, information was gained that indicated the parents' perception of their child's disabilities. This information was later compared to the perceptions of the special education staff at Morgan Junior High School.

Interviews with the parents of the students with disabilities were also conducted midway through the study to obtain information regarding their feelings about the students with disabilities being in the technology education
program. This was only accomplished with the parents of Dan, the autistic student. At this time the other subject in the study had decided to drop out of school, and the parent had lost interest. Also, due to the nature of this student's family situation it became evident that it was best not to pursue the interview.

Interviews were conducted with special education staff, both at the central office and at Morgan Junior High School. Prior to the study, the special education consultant responsible for supervising inclusion and transition for the school district was interviewed to determine the philosophy of the district regarding inclusion. This interview also provided an official school district interpretation of the inclusion concept. The data gained from the interview with the central staff consultant reinforced the significance of this study. The school district is earnestly moving toward implementing the inclusion concept on a districtwide basis. The central administrators interpreted inclusion as meaning that efforts will be made to include all students in regular education. The findings in this study provide information that can be used to help prepare schools for the implementation of the inclusion concept.

At various times during the study, both formal and informal interviews were conducted with the special education staff at Morgan Junior High School. An initial interview was conducted prior to the beginning of the data collection to
obtain information regarding the students with disabilities who were to be the subjects of the study. This interview also provided input regarding the feelings of the building special education staff regarding inclusion. The opinions of the building staff, which did not match those of the central staff, were that total inclusion will not work. They believed that there are a number of students with disabilities who cannot succeed in the regular classroom. In the opinion of the building special education staff, total inclusion would not only be unfair to some of the students with disabilities, but also to regular classroom teachers.

The initial interview with the special education staff at Morgan Junior High School provided an opportunity to look through the cumulative folders of the subjects of the study with the special education staff. Staff members were cooperative in providing needed information. Additional interviews were conducted with the building special education staff throughout the course of the study. These interviews, primarily informal in nature, were used to reinforce and clarify data being gathered regarding certain behaviors and interactions of the students with disabilities. Interviews with the special education staff were conducted to determine how they felt about the involvement of students with disabilities in the technology education program.

Numerous interviews with the technology education teacher were conducted on an informal basis at the end of
class periods during the course of the study. While the teacher interviews were not lengthy, they revealed his feelings regarding the presence of the students with disabilities in his technology education class. He also volunteered suggestions for facilitating the successful inclusion of students with disabilities in the technology education classes. The interviews with the teacher were not structured interviews; they usually were guided by what had been observed in the class.

Summary

Three types of data-gathering techniques were used in this study. While participant observation and field notes were the primary methods used for data collection, interviews and video recordings were also used. Thirty-four classroom observations were conducted, from which more than 200 pages of transcribed field notes were generated. In addition, video recordings were made of five class sessions, and numerous interviews were conducted with parents, special education staff members, and the technology education teacher.

Transcripts of the observation field notes and the videotapes were coded with category codes to enable the identification of the data in relation to the research questions. The coding also served to facilitate the sorting of the data for analysis.
CHAPTER 4

ANALYSIS OF DATA AND FINDINGS

Introduction

The procedures used for analyzing the data gathered during this study and a description of the findings are provided in this chapter. The data gathered through classroom observations, video recordings, and interviews were sorted, refined, and grouped to provide the narrative for the findings. During the analysis process, further data reduction took place as was appropriate.

The findings were recorded as they related to the questions addressed by the study. The findings focused on the impacts of integrating students with moderate-to-severe disabilities into a contemporary technology education program. Impacts on students with disabilities, regular students, teachers, and the parents of students with disabilities were addressed.

Analysis of Field Note Data

Sorting the Field Notes

After the 170 single-spaced typewritten pages of field note transcripts were coded, it was necessary to sort the data by category in order to facilitate analysis. Five
photocopies of the field note transcripts were made so that the pages could be cut apart and each piece of coded information sorted according to the category indicated by its code. Because many of the pieces of information were assigned multiple codes, it was necessary to have multiple copies of this information. No piece of coded data was assigned more than five codes. Each unit of coded data was separated and placed in an appropriate stack. Units of data with the same codes were placed in separate stacks in chronological order. This process yielded 31 stacks of coded data; each stack represented one category for data analysis.

To ensure the data would remain in the appropriate groups and order, and to allow refinement of the data, each strip of coded data in each stack was taped to a group of unseparated computer pages. The information in each category stack was taped to the far left of the computer pages to allow space on the right side of the pages for refinement of the data. The name of the category was written at the top of the first page of each stack of computer paper.

This process yielded 31 groups, or stacks, of computer paper. Each group contained all of the units of field note data pertaining to one data category. The pages in the stacks were left attached to allow the pages to be unfolded and the complete collection of data for a category to be viewed. Having the data taped to the computer pages in chronological order allowed the information to be examined
for any effect time might have on the findings. Arranging
the data chronologically also allowed easy reference to the
original field notes when needed.

The coded transcripts of the field notes of the
videotaped sessions were sorted in the same fashion. The
segments of coded information from the videotape transcripts
were cut apart and taped to pages in the appropriate stacks
of observation field note data. As with the observation
field note data, the videotape data were taped to the extreme
left side of the computer paper. The videotape data were
taped in chronological order to the coded computer sheets at
the end of the observation data. The computer pages on which
the information was taped were left attached enabling all of
the field note data for each category to be viewed as a total
picture, in a continuous flow.

Refining the Field Note Data

Once all of the coded field note data were sorted and
attached to the wide computer paper, the refinement of the
data was begun. To refine the data, the information taped on
the computer sheets was reviewed, and a synopsis of each
segment was written on the right side of the attached sheets.
Having taped the field note data on the left side of the
computer paper provided sufficient space on the right portion
of the sheets for recording the synopses. The synopses were
written by hand. For the categories directly involving the
students with disabilities, the space for recording the synopses was divided into two columns. Each column was designated for the synopses related to one of the students with disabilities. An example of the data refining process is shown in Appendix F.

Refinement of the data resulted in a reduction of data through the elimination of unnecessary verbage. The process also allowed an additional examination of the data, which resulted in the elimination of information that was not relevant to the specific purpose of the study.

Grouping the Refined Field Note Data

As stated in Chapter 3, the specific categories for data analysis were grouped under broad headings which reflected the research questions (see Appendix E). To effectively group the field note data for further analysis, category analysis forms were developed. Space was provided at the top of the form for the name of the broad heading. Below the name of the broad heading were five columns. At the top of each column was space for a category number and the name of the category. Each of the categories identified under the broad heading shown at the top of the form were identified in each of the five columns. If more than five columns were required, a second page was used. A sample of the form is provided in Appendix G.
On the category analysis form, in the appropriate columns, each synopsis of the coded data from the computer sheets was recorded. If the synopses were too extensive for one page, a second page was used. This process yielded a total of 35 pages of grouped information. These pages included data from both participant observations and videotaped sessions. This method provided a convenient format from which the narrative of the findings could be developed.

The information included on the category analysis forms provided an in-depth description of activities in the classes that were observed. The forms allowed the data to be arranged by categories under broad headings which related to the questions being addressed by the study.

Analysis of Interview Data

Interviews were conducted with parents of the students with disabilities, special education staff, and the technology education teacher to help gain additional insight into the activities observed in the technology education class. Some of the interviews were recorded on audiotape, notes were taken during some of the interviews, and the data for the remaining interviews were recorded from memory. The audiotaped interviews were transcribed in their entirety to facilitate analysis of the data. Each interview was recorded in writing.
Technology Education Teacher Interviews

The teacher interviews were, for the most part, informal; therefore, the transcribed notes were not lengthy. The teacher interviews generally took place at the end of class periods and focused on events that took place during the period. The transcribed notes for each teacher interview that was conducted at the end of a class period were recorded at the end of the observation field notes for that class period. The date of the interview was placed in the left margin of the interview notes.

The transcribed interview notes were photocopied, and a copy of each interview was taped to continuous sheets of wide computer paper. The interview notes were taped to the computer paper in chronological order. Compilation of the interview notes in this manner allowed easy access to the complete set of notes for review. The notes of the teacher interviews were reviewed, and pertinent information was highlighted for use in developing the findings. A yellow marker was used to highlight the information.

Synopsis forms were developed for recording pertinent data that were highlighted from the technology education teacher interviews. The form consisted of four columns, one for each of the following four categories: (a) preparations for the students with disabilities, (b) perceptions of and expectations for the students with disabilities, (c) feelings for the students with disabilities, and (d) teacher
reflections. Each of the four categories addressed the research question concerning the strategies the teacher used with the students with disabilities. The category titles were placed at the top of the columns, and each piece of highlighted information was copied into the appropriate column. See Appendix H for a sample of the completed synopsis form.

Special Education Teacher Interviews

Transcripts of the interviews with each of the special education teachers were also taped to continuous sheets of wide computer paper in chronological order. As was done with the technology education teacher interviews, the transcripts were reviewed, and the pertinent segments of information were highlighted with a yellow marker. Most of the highlighted information related to one or more of the 31 field note categories.

A form was also developed for recording the highlighted data. Because two special education teachers were involved in the interviews, the form included a column for the responses of each teacher. Beside each of the teacher columns were smaller columns for recording the number of the category to which each piece of information related.

Each of the two special education teachers was primarily responsible for one of the two students with disabilities being used in the study. Separation of the information on
the synopsis form by teacher made it easy to focus on each student. Presentation of information in the synopsis format provided a composite picture of the pertinent findings from the interviews.

**Parent Interviews**

Two sets of interviews were conducted with the parents of the students with disabilities. The first interviews took place prior to the beginning of the study. The purpose of these interviews was to secure permission from the parents to use their children in the study and to determine how the parents felt about their children being a part of the project. The initial interviews also provided insight into how the parents of each student perceived their child's disability. Relevant data were copied to a synopsis form for parent interviews for inclusion in the findings. The synopsis form provided a column for recording the data from each parent interview.

Approximately midway through the study, an additional interview was conducted with Dan's parents. Dan was the student who had autism. Relevant data from this interview were compiled on a separate form. An attempt to conduct an interview with John's mother at this time was unsuccessful. John had already committed to dropping out of school, and his mother, who was working and going to school, was not accessible for an interview.
The information compiled from the interviews with parents provided data pertaining to how the parents of the students with disabilities felt about their children being in the technology education program. The parent interviews also furnished information that supported the findings that emerged from the classroom observations.

Once all of the data from the observation field notes, videotape notes, teacher interviews, and parent interviews was sorted, analyzed, and grouped, the stage was set for formal discussion of the findings. The data were organized in such a way, using the forms and tables, to facilitate the development of the narrative. The forms and tables were valuable in drawing and verifying conclusions.

Discussion of Findings

As stated previously, the purpose of this study was to describe the impacts of integrating students with moderate-to-severe disabilities into a contemporary technology education program. This section provides a discussion of the impacts as they related to students with disabilities, regular students, teachers, and parents of the students with disabilities.

Teacher Strategies

During one of the interviews with the technology education teacher, it was learned that the teacher had not prepared or coached the students in the technology class in
any way for having Dan as a new member of the class at the
beginning of the second semester. John had been in the class
since the beginning of the school year; therefore, the
students were familiar with him. The teacher felt that the
regular students would "begin to take care of Dan" as the
semester progressed.

The technology education teacher did not have any
special orientation from the special education department
before Dan entered his class. The teacher stated in an
interview that he had never met Dan before he entered the
technology education class. This was the decision of the
technology education teacher. The special education teachers
met with the technology education teacher on one occasion to
discuss Dan prior to the beginning of the study. The meeting
was approximately 30 minutes in length and dealt primarily
with Dan's special education assessment. Effective
strategies and methodologies to use with Dan or behaviors to
be anticipated from Dan were not discussed.

At one point the technology teacher was asked if he had
received an Individual Education Plan for Dan from the
special education department. The teacher stated that he
had, but that he had probably put it in the drawer with the
rest of them. His feeling was that he did not want to have
any preconceived ideas about the students.

The teacher equated the presence of students with
disabilities in the class to a previous experience with a
student who had been in trouble with the law. Because the teacher did not know of the problems the student had when he was placed in the program, he naturally treated the young man as he would have any other student. The student performed very well. The teacher believed that not having any predetermined feelings about the student was the key to his success, and expected that the same would be true in working with the students with disabilities. The teacher seemed to be confusing disability with delinquency. At the end of the study the teacher stated that he would want a thorough orientation if students with moderate-to-severe disabilities were again placed in his classes.

The teacher seemed to have become sensitive to John's behaviors and tendencies, and occasionally made statements such as, "You have to go real easy with John." The teacher was aware that John could be easily upset and become irrational. As a result, the teacher did not push John into completing tasks. For example, the teacher did not insist that John do any writing on the computer because he knew that John could not write well and would become embarrassed. The teacher knew that John's self-esteem could be easily damaged. The teacher seemed extremely sensitive to the feelings of the students.

The teacher had a definite daily routine for the class. When the tardy bell rang to begin the period, the students were to be seated at tables in the area referred to as the
lecture/demo area. The teacher would keep the students at the tables for approximately 5 minutes. This was enough time to check roll and make any special announcements. At the conclusion of this period of time, the students were released to go to work on their tasks in the lab. The students worked on problems in teams consisting of four to five members. The teacher moved around the lab and provided assistance as necessary. Five minutes prior to the end of each period a student turned the lights in the lab off and then on again. This was a signal for the students to stop work and put things away. When the students completed their shut-down chores they returned to the tables in the lecture/demo area to wait to be dismissed.

The first day that Dan was in the class, the teacher introduced him to his teammates and showed Dan his lab notebook and what to do with it. Each student had a lab notebook which contained note pages and worksheets used in problem-solving activities. As the teacher explained to the class what was to go into the lab notebook, he treated Dan as a regular student, and left Dan to sit with his team and listen. After the presentation, the teacher helped Dan enter some information in his notebook. When it was completed the teacher said to Dan, "Very good, excellent."

During the first 2 days of Dan's presence in the class, the teacher tried to pull Dan into the team's activities. He asked Dan questions that related to the team's activities.
The teacher asked Dan such questions as, "Do you have it figured out?" and, "Have you ever used a video camera before?" Dan responded with short answers. Later in the semester the teacher tried various strategies in an attempt to get Dan to work with his team. Sometimes he was straightforward and told Dan to get with his team. Once the teacher told one of Dan's teammates, within earshot of Dan, that he needed to get Dan to help. Sometimes the teacher made suggestions to the team about certain things that Dan might be able to do. None of the strategies was effective for any length of time. Dan spent most of the time sitting and watching or working by himself on a computer at one of the stations.

The teacher always remained very calm. The first time Dan asked to leave the class to go to the restroom it was obvious that the teacher was not sure exactly what to do. However, after thinking for a few seconds he very calmly told Dan to get a hall pass, and allowed him to go to the restroom. The teacher had Dan fill out the hall pass. The teacher always answered Dan's questions in a calm manner. Many times the teacher asked Dan to repeat his questions because Dan did not speak well and was difficult to understand. Sometimes when the teacher asked Dan to do something other than what he was working on, Dan resisted. Each time, the teacher remained calm, but persistent, and Dan finally moved to the new task. Many times, when the teacher
questioned Dan and he did not respond, the teacher remained calm and repeated the question until Dan answered.

The technology education teacher was always polite to the students with disabilities as well as the regular students. The teacher made it a practice of saying please and thank you. Even when disciplining a student, the teacher showed respect for the students. On one occasion the teacher had to tell Dan to sit down, and he ended the command with please. On another occasion, when the teacher wanted John to move to another chair, he suggested that John use a more comfortable chair. When John moved, the teacher said, "Thank you."

For the most part, the teacher placed responsibility for assigning tasks to Dan and John with their team. The teacher wanted the team to direct the students with disabilities. On various occasions when Dan needed assistance with a task on a computer, the teacher told Dan to check with his teammates. Sometimes Dan responded, but most of the time he sat and waited for someone to come to him.

On three or four occasions the teacher paired Dan with one of his teammates to learn new operations such as scanning, using a software package, or printing a document. At other times the teacher sat with Dan and showed him how to perform certain tasks. The teacher personally showed Dan how to use certain parts of a drawing program and an animation program. Dan never used the animation program by himself.
The teacher worked individually with Dan on classroom tasks more than he did with John. This may have been due to the fact that John was frequently absent and eventually dropped out of school. It may also have been because the teacher had worked with John in the class for one entire semester prior to the study. When the teacher worked individually with John, it was for very brief periods of time. Dan seemed to always be receptive to assistance from the teacher and was always cooperative.

The first three days that Dan was in the class, John was absent. When John returned, the teacher requested that he copy the information he missed from a teammate. John did so. As stated previously, the teacher was sensitive to John. When John mentioned dropping out of school, the teacher had serious talks with him about the need to stay in school. On two occasions, when John came in very upset, the teacher had to be a consoler and counselor to him. The teacher spoke quietly with him in a manner designed to calm him. On one occasion, the teacher took him into the hall to talk with him. When John had his head on a table for almost 20 minutes, the teacher jokingly let John know that he was not pleased with this conduct. This was the teacher's way of correcting John without causing embarrassment to him.

John sat and watched his teammates work most of the time. The teacher usually allowed him to do so. The teacher seldom insisted that John do something. He occasionally
suggested activities, but never strongly insisted. As a result, John rarely did anything productive in the class. At one point the teacher tried to get John involved with his team's task by suggesting that he be the cable hook-up man for the video. The teacher asked John on a couple of occasions if he had the cable connected. Connecting the cable kept John involved for the majority of one period.

The teacher was quick to let all of the students know that they must follow the class rules. The students with disabilities were no exceptions. They were expected to put things away, push their chairs in place, sit at their team's table at the beginning and end of the period, turn off their computers at the end of the period, and refrain from rowdy conduct. On one occasion, the teacher had to remind Dan to push his chair under the table at the end of the period. However, the teacher became aware that Dan did not always want to leave his computer at the close of the period. Rather than making an issue of it, on numerous occasions the teacher let him remain at the computer. On most of these occasions, Dan took it upon himself to be at his team's table in time for dismissal.

The teacher constantly praised the students with disabilities. He used statements such as, "You did a good job," "That's a great idea," "Excellent," and, "Outstanding." The teacher complimented the students on their work frequently. He rarely made negative observations. If
something needed to be corrected, the teacher approached it from a positive position. He would say, "I wonder what would happen if . . .," or "That is one way, but have you thought about . . .?"

The teacher tried to maintain a light-hearted relationship with John. He joked with John quite often. When John had returned from the office during one period the teacher asked, "Are you O.K.? They didn't beat you up?" On another occasion the teacher jokingly suggested that John could do a rap on the video which his team was producing.

The teacher took the time to show Dan how to turn off the computers and the video monitors hanging at each station. A few times at the end of the period the teacher asked Dan to turn off all of the computers and the video monitors.

Throughout the entire study the teacher exhibited a relaxed, confident, and calm demeanor. He always had a pleasant expression on his face and had positive words for the students. He displayed a great deal of patience when assisting teams or individuals. The teacher was constantly on the move in the lab and always had materials prepared and available when needed. He made it a practice to provide answers infrequently, directing the students instead to find the answers. The teacher was extremely polite to the students and was quick to apologize if he made a mistake. The students seemed to have a great deal of respect for the teacher.
Behaviors of Regular Students Toward Students With Disabilities

This portion of the findings deals with how the regular students reacted to the presence of students with disabilities in the technology education class. Throughout the course of the study, the regular students appeared to readily accept the students with disabilities. John had been a member of the class for one semester prior to the study, and the other students accepted him as a regular member of the class. The regular students paid no special attention to John except to comment at times on his number of absences. The members of John's team did not require much of John in the way of productivity. John's teammates did the work, and John watched.

The students had not been prepared by the teacher for Dan's entry into the class at the beginning of the second semester. The regular students could readily tell that Dan was different. Dan walked slumped over somewhat and took short steps. He carried his books against his chest and wore fairly thick glasses. His expression was usually very pleasant, even smiling, and his mouth was almost always open. When Dan first entered the class, none of the regular students spoke to him. The regular students seemed almost unconcerned that Dan was in the class. They went about their beginning of class routine as usual.
Dan was immediately assigned to a team, and from that point forward almost all of Dan's interaction was with his teammates or the teacher. On the first day, Dan's team tried to include him in their activity by asking him questions. One student voluntarily retrieved Dan's notebook from the rack and brought it to him. As is typical of a person with autism, Dan did not respond. The teammates continued to try to make him feel a part of the group by commenting on the writing he did and sometimes said, "Way to go." Other than his teammates, no one paid attention to Dan. At the end of the period, the student who gave Dan's notebook to him put the notebook away for him.

Although the team did not pay as much attention to Dan during the second class period as they had the previous day, a student did retrieve Dan's notebook for him at the beginning of the period. For the most part, the team let Dan do whatever he wanted. When Dan occasionally got up and walked around, no one said anything to him. At one point midway through the period, Dan's teammates asked him if he had any ideas. Dan, in his typical quick, short-answer way, said, "No." For the entire period Dan's teammates sat at their table and discussed their project. Dan sat most of the period watching them or looking around the lab. The teacher sat down beside Dan once or twice and asked him questions. Dan's teammates did take notice of the teacher doing this.
By the third class period, a member of Dan's team, Tom, began to take an interest in Dan. He sat with Dan at one of the computers and showed him how to enter text on the computer. When Dan began spelling out words, Tom seemed very surprised. During this activity Dan wrote Tom's first and last name on the computer. Tom looked at Dan in amazement and said, "That's right. How did you know my name?" For the remainder of the study, Tom seemed to take a special interest in Dan. Tom invited Dan to go to the library with him, and he even asked Dan to walk to the high school with him. The high school was on the same campus. Tom made it a point to walk and talk with Dan during the classes. Almost everything Tom did with Dan was voluntary. When asked, the teacher explained that Tom was an honor student.

Tom was instrumental in giving instructions to Dan on how to use various pieces of equipment in the lab. Tom showed Dan how to use the scanner to scan a picture the team was going to use in their project. Tom also gave Dan instructions on how to shut the computers down and how to boot them up. He took numerous opportunities to show Dan how to perform various computer operations. There were a few times when Tom called to Dan to come help him. On one of these occasions Tom had Dan dictate to him, and Tom entered the information into the computer. After a short while they reversed their roles. This happened a number of times during the course of the study. Tom was always very patient with
Dan and never showed any signs of frustration. Dan seemed to become attached to Tom.

Mike was another of the teammates who was always willing to help Dan. Most of the help Mike provided was at the teacher's request. Mike sat and talked Dan through various computer operations from time to time. Mike also voluntarily provided Dan instruction on the use of the camcorder. Mike always spoke to Dan upon entering the class. Dan responded with a smile and, a few times, placed his hand on Mike's shoulder. Mike also spent time dictating information for Dan to enter on the computer. At times Mike approached Dan as he worked with a computer and asked if he needed help.

Ann was the only other member of Dan's team except John. She did not have as much interaction with Dan as did Tom or Mike. Occasionally Ann provided Dan assistance on the computer. Whereas Tom and Mike talked with Dan frequently, Ann did not. Ann was always very pleasant to Dan and did not appear to be uncomfortable around him. Although Dan occasionally initiated interaction with Mike and Tom, he never initiated interaction with Ann. Ann was also an honor student.

Tom and Mike both exhibited extreme patience in their interactions with Dan. For example, when Tom assisted Dan with the scanner, he took the time to guide Dan's hand as he moved the scanner across the page. This operation had to be repeated a number of times until Dan got the feel of the
operation. Mike and Tom, when dictating to Dan, patiently sat and waited for Dan to find the correct keys and press them with one finger. Mike and Tom also took the time to talk to Dan as they worked through computer operations. Tom, especially, explained to Dan in detail what was being done.

On occasion, Tom and Mike corrected or disciplined Dan. Tom told Dan at the end of one period to put his chair in place. Another time when Dan was standing when he should have been seated at the table, Mike quietly told him to sit down. Once, when Dan was tapping his hands on the table while the teacher was addressing the class, Tom looked at Dan and shook his head to indicate no. It sometimes seemed that Tom and Mike were trying to take care of Dan. This feeling was not exhibited toward John.

The team seemed to be a little less willing to direct John. The team members interacted with John, but usually in the form of comments about what was happening on the computer or the video screen. At times, Mike and Ann talked with John about things outside of school, such as video games or cars. However, his teammates never voluntarily made an attempt to involve John in the team's project. From time to time, the teacher suggested that John perform certain tasks. The team then provided John an opportunity to participate. John's participation was always very brief. On various occasions Ann joked and laughed with John. Ann seemed more willing to
interact with John than did his other teammates. Ann also seemed more willing to interact with John than with Dan.

The members of the class who were not on the team with Dan and John rarely interacted with Dan. There were only two occasions when interaction with Dan was voluntary, and they were both negative interactions. At one point, Norman sat down beside Dan while Dan was working at a computer. Suddenly Dan stood up, told Norman to go back to his group, and started toward Norman. Norman quickly ran back to his team. Shortly thereafter one of Norman's teammates did the same thing and the same action resulted. At first glance, it appeared Norman and his teammate had taunted Dan. However, videotape revealed this was not the case. Norman sat beside Dan out of curiosity. When Dan reacted the way he did, Norman told his teammate what had happened and the teammate sat beside Dan to see if he would get the same reaction. On another occasion, Dan followed Norman to see what he was going to do, and Norman mumbled to Dan, "Don't follow me." It was interesting to observe that Norman and his teammate were two of the lower level academic students in the class. Dan's only other interactions with students other than his teammates were at the teacher's request.

The rest of the students in the class were more willing to interact with John than with Dan. John's ability to communicate was probably a factor that prompted this interaction. The majority of John's interaction with
students other than his teammates occurred with other African-American students. The interactions with the students who were not John's teammates were usually in the form of casual conversations that were unrelated to class activities. One of these conversations ended with John and an African-American classmate exchanging blows to the arm in a somewhat aggressive manner.

Although the regular students in Dan's team were attentive to him much of the time, they ignored Dan when they became heavily involved in their tasks. Dan was often left to sit and watch the team, work by himself at a computer, sit and write in his notebook, or walk around the lab. When the team was under pressure to get a problem solved, Dan was left out.

During the course of the study, it became apparent that Dan's team was very willing to work with him when time allowed. The regular students on the team were more willing to assist and direct Dan than they were John. They rarely involved John in activities. On the other hand, the team members carried on conversations and joked with John. Other students in the class rarely initiated interaction with Dan, but frequently initiated interaction with John. Even though Dan's teammates interacted with Dan during the class, when the class ended, Dan left the class and walked to his locker alone. John, on the other hand, usually walked out with one or two other students in the class.
Interactions of Students With Disabilities With Regular Students

One of the objectives of this study was to describe the interactions of students with disabilities with other students in the technology education class. While both Dan and John interacted with the other students in the class, the nature of their interactions were somewhat different. John was much more vocal and outgoing in initiating interactions with other students than was Dan. Dan's interactions with other students were predominantly non-verbal and, in most cases, were precipitated by requests to interact. When Dan initiated verbal or physical contact with other students, it was only with his teammates. John was open to interaction with all of the students in the class. Most of his interaction was in a joking manner and many times in a loud voice.

During the first few periods that Dan was in the class, he watched his teammates closely and determined his actions accordingly. When it was time for the team to move from their table to the lab area, Dan sat until he saw where they were going and then followed. Dan learned the location of the pencil sharpener by watching one of his teammates. Dan followed individual team members as they got up to do various tasks such as going to the printer, getting items from a storage cabinet, or getting materials from a bookshelf. Dan
followed his teammates in this manner for the duration of the study, but did so less as time passed.

While Dan rarely communicated verbally, he teased his teammates on occasion. At times his teammates appeared unsure how to respond to Dan when he teased them. On other occasions, his teasing was completely overlooked. Dan sometimes walked up to a teammate, smiled at him, and gently poked him, as if trying to get a reaction. On one occasion, Dan teasingly grabbed Tom's book from him as they sat at the table. He held the book in both arms and smiled at Tom. While listening to a presentation by the teacher, Dan reached over and put his hand on Tom's arm and began acting as if he were tickling him. Tom, who realized that it was an inappropriate time, frowned at Dan and asked him to quit. At the beginning of one class period, as the teams were going to their tasks in the lab, Dan pulled his chair between two filing cabinets which were about 2 feet apart. He sat there grinning and watching as if to see if anyone noticed. None of the other students paid any attention to him.

When John interacted with his teammates it was usually in a loud voice, and often in a caustic manner. The sarcastic remarks which he made to his teammates were almost always ignored. John joined in team discussions only if he was interested in the topic, otherwise he let the team discuss and he sat back. He was always eager to speak out when someone made a mistake, if he was in an outgoing mood.
On some days, John entered the class with a frown or angry look on his face and never said a word during the entire period. On a few occasions, John's mood changed from outgoing to very somber during the course of one class period. Sometimes John acted as if he were policing the team. He, in a joking way, told his teammates to do such things as pick up their trash or sit down. His teammates never took him seriously.

Both Dan and John reacted positively to requests by teammates. On various occasions, they were asked to do such tasks as retrieve computer disks from the storage rack, wind up video cords, look for pictures in books, retrieve videotapes from the shelf, or help move equipment. John always responded very willingly. Dan responded willingly unless he was engaged in another activity. Dan did not like to have to shift from one task to another.

Both Dan and John socialized with members of the class during the period, but in different ways and to different degrees. Socialization as used here is intended to mean casual interaction such as informal conversations. Dan tried to meet one or more of his classmates at the door at the beginning of each period. He walked into the class with them and, in two or three instances, called their names. Dan rarely touched his teammates as they walked, but he did put his hand on their shoulders on a very few occasions. Dan always walked in with one of his male teammates and not with
the female member of the team. Dan did not initiate any interaction with his female teammate during the course of the study. This was the extent of Dan's socializing with the other students.

John socialized frequently when he was in a good mood. He frequently left his group to carry on conversations with students in other parts of the lab. Almost all of John's socializing involved other African-American students in the class. John was usually the one to initiate the conversations.

John never asked for help from anyone except for the one time he asked to copy Tom's notes. The rest of the time John rarely did anything; thus, there was no need to request assistance. Dan would frequently ask teammates to help him find certain programs on the computer. There were two programs with which he liked to work. One was a program containing various sounds to be incorporated into presentations, and the other was a drawing program. Occasionally, Dan was asked to assist team members on one of the computers. Sometimes he was shown what to do and then allowed to do it. If he encountered a situation in which he needed assistance, he would ask a teammate only if the teammate was sitting next to him. Dan never left where he was sitting to go seek a teammate for help. If the teammate had gone to another part of the lab, Dan waited for him or her to return to ask for help. Dan asked questions of his
teammates only if they involved something he needed or wanted.

On a number of occasions during the study, Dan was asked to assist teammates on the computer. This was done to get Dan involved. Dan usually entered data that was dictated by the teammate into the computer. Occasionally, Dan questioned or commented to the teammate about what was being done. However, it was very seldom that Dan initiated communication with teammates.

As mentioned previously, Dan only interacted with members of his team. He seemed to identify with his group and feel some sort of bond with them. It was observed that if any one of Dan's teammates sat beside him while he was involved in a task, which was usually at a computer, he never responded negatively. However, if a student other than a teammate sat beside him, Dan insisted that the student leave. On one occasion, Dan grabbed a student by the arms and pushed him backward a few feet to a chair and told the student to sit.

Neither John nor Dan appeared to feel any responsibility for helping the team get the work done. John preferred to sit and watch, but was never assigned specific responsibilities. John acted bored much of the time. Most of the time that Dan was positioned with the team, he sat and looked around the lab. Throughout the semester, Dan frequently got up and walked around or looked for his
favorite computer programs at the computer station while the team worked. Dan was only assigned one task to do by himself for the team. Most of Dan's time in the class was spent on tasks that were unrelated to the team's activities. This was probably due in large part to the team's uncertainty as to Dan's ability to carry out a task.

It is interesting to note that the two subjects of the study never attempted to constructively interact with each other. The only interactions between them were on two occasions when John made sarcastic remarks to Dan. An interview with the special education teachers revealed that John wanted nothing to do with any student who had visible disabilities. Earlier John had been removed from a vocational skills class which accommodated students with disabilities ranging from cerebral palsy to Down's syndrome because his self-esteem was lowered to a great extent by being with students with visible disabilities. Except for the two occasions mentioned, John went out of his way to avoid being next to Dan or interacting with him.

**Behaviors Exhibited by Students With Disabilities**

Both Dan and John were well behaved while in the technology education class. Neither exhibited extreme negative behaviors that created discipline problems within the class. At no time did they attempt to abuse any of the equipment or materials in the lab. Both subjects were very
willing to follow instructions and directions given by the teacher. On two or three occasions, Dan failed to carry out the directions given by the teacher because he did not understand what he had been asked to do. As an example, during one class period the teacher asked Dan to pull a chair up next to his teammates, meaning for Dan to sit with them. Dan pulled a chair up next to his teammates, and then he walked away. Dan did what he believed he was instructed to do, and that was to pull a chair up beside his teammates. The teacher had not been specific enough in his directions. On one occasion Dan was asked by the teacher to put some papers in his notebook, and he did not do so. The teacher repeated the request and once again Dan ignored the teacher. The teacher did not press the issue. Except for a very few instances, however, Dan was most willing to comply with the teacher's requests.

Dan was always among the first three students to enter the class each day. Most of the time he was the first student to enter. He always entered the lab with a smile on his face. Dan was not absent during the study. John was absent quite often and was tardy to class on a few occasions. The special education staff indicated that John had developed a pattern of being absent on Monday if he had been in school on the previous Friday. Attendance was a problem for John in his special education classes, as well as in the technology
education class. John was also summoned to the office from the technology education class on three occasions.

Dan spent a great deal of time walking around the lab. After entering the class each day, he walked around the lab looking at things. Many times he left his group and walked around the lab during the class period. Sometimes when he seemed to be confused or stymied when working at a computer, he got up and walked around the lab. He almost always carried his school notebook with him as he walked. In contrast to Dan, John was always sitting when not engaged in an activity with his team that required he move around, which was seldom. He occasionally walked across the lab to converse with other students.

Once Dan discovered the electric pencil sharpener it became part of his routine to sharpen his pencil numerous times during the period. He learned where the pencil sharpener was located during the second period he was in the class. He sharpened his pencil from three to six times during each class period. When the special education teacher was asked about this behavior, she indicated that it was a routine he tried to develop. She said she only allowed him to sharpen his pencil at the beginning of the period in an attempt to prohibit him from developing the pattern. After each sharpening, Dan examined the pencil point very closely as he felt the point with his finger for 5 or 10 seconds.
Dan quite often wrote when he was bored with what was going on or not involved in an activity. He usually wrote on a previously used sheet of paper from his notebook. If anyone attempted to look at what he was writing he covered it up or put the paper back in his notebook. His parents stated in an interview that Dan liked to write stories. He especially liked to write portions of the scripts from the *Raiders of the Lost Ark* movies. A few times Dan took paper from his notebook as if he were going to write, but stared at it for a few seconds and then put it back in the notebook.

Dan always wrote with a pencil, and he held the pencil in an unorthodox manner. He held the pencil between his thumb and first two fingers with the fingers curled under. When he wrote he held his face very close to the paper, and made chewing motions with his mouth. When Dan used a computer, he also placed his face close to the screen and moved his mouth in a chewing motion.

During presentations by the teacher, Dan usually appeared to not be paying attention. He sometimes wrote or sat and looked around the lab. He often leaned back and yawned. It was noted that Dan usually carried out what was discussed in the presentations, which indicated that he was processing what he heard. He had the same sort of reaction in one-on-one situations. He did not look at the speaker and acted as if he were not listening. However, he usually reacted the way he was supposed to at the end of the
discussion. The special education staff indicated that they tried to insist that Dan look at them when they spoke to him. The technology education teacher was not aware of this.

Once in awhile, John exhibited behaviors that were somewhat inappropriate. He talked very loudly to his team when he did interact with them, and occasionally did a little dance before sitting down. At times he rocked back and forth in his chair as if in time to music. A few times when John was sitting in his chair watching his team, he would suddenly shake his head back and forth rapidly. John sometimes got very demonstrative when he spoke by using his hands and going through body motions.

Many times Dan had difficulty in sitting still. He wiggled in his chair or swiveled it back and forth. This happened primarily when he had to sit and watch his teammates. While sitting with a teammate at one of the drafting tables during one period, Dan pulled his coat over his head and placed his head on the table. At one point, he looked in all of the drawers in the drafting table and then picked up a T-square and began to play with it as if it were a gun. These actions left the impression that Dan was bored. He also rocked in his chair, yawned quite often, crossed his arms on his chest with his hands on his shoulders, and put his hands inside his shirt and scratched himself. He raised his shirt to look at his stomach on a few occasions. Quite often when watching his team, Dan suddenly got up from his
chair and walked around. Sometimes he half-ran to a location in the lab to look at something. However, if Dan was occupied at a computer, he usually stayed there for the entire period. Dan appeared to dislike not having something to do.

Dan's behavior when he was with the regular students was different than when he was interacting with other special education students. On two occasions a group of students in a special education pre-vocational class utilized the technology education lab during Dan's class period. During these times Dan had interactions with one of the special education students that were inappropriate for the setting. Dan and William got into shoving matches. They jabbed at each other and, in two instances, became so rowdy they had to be separated by the teacher. Dan never exhibited this type of behavior when he was with the regular students.

While John was not hesitant to verbalize with his classmates or the teacher, Dan normally did not communicate. When he did speak his speech was difficult to understand and he did not speak in complete sentences. He often responded to questions by saying, "I don't know." It was determined that this was his way of not having to interact. Sometimes he said, "Have to think about it," which bought him time or put the questioner off. John did not communicate with strangers. Three attempts to speak with John resulted in a stern look and a couple of mumbled words. The special
education teachers indicated that this was his normal behavior. His mother had stated that John did not like to be confronted with questions. She indicated that questioning made him tense and "set him off."

Both subjects with disabilities were willing to carry out assignments. Dan's team members asked him to find sounds on the computer program that he wanted to use in their project. They asked him to write them down. He did what he was asked, but he wrote down the names of almost all of the sounds. The sounds program also became the only thing Dan really wanted to do in the class. Dan once went to locate a teammate in the library as he was asked to do. When he was assigned to turn off the video monitors and the computers at the end of the period a few times, he did so. On one occasion the teacher asked Dan to look for a printer ribbon that had been misplaced and he cooperated. John was asked to run the vacuum cleaner during one period and he willingly did so. When he was asked by the teacher to copy the previous day's notes from a teammate, John spent the entire period copying. Even though there was never any hesitancy on the part of Dan or John to carry out assignments, they received few assignments in relation to the time spent in class.

Both Dan and John followed the class routines in concert with the other students once Dan learned the routine. Because John had been in the class the previous semester, he was already familiar with the class procedures. At the end
of both the third class period and the fourth class period that Dan was in the lab, he started to leave before being dismissed by the teacher. After the teacher reminded him he should stay, he did not attempt to leave prematurely again. At times John was reluctant to go to work with his team, and sat at the table for awhile. Dan was sometimes hesitant to shut down the computer when the time arrived, but he always did so. They both conformed to the beginning- and end-of-the-period routines. Dan and John seemed to benefit from the teacher's flexibility to sit and work with individual students.

Dan exhibited the ability to read, write, and use a calculator. The first time Dan was allowed to use a computer, he wrote the words Sigmund Freud, Beethoven, and Abe Lincoln. His teammates acted surprised. Dan went on to write the alphabet and the numbers from one to nine. When information was dictated to Dan for entering into the computer, Dan rarely misspelled a word. He obviously could read the dialog boxes that appeared on the computer screen from time to time, because he always responded correctly. He sometimes read from documents and dictated the information to a teammate who entered the information into the computer. On one occasion, Dan was observed using his calculator to perform some mathematical operations. The special education teachers had stated in an interview that Dan could spell very well and could read words. They explained that he could not
figure things out from reading, and that comprehension was
difficult for him. The technology teacher was not aware of
these disabilities.

John never allowed himself to be put in a situation in
which he had to write original passages for others to see.
The teacher agreed that this was probably because John did
not want to embarrass himself by letting everyone know he
could not write well. This conclusion was later confirmed by
one of the special education teachers who stated that John
could not put words together to make sentences. She said
that John could copy well, but that he had difficulty in
making things up on his own. John demonstrated his ability
to copy when he copied the notes from his teammate. At no
other time during the study did John demonstrate any of the
basic skills of reading, writing, or computation.

Interaction With the Lab Environment by Students With
Disabilities

Dan interacted with the lab environment much more than
did John. After brief instruction from a teammate, Dan was
able to utilize the Macintosh computer on his own, and he did
so quite often. When shown an operation one time, Dan
usually did not forget it. Dan used the hand scanner for two
periods with early assistance from a teammate. After a brief
time, Dan could manipulate the scanner alone. This was the
only time during the study that he had an opportunity to use
the scanner. Dan interacted frequently with the two software programs that he learned how to use. He could turn the computer on, find the program and open it, search through the menus to find what he wanted to do, quit out of the program, and shut the computer down in the proper manner. Dan also had occasion to work with an animation program on an Apple IIgs computer. Dan's teammates often talked him through operations on the computer. Dan was given one brief orientation on the use of a camcorder, but was not given an opportunity to use it after the instruction.

John used a computer only if it involved manipulating objects or images that were already on the screen. He appeared to be very hesitant to use any of the equipment. In a discussion with the special education teachers, it was learned that John preferred not to try anything he thought he did not know how to do. He was very sensitive to letting people see that he was unable to do things. Only on one occasion was John observed utilizing any equipment in the lab. He sat with his team and moved some objects around on the screen and changed their colors. He did it in a joking manner, and his teammates chuckled. The teacher indicated that John had used a computer a few times earlier in the year. In contrast, Dan interacted with a computer anytime he could.

Dan had significant reactions to many occurrences in the lab. The first time he heard the printer operate, he rushed
over to watch it print. At times he was distracted by
activity at other workstations, and at other times he totally
ignored such noises. At one point a video disk program came
on a monitor which was above Dan's head but facing away from
him. He got up from his computer and walked to the monitor
to see the display. The next time it happened Dan did not
move from his seat. The same thing happened when he heard
students talking loudly at other workstations.

During one period, the class was racing model cars that
were powered by CO$_2$ cartridges. When the cartridges were
fired, a loud noise resulted. The first time it happened, Dan
did not move from his seat beside the track. Before the
second set of cars were set off, Dan crawled under the
teacher's desk. When the teacher asked him to come out, Dan
did so, but he crouched behind the book rack with his hands
over his ears. The teacher was unaware that autistic
individuals are very sensitive to loud noises. When the
racing was completed, Dan regained his composure.

Dan often walked around the lab looking at things. He
did not pick up things unless he was instructed to do so. At
times he got on his knees to look more closely at objects.
Sometimes he studied objects for 1 or 2 minutes. For
example, when Dan became fascinated with a three-hole punch
on the table by the printers, he knelt down in front of it
and studied it from all angles, but he never touched it.
John never actually interacted with the lab environment other than the one time he manipulated the computer. Most of his time was spent sitting and watching. John helped with chores such as winding up cords or moving carts if asked. John was never seen voluntarily interacting with equipment or materials in the lab.

Dan seemed to want to interact with the lab environment, and did so whenever given an opportunity. His interactions ranged from working on computers and related equipment to walking around looking at apparatus in the lab. John was content to sit and watch, and preferred not to perform.

Productivity of the Students With Disabilities

The productivity of both Dan and John was somewhat limited. This was especially true in the case of John. Dan produced a few documents on the computer with the assistance of his teammates and completed some worksheets. John's only productivity was the copying of notes from a teammate and providing a few suggestions to his team.

The first period that Dan was in the class he provided the information at the top of a problem-solving worksheet. This included his name, the team name, the period, and a statement of the problem. The following period he filled in additional information on the worksheet. He received assistance from a teammate in completing the worksheet.
Later in the semester, Dan was shown how to use the computer program that provided the sounds from which he was to write down his selections for use in the team's problem solution. He used the proper information sheet to do this. He completed four or five of these forms during the course of the study. Although it was apparent that the team did not use his suggestions, the team did not tell Dan to stop identifying the sounds. As a result, whenever he had an opportunity, Dan would sit at a computer and open the sounds program.

Dan produced two or three documents on the computer that were dictated to him by teammates. One of the documents was a permission form for the team members to take home and have signed to allow them to go on a field trip. Another document was an outline of tasks to be carried out by the team in solving their problem. On another occasion Dan produced a computer generated problem-solving worksheet. This was also done with the guidance of a teammate. An interesting point was that Dan rarely had to be given help with spelling. Also, even though Dan typed with one finger, he seemed to have the location of the keys memorized. Once he got into a rhythm he stayed with it and did not spend time looking for the keys. He sometimes appeared to hit the keys without looking at them.

Occasionally John made suggestions to the team regarding the video presentation on which they were working. Much of
the time his suggestions were not acknowledged. He contributed suggestions such as slowing down the sound and moving the goalpost in the picture. Once Dan was asked what he would like to see in the newscast the team was developing and he said, "Include ballgames."

Dan and John both provided help to the team when requested. Dan did such things as untangle some video cords, hand video cords to a teammate, help a teammate move a video cart, and retrieve computer disks from a rack. John provided similar assistance to the team. On one occasion, John turned the pages of a book while the team looked at the pictures.

Much of the time neither Dan nor John was actively involved in producing solutions to the problem on which their team was working. The majority of the time the team did not seek their participation. When Dan and John did actively participate, it was usually as a result of a suggestion given to the team by the teacher. As a result of not being involved, Dan and John spent a great deal of the time off task. John sometimes conversed with other students or even sat with another team. Dan spent a considerable amount of time walking around the lab or writing in his notebook. There were a few times when Dan took books from the reference cart and sat and looked through them. Dan spent extended periods of time sitting and looking around.

In summary, the productivity of both Dan and John was extremely limited. This was due to the limited expectations
that the team and the teacher had of them. Neither Dan nor John was presented very many opportunities to be productive. They both spent much of their time in the class off task.

Reactions of the Parents of Students With Disabilities

The parents of Dan and John were interviewed prior to the study to secure their permission to use their children in the study and to learn their feelings regarding Dan and John being enrolled in the technology education class. The parents of both subjects expressed their satisfaction over the opportunity for their children to participate in the technology education program. Dan's parents were somewhat more cautious than John's mother. This was most likely due to the fact that John had already been in the class for one semester, whereas it was the first experience for Dan in a mainstream class. Both sets of parents expressed a positive attitude toward the study.

Dan's parents were anxious to learn as much about the technology education class as they could during the initial interview. They were also more than willing to express their perceptions of Dan's disabilities. John's mother was also very open in talking about John's disabilities. She indicated that John did not like school and that she was afraid he would attempt to drop out of school. She said that John did not like Morgan Junior High School because his friends were there. This was possibly because his friends
could see that he was in the special education program.
John's mother indicated that he liked to work alone, without interference. She stated that John liked computers and cars. The parents seemed to view the experience as an opportunity for their children.

Approximately midway through the study, another interview was held with Dan's parents to gain further insight into their feelings after Dan had been in the class for a little more than six weeks. Dan's parents felt the technology education program was very impressive. They had taken the opportunity to visit the lab on an open house evening. They also visited with the teacher and were favorably impressed.

Dan's parents indicated that Dan was very excited about being in the class and seemed to be happy in the class. They said Dan had mentioned something about sounds and that he appeared to be very interested in the sounds. The opportunity was taken to explain the sounds program to Dan's parents. The parents also said Dan had mentioned something about a videotaping session.

The feedback from the parents reinforced many of the observations made in the study. Dan's parents mentioned that even though Dan might be working on something and appear to not be hearing what was being said, he was generally hearing and registering what was being said. They stated that Dan had to be prompted at times by saying, "Look at me with your
eyes," to get his attention. The parents mentioned that Dan was very routine oriented, was comfortable with a pattern, and did not like to break the pattern. They stated that Dan had a tendency to find something he liked to do and to do it over and over. According to his parents, Dan sometimes refused help and preferred to do things himself. The parents discussed Dan very freely and openly, which indicated that they were comfortable with the arrangement. The information they provided would have been extremely useful to the teacher prior to Dan entering the technology education class.

Dan's parents were very pleased that Dan was able to mainstream into the technology class and work in his group. They believed the team and the teacher were supportive of Dan. The parents expressed their feeling that the lab situation was an excellent way to draw students with disabilities into interaction with regular students. Dan's parents recognized that the technology education class had been very good at optimizing the opportunity for socialization between the students with disabilities and the regular students. They felt that this was one of the positive things about what was happening. However, they admitted to being pragmatists and expressed reservations that mainstreaking or inclusion would work in all classes.

Dan's parents feared that in a typical academic class, where students sit at desks and do not interact with each other and the material presented is above the level that
students with disabilities can absorb, not much socialization or education was likely to occur. They expressed their concern that in a typical class, teachers have all they can handle with the regular students. If a teacher had to devote the time necessary to a student with disabilities, such as Dan, it would take a major portion of the class time. Dan's parents felt strongly that the regular teachers should not be put in that position. They also voiced an equal concern that, because classroom teachers can not devote the time necessary to students with disabilities, students would be left to sit and do nothing.

Overall, the parents of the students with disabilities were very pleased that Dan and John were a part of the technology education class. The parents were impressed with the technology education program and the environment it provided for interaction between students with disabilities and regular students. They were skeptical and fearful as to whether mainstreaming or inclusion would be effective in a regular classroom.

Summary

The purpose of this study was to describe the impacts of integrating students with moderate-to-severe disabilities into a contemporary technology education program. The research centered around questions that addressed the impacts
on students with disabilities, on regular students, on teachers, and on parents of students with disabilities.

The findings indicate that there were no major problems with integrating the students with disabilities into the technology education program. The students with disabilities did not cause any discipline problems and were readily accepted by the regular students. The students with disabilities were not actively involved in the class much of the time and, as a result, they spent much time of the class time off task.

The technology education teacher left the direction of the students with disabilities in the hands of the leader of the team to which the students with disabilities were placed. The teacher occasionally assisted the team in involving the students with disabilities. The teacher occasionally worked with the students with disabilities on an individual basis.

The parents of the students with disabilities were pleased to have their children participate in the technology education program. They viewed it as an outstanding program and an excellent opportunity for their children to interact and socialize with regular students.
CHAPTER 5

SUMMARY AND DISCUSSION

Background

The impacts resulting from the integration of students with moderate-to-severe disabilities into a contemporary technology education program are described in this study. The study took place in a ninth-grade technology education class and involved two students with moderate-to-severe disabilities.

One subject was Dan, a 15-year-old autistic student who had a speech handicap and was mildly retarded. The other student was John, a 17-year-old male who was emotionally disturbed and learning disabled. Dan entered the class at the beginning of the study; John had been in the class for one semester.

Data were collected through classroom observations, videotapes, and interviews with teachers and parents. The notes taken during the observations and from the videotaped sessions were transcribed and coded. Thirty-one category codes were used to identify appropriate information in the transcripts.

The coded field note data that were gathered through classroom observations and videotape were sorted into 31
categories. The data were then refined by reviewing and writing a synopsis of each segment of coded data. The synopsis of each portion of coded data was transferred to category analysis sheets. Each category analysis sheet was labeled with one of the broad headings, and the data synopses were grouped onto the category analysis sheets under the appropriate broad heading. The category analysis sheets provided in-depth descriptions of activities in the observed class. Each group of categories related to one of the research questions.

Interviews with the parents, the technology education teacher, and the special education teachers were transcribed. The transcripts were then reviewed, and significant data were highlighted. The significant data were then transferred to interview synopsis sheets to be incorporated with the other findings.

Review of Findings

The findings of this study emerged from the questions which provided the direction for the research, as stated in Chapter 1. Following is a review of the findings as they relate to the research questions.

1. What kinds of strategies did the teacher use with students with disabilities in a modern technology education lab?
• To avoid developing preconceived opinions regarding the students with disabilities, the teacher wanted no special preparation for their admission to his class, nor did he prepare the regular students in any way.

• The teacher placed the students with disabilities on a team with regular students, who were academic honor students, and depended to a large degree on the team leader to assign tasks to the students with disabilities.

• Periodically the teacher worked with the students with disabilities on an individual basis. More individual attention was given to the student with autism than to the student with emotional disabilities.

• The teacher regularly praised the students with disabilities and was always polite and patient in dealing with them.

• The teacher sometimes paired the student with autism with one of his teammates to facilitate learning new operations on equipment such as computers, printers, the video camera, and the scanner.

• The students with disabilities were expected to conform to the same class rules followed by regular students.

2. What behaviors were exhibited by the regular students toward the students with disabilities in the technology education lab?

• The regular students appeared to readily accept the students with disabilities as members of the class.
The teammates of the student with autism attempted to make him feel a part of the group by frequently asking him questions and trying to include him in activities. Less of this attention was evident toward the conclusion of the study.

The regular students socialized with the student with emotional disabilities more than they did with the student with autism.

The teammates of the students with disabilities were always willing to assist them when requested by the teacher. Many times assistance was voluntarily given to the students with disabilities.

The members of the team were more inclined to direct the student with autism than they were the student with emotional disabilities.

The members of the class who were not on the team with the students with disabilities were more willing to interact with the student with emotional disabilities than with the student with autism.

The regular students on the team with the students with disabilities were attentive to them much of the time; however, when the regular students became heavily involved in a task, the students with disabilities were ignored.

3. What kinds of interactions did the students with disabilities have with other students in the technology education class?
• The student with emotional disabilities was much more vocal and outgoing in initiating interactions with the other students than was the student with autism. The interactions by the student with autism were primarily non-verbal and were almost always a result of requests to interact.

• The only students with whom the student with autism initiated verbal or physical contact were the regular students on his team. The student with emotional disabilities was willing to interact with any of the regular students in the class. He avoided interaction with the student with autism.

• The student with autism followed his teammates quite often as they moved around the lab to perform various tasks.

• The student with autism teased his teammates on occasion. At times the teammates appeared not to know how to respond to these actions.

• The student with emotional disabilities usually interacted verbally with his teammates in a loud voice and many times in a caustic manner.

• While the student with emotional disabilities rarely requested assistance from his teammates, the student with autism frequently asked teammates for help if they were sitting with him.

4. What kinds of behaviors were exhibited by students with disabilities in the technology education class?
• Both of the students with disabilities were well behaved, and neither of them exhibited negative behavior that created discipline problems within the class.

• The student with autism was in attendance every day during the study and was always among the first students to enter the class. The student with emotional disabilities was absent quite often and was tardy to class on a few occasions.

• The student with autism spent much of his time walking around the lab looking at things. He sometimes sharpened his pencil as often as six times during a class period. When he was left alone, or became bored, he often wrote in his notebook. He had difficulty being still when sitting and watching his teammates.

• Occasionally the student with emotional disabilities exhibited inappropriate behaviors such as talking loudly, doing little dances, vigorously rocking back and forth, and rapidly shaking his head. These behaviors did not appear to distract the other students in the class.

• The behavior of the student with autism was usually acceptable when he was with regular students. This was not the case when he was provided opportunities to interact with other students with disabilities.

• Both of the students with disabilities were willing to carry out any assignments they were given.

• The student with autism exhibited an ability to read, write, and use a calculator, and did so quite often. The
student with emotional disabilities did not allow himself to be put in a position in which he had to write for others to see.

5. How did students with disabilities interact with technology in the technology education lab?

• The student with autism was able to utilize the computers in the lab, the scanner, and the video camera. His favorite activity was to sit alone and work at a computer.

• The student with emotional disabilities used a computer on only one occasion. He appeared hesitant to use any of the equipment.

• The student with autism seemed to be interested in all of the equipment in the lab, and he seemed to enjoy walking around the lab looking at various items. He sometimes stood for 2 or 3 minutes examining different pieces of equipment with his eyes.

6. How productive were the students with disabilities in the technology lab?

• The productivity of both of the students with disabilities was very limited. The student with autism produced a few documents on the computer, and in writing, with the aid of his teammates. The student with emotional disabilities produced nothing other than a few pages of notes he copied from a teammate.

• Both of the students with disabilities provided assistance to their teammates when requested.
The students were seldom involved with their team in producing solutions to the problem on which the team was working.

7. How did parents of students with disabilities react to their children's inclusion in the technology education program?

• The parents of both subjects expressed excitement over the opportunity their children had to participate in the technology education program.

• The parents of the student with autism took the opportunity to visit the technology education lab and talk with the teacher. They felt the program was impressive, and stated their satisfaction with the teacher.

• The parents of the student with autism believed that the technology education lab environment provided an excellent opportunity for their child to socialize with regular students.

Interpretations of Findings

During the collection of data for this study, various feelings and impressions were developed regarding interpretations of the findings. In the case of the strategies utilized by the teacher, it became apparent that certain difficulties could have been averted had the teacher been provided more in-depth information regarding the students with disabilities prior to their entering his class.
For the most part, however, the teacher was very successful in dealing with the students with disabilities. This was due largely to his patience, his calm demeanor, and his willingness to accept them as regular members of the class. His giving more attention to the student with autism was due to the nature of the student's disability. The teacher was attempting to determine what the student was able to do. Also, due to the fact that the student with emotional disabilities had been in the class all year, the teacher probably felt more responsibility toward the student with autism.

The teacher may have relied too heavily on the regular students to voluntarily direct the students with disabilities. There was a lack of assertiveness on the part of the teammates to provide direction for the students with disabilities. The teacher could have worked more closely with the team leader to define specific tasks for the students with disabilities. A greater understanding of the disabilities of the subjects as well as a knowledge of their capabilities would have been valuable in designing activities for them.

All of the students in the class responded extremely well to the teacher. There was never a disruptive teacher/student conflict. This was due to the fact the teacher treated the students with respect, gave them credit
for their accomplishments, and praised them often. The teacher also displayed his trust in the students.

It was noted that the teammates of the students with disabilities were all academic honor students. This may have been a contributing factor in their genuine acceptance of the students with disabilities. The regular students on the team manifested confidence in themselves and in their relations with the students with disabilities.

If the teacher had prepared the regular students for the students with disabilities entering the class, they might have had a more productive relationship because the regular students would have known what to expect and would have been conscious of the capabilities of the students with disabilities. This would have facilitated the students with disabilities becoming more productive members of the team.

Had prior information been given the regular students on the team, they would have known that John did not want to display his inability to read and write, but that he did like to work with objects, to copy things, and to color pictures. They would also have known that Dan characteristically had an excellent memory, could spell very well, liked routine, liked to work alone, communicated very little verbally, and remembered procedures once he was shown. Although the behaviors of the students with disabilities did not seem to disturb the regular students, had they been prepared, the regular students could have helped to reinforce the desired
behaviors of the students with disabilities. The special education staff expressed a desire to reinforce such behaviors as looking at the speaker when being spoken to, going to the pencil sharpener only when necessary, and breaking away from routine activities.

It was evident that the regular students did not want to slow down when momentum had been generated to complete assigned work. As a result, they did not take the time to include the students with disabilities. The regular students apparently felt it was easier to perform the tasks themselves than to slow down and direct the students with disabilities. When time was not an issue, the regular students were readily willing to include the students with disabilities.

The regular students found it much easier to communicate with the student with emotional disabilities than with the student with autism because of the difference in their levels of communication skills. The student with emotional disabilities was outgoing, could carry on a conversation, and would laugh and joke, which made the regular students feel more comfortable with him. The regular students exhibited a stronger feeling that the student with autism was different from them. Even when the regular students wanted to generate a conversation with the student with autism, it was almost impossible to do so.

The behaviors of the students with disabilities in the technology class indicated that inclusion in the class was a
positive experience for them. The student with autism always seemed happy and quickly began to interact with his teammates. This was a surprise to the special education staff when they were told about it. While the student with emotional disabilities was not very productive, he seemed to enjoy socializing with the regular students in the class. The lab environment allowed students the freedom to move around and to interact with each other. By following his teammates as they went about their activities, the student with autism learned appropriate behaviors and actions as they applied to the technology lab. As observed in this study, the technology education lab was an appropriate setting for the students with disabilities.

The students with disabilities were able to do more than was expected of them. Dan did not seem to like to sit idly. He wanted to be active. Both of the students with disabilities needed to have more direction and structure than was provided. They could have been given definite assignments, based on what they were able to do, that were a part of the team effort.

The parents of the students with disabilities, especially Dan's parents, were excited about their children being in the technology education program because it provided opportunities not usually found in a regular classroom. The parents saw this experience as an opportunity for the students with disabilities to be in a mainstream setting, to
socialize with regular students, and to receive individual attention. They were also realistic in their concern that it will be difficult to transfer these conditions to the mainstream academic classroom.

Implications

While the findings of this study only apply to the setting in which they occurred, the implications may be farther reaching. The findings reveal numerous issues that should be dealt with if public education is to embrace the mainstreaming and particularly the inclusion concepts. Many of the issues apply to all of the educational settings in the school, and not just to the technology education programs alone.

It is evident from this study that regular teachers should be provided as much information as possible about students with moderate-to-severe disabilities who are placed in their classes. This should happen well in advance of student placement. For example, the technology education teacher in the study knew nothing of autism prior to Dan being placed in his class. As a result, he did not understand behaviors exhibited by Dan, such as being routine oriented, not wanting to change tasks, and being sensitive to loud noises. The teacher also did not anticipate that Dan was able to spell very well, was able to read, and possessed an extremely good memory. Some of Dan's behaviors were
misinterpreted, such as his apparent lack of attention. The teacher even needed input on how to give instructions to students such as Dan. Sometimes the teacher assumed too much when giving instructions, and Dan did not understand fully. An understanding, or an awareness of these behaviors can eliminate many frustrations that occur when students with disabilities are placed in regular classrooms. When this problem is compounded by the fact that each disability has its own characteristics, the need for the awareness or understanding becomes more crucial.

The study also revealed a need for regular teachers and special education staff to stay in constant contact during the time that the students with moderate-to-severe disabilities are in the regular class. At no time during this study did a member of the special education staff visit the technology education class or did the teacher rely on the special education staff for assistance. When the technology education teacher encountered a problem with Dan or John, especially Dan, he sometimes did not know how to deal with it, or ignored it. When situations arose in class that the special education staff had been working on with Dan, the technology education teacher did not reinforce the actions being taken by the special education staff because he was not aware of their efforts. For example, the special education staff wanted Dan to look at the person speaking to him, and they wanted the speaker to tell him to do so. They also
permitted Dan to go to the pencil sharpener only at the beginning of the period in an effort to discourage his routine of repeatedly going to the pencil sharpener. The technology education teacher was unaware of these strategies. It is essential that ongoing communication take place between the regular classroom teacher and the special education staff. A thorough Individual Education Plan, combined with strong support from the special education staff, can help both teachers and students with disabilities to be more productive.

No leadership was evident in the development of a working relationship between the technology education teacher and the special education staff. A definite need for this leadership was apparent. Someone should have taken the lead in ensuring that continuous interaction took place between the two departments.

In the case studied, it would have been beneficial for the teacher to prepare the regular students for Dan's placement in the class. Because John had already been in the class for one semester, the students in the class were comfortable with him. Questioning of Dan's teammates revealed that none of them knew anything about Dan's disability. As a result, they did not understand some of Dan's behaviors. The regular students also expressed surprise at some of the skills Dan possessed such as being able to spell and manipulate a computer. Because Dan's
disability was not understood, his skills often were not employed to their fullest.

The findings of this study indicate that the technology education lab is an appropriate environment for students with moderate-to-severe disabilities. The environment provided students with disabilities the freedom to move around, provided many opportunities for them to interact with regular students, and gave them an opportunity to interact with various technologies that could assist them with difficulties brought on by their disabilities. The ability to use computers for writing is an example. Other factors affecting the appropriateness of the technology education lab for students with moderate-to-severe disabilities are that students work in teams and assist each other in a cooperative setting, and teachers have more opportunities to work with students on an individual basis than they would in most regular classrooms. In this study, the technology education lab appeared to be a positive environment for students with moderate-to-severe disabilities.

It was noted in this study Dan's socializing with the regular students ended when the bell rang at the end of class. Dan always walked alone to his locker and then to his ride home. Some effort may be needed to encourage regular students to develop relationships with the students with disabilities. The regular students in the class seemed less willing to build a relationship with the student who had the
more visible disability (Dan). The fact that students walked down the hall and visited with John but not with Dan may be indicative of the need to educate regular students concerning students with moderate-to-severe disabilities.

The study revealed that the students with disabilities behaved differently in their interactions with regular students than in their interactions with other students with disabilities. Dan's behavior was significantly different when he had the opportunity to interact with other students with disabilities who used the technology education lab on two different occasions. The behavior Dan exhibited with the students with disabilities was more inappropriate than was his behavior when he interacted with regular students. This supports the theory that students with disabilities should have opportunities to interact and socialize with regular students in order to learn and practice appropriate behaviors.

It was evident that the students with disabilities were able to do more than was expected of them. This was possibly due to the fact that the teacher was not familiar with the capabilities of the students. The teacher did not capitalize on the abilities of the students. There seemed to be a reluctance on the part of the teacher to make specific assignments to the students with disabilities. Again, collaboration between the technology education teacher and the special education staff would have proved beneficial.
The findings of this study also implied that it may not be appropriate to expect regular students to assign tasks to students with disabilities. Even though work was done in a team, the team leader seemed to be much more willing to assign tasks to regular students than to Dan or John. The teacher should take the lead in seeing that the students with disabilities are assigned specific tasks. The teacher could work through the team leader in doing so.

The findings of this study provide data that have implications that apply not only to technology education, but also to education as a whole. The consideration of these implications is appropriate as inclusion and mainstreaming become more prominent in American education.

Recommendations for Future Research

Additional research is needed to study the impacts that result from integrating students with moderate-to-severe disabilities into a technology education class with a teacher who has been given an in-depth orientation regarding the students with disabilities. Also, as part of the design of the study, a procedure for maintaining ongoing communication between the technology education teacher and the special education staff should be implemented. A definite plan should be developed for students with disabilities as they participate in a technology education class. The study could then be focused on the productivity of students with
disabilities, as well as their interactions with regular students. This would provide a more narrow and controlled study than the current one. Such a study would provide data as to the effectiveness of extensive preparation before integrating the students with disabilities into the technology education class.

Studies such as the one recommended should also involve students with a variety of moderate-to-severe disabilities who participate in technology education classes. This would allow insight into how students react to technology education classes in relation to their disabilities. The study should also be conducted in a variety of settings. Some technology education environments and philosophies are much different than others. The investigation of which type of setting is most appropriate for students with moderate-to-severe disabilities could prove to be extremely valuable.

Another aspect of further research should be focused on the possibility of incorporating features of the lab environment that is characteristic of the technology education program into a traditional classroom setting at the secondary level to facilitate the inclusion concept. A number of strategies could be incorporated, such as cooperative learning, the teacher as a facilitator of learning, the use of technology, and the freedom for students to be mobile within the setting.
A closer relationship needs to be developed between teachers in regular education and those in special education. Integration of students into the mainstream will require a close working relationship between regular and special education teachers. Although total inclusion may never be possible, there is evidence that integration can work in the proper setting with the proper preparation.
APPENDIX A

PERMISSION FORM
Dear Mr. and Mrs. Jones,

I will be conducting a research project designed to study the impacts of placing students with challenges in a modern technology education class. The study will address the impact on the special needs students, the regular students, the teachers, and the parents of the special needs students. I am requesting permission for your child to participate. The study requires that selected special needs students become regular members of a technology education class for one period each day during the 1992 spring semester. The administration, the special education staff, and the technology education teacher at Richardson West Junior High School are all aware of the study and have granted their approval.

Your child will become a regular member of a class that is involved in exploring and using modern technology, primarily computers, and will not be required to perform any tasks that might be physically or psychologically threatening. Your child will be provided an opportunity to gain some very valuable experiences while becoming a part of this study. I will gather data for the study through classroom observations, interviews, and videotaping. To maintain confidentiality no real names will be used in the study. I plan to observe the class three times each week for twelve weeks and take notes regarding what goes on in the class. The class will be videotaped occasionally to serve as verification of what has been personally observed. At the conclusion of the study the videotapes will be retained by me. From time to time I will interview the students and teachers, as well as yourself, to gather input regarding personal feelings. The data will be analyzed in relation to the following:

- Interactions special needs students have with other students in the class.
- Behaviors exhibited by special needs students in the technology education class.
- Interaction of special needs students with the technology in the technology education lab.
- Productivity of special needs students in a modern technology education lab.
- Strategies used by the teacher with the special needs students.
- Behaviors exhibited by the regular students toward the handicapped students.
- How the parents of students with challenges react to their children being a part of a technology education program.

At the conclusion of this study, a summary of the findings will be made available to all interested parents and teachers. Should you have any questions or desire further information, please call me at XXX-XXXX (work) or XXX-XXXX (home). Please indicate your consent on the attached form.

Sincerely,

Dave Pullias
This project has been reviewed by the University of North Texas Committee for the Protection of Human Subjects (phone: 817-565-3940).
Please indicate whether or not you wish to have your child participate in this project by checking a statement below and providing your signature.

☐ I do grant permission for my child, ______________________ to participate in this project.

☐ I do not grant permission for my child, ______________________ to participate in this project.

_________________________________________  ______________________
Parent/Guardian's Signature          Date
APPENDIX D

DATA COLLECTION SCHEDULE
<table>
<thead>
<tr>
<th>Duration</th>
<th>Focus</th>
<th>Technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two weeks</td>
<td>Become familiar with the setting</td>
<td>Participant/observation</td>
</tr>
<tr>
<td>3 days per week</td>
<td>Establish myself as part of the class</td>
<td>Field notes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conversations with the teacher</td>
</tr>
<tr>
<td>Three weeks</td>
<td>Identify student behaviors</td>
<td>Participant/observation</td>
</tr>
<tr>
<td>3 days per week</td>
<td>Identify interactions of special students with other students and the lab environment</td>
<td>Field notes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Informal interviews with students and teacher</td>
</tr>
<tr>
<td>Two weeks</td>
<td>Identify parent reactions</td>
<td>Formal interviews with parents</td>
</tr>
<tr>
<td>3 days per week</td>
<td>Identify teacher reactions (both regular and special education)</td>
<td>Interviews with the technology education teacher</td>
</tr>
<tr>
<td></td>
<td>Begin to identify technology teacher strategies</td>
<td>Formal interviews with the special education teachers</td>
</tr>
<tr>
<td></td>
<td>Restate research questions</td>
<td>Participant/observation</td>
</tr>
<tr>
<td></td>
<td>Continue to identify student behaviors/interactions</td>
<td>Field notes</td>
</tr>
<tr>
<td></td>
<td>Begin to identify productivity of the special students</td>
<td>Videotape</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Triangulation</td>
</tr>
<tr>
<td>Three weeks</td>
<td>Continue to identify student behaviors/interactions</td>
<td>Participant/observation</td>
</tr>
<tr>
<td>3 days per week</td>
<td>Continue to identify teacher/student interactions and teacher strategies</td>
<td>Field notes</td>
</tr>
<tr>
<td></td>
<td>Begin to determine skills being learned by the special needs students</td>
<td>Videotape</td>
</tr>
<tr>
<td></td>
<td>Continue to identify teacher reactions (both regular ed. and special ed.)</td>
<td>Informal interviews with teachers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Collection of documentation of student work</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Informal interviews with students</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Triangulation</td>
</tr>
<tr>
<td>Two weeks</td>
<td>Prepare for exit from setting</td>
<td>Participant/observation</td>
</tr>
<tr>
<td>3 days per week</td>
<td>Final reactions from teachers, parents, and students</td>
<td>Videotape</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Formal interviews with teachers, parents, and students</td>
</tr>
<tr>
<td></td>
<td>Identify interactions</td>
<td>Triangulation</td>
</tr>
</tbody>
</table>
APPENDIX E

CATEGORIES FOR DATA ANALYSIS
Behaviors of students with disabilities toward the regular students

1. Socialization with the regular students
2. Interaction with the regular students
3. Requests for assistance from the regular students
4. Physical contact with the regular students
5. Responsibility to the team

Behaviors exhibited by the students with disabilities

6. Attendance and punctuality of the students with disabilities
7. Expressions, gestures, and mannerisms of the students with disabilities
8. Physical activity of the students with disabilities
9. Reactions to the teacher by the students with disabilities
10. Carrying out assignments by the students with disabilities
11. Behaviors/discipline of the students with disabilities
12. Reaction to the class routine/methodology by the students with disabilities
13. Physical appearance of the students with disabilities
14. Reactions of the students with disabilities to each other
15. Basic academic skills exhibited by the students with disabilities

Interaction with the technology education lab by the students with disabilities

16. Use of computers and related technologies by the students with disabilities
17. Use of information resources in the lab by the students with disabilities
18. Reaction to the lab environment by the students with disabilities

Productivity of the students with disabilities

19. Documents and/or materials produced by the students with disabilities
20. Ideas/suggestions provided by the students with disabilities
21. Students with disabilities on/off task

Teacher behaviors

22. Reaction of the teacher to the students with disabilities
23. Teacher routine and organization
24. Disciplining of the students by the teacher
25. Teacher behaviors/mannerisms

Behaviors of the regular students toward the students with disabilities

26. Reactions to the students with disabilities by the regular students
27. Relationships of the regular students with the students with disabilities
28. Willingness of the regular students to assist the students with disabilities
Lab environment

29. The lab arrangement/appearance/equipment
30. Activity in the lab
31. Behavior/discipline of the regular students
APPENDIX F

CATEGORY SYNOPSIS FORM
<table>
<thead>
<tr>
<th>CATEGORY 7 Expressions/gestures/mannerisms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4-1F</strong> 7 Tom comes into the class late with a note. He sits down with his team, and he and Ann and Mike begin discussing the assignment. <strong>Dan watches them and smiles.</strong> John continues to fill out his worksheet.</td>
</tr>
<tr>
<td><strong>4-2F</strong> 7, 21 Now the team is back on task. <strong>John continues to write in his notebook.</strong> All at once John shakes his head rapidly and moves back and forth as if in time to music. Dan opens and closes his notebook a couple of times.</td>
</tr>
<tr>
<td><strong>4-2F</strong> 7, 2, 27 One of the other groups has as its problem to design a T-shirt to promote technology education. They are to conduct a survey to get the feelings of other students regarding colors. The student conducting the survey converses with Ann, Mike, and John to get their ideas. <strong>John is very willing to speak out with ideas.</strong> The student conducting the survey is also getting input regarding sizes. John says, &quot;Extra large, buddy—extra large pal.&quot; John can be very demonstrative.</td>
</tr>
<tr>
<td><strong>4-3F</strong> 7 Dan, Ann, Mike, and Tom are all around the computer. At times Dan seems to pay no attention at all to what is going on while the other students are concentrating on the computer.</td>
</tr>
<tr>
<td><strong>4-3F</strong> 7 John is still in the lecture/demo area writing. <strong>He begins to rock back and forth as if in time to music.</strong></td>
</tr>
<tr>
<td><strong>4-3F</strong> 7, 18 Dan is sitting somewhat sideways in his chair and for a short period of time rests his head on the back of the chair. Tom, Ann, and Mike discuss the problem, but Dan is not involved. The teacher asks Mike to show one of the students in another group how to use a software package. <strong>Dan yawns and gazes at a bookcase which holds various kits and books, and is located right next to the computer table at which the team is sitting.</strong></td>
</tr>
<tr>
<td><strong>4-3F</strong> 7, 27 John finally finishes copying the information in his notebook, gets up, and puts it away on the shelf on the cart. He takes a seat with his team at the computer. He asks, &quot;What's that?&quot; No one seems to acknowledge him. He asks another question, but I can't hear it. He seems to be trying to participate. He laughs at humorous comments made by other teammates.</td>
</tr>
<tr>
<td><strong>4-4F</strong> 7, 22</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
APPENDIX G

CATEGORY ANALYSIS
<table>
<thead>
<tr>
<th>Category #6: Attendance and punctuality of the students with disabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Dan was the first student in the lab almost every day</td>
</tr>
<tr>
<td>* On the days Dan was not the first student in the lab he was among the first three or four</td>
</tr>
<tr>
<td>* Dan was not absent one day during the study</td>
</tr>
<tr>
<td>* John was absent a great deal of the time before dropping out of school</td>
</tr>
<tr>
<td>* John was tardy three times and close to being tardy on two other occasions</td>
</tr>
<tr>
<td>* John was summoned from the class to the office three times during the observations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Category #7: Expressions, gestures, and mannerisms of the students with disabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>* The first time he entered the lab, Dan had a look of anticipation on his face</td>
</tr>
<tr>
<td>* During the first two periods he was in the class, Dan looked around much of the time as if he was trying to take it all in</td>
</tr>
<tr>
<td>* The first time in the class, Dan looked at each student closely</td>
</tr>
<tr>
<td>* From the first day in the lab, Dan walked around the lab much of the time at the beginning of the period and anytime he had no assignment</td>
</tr>
<tr>
<td>* Dan would look at things as he walked around the lab</td>
</tr>
<tr>
<td>* Dan usually walked around carrying his school notebook against his chest</td>
</tr>
<tr>
<td>* Many times Dan would appear to not pay attention to what the teacher said, however he usually seemed to know what to do</td>
</tr>
<tr>
<td>* Dan smiled most of the time</td>
</tr>
<tr>
<td>* When he wrote, Dan would hold his pencil in a most unusual manner—he held the pencil between his thumb and first two fingers with the fingers curled under</td>
</tr>
<tr>
<td>* Most of the time Dan would not respond when his team members would laugh at something</td>
</tr>
<tr>
<td>* Dan yawned a great deal</td>
</tr>
<tr>
<td>* Even when he was seated Dan would gaze around the lab most of the time unless he was occupied</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Category #8: Physical activity of the students with disabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Dan tried to walk around the lab and look at things—he did this a number of times each period</td>
</tr>
<tr>
<td>* Dan was constantly sharpening his pencil—sometimes four or five times during one class period (the lab has an electric pencil sharpener)</td>
</tr>
<tr>
<td>* John would occasionally walk across the lab, but it was usually just to talk with someone</td>
</tr>
<tr>
<td>* Dan would sometimes run or half-run to where he went in the lab (not too often)</td>
</tr>
<tr>
<td>* John would sometimes rock back and forth in his chair, or shake his head</td>
</tr>
<tr>
<td>* Once when sitting with his group, John would bend over and rub his shoes as if cleaning them</td>
</tr>
<tr>
<td>* When picking things up off the floor Dan would put many times kneel rather than bending over</td>
</tr>
<tr>
<td>* One time while sitting at one of the drafting tables, Dan went through all of the drawers in the table—he also picked up a T-square and played with it. HE WAS BORED</td>
</tr>
<tr>
<td>* Once Dan pulled his coat over his head and put his head on the table</td>
</tr>
<tr>
<td>* Sometimes Dan had difficulty sitting still—he would wiggle in his chair, or swivel it back and forth—he did this mostly when he was having to watch his teammates</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Category #9: Reactions to the teacher by the students with disabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Dan seemed to want to do as directed by the teacher—he followed teacher directions</td>
</tr>
<tr>
<td>* Many times Dan would not look at the teacher as he talked, but Dan seemed to hear what was being said</td>
</tr>
<tr>
<td>* Sometimes as the teacher talked to the class Dan would look through one of his books</td>
</tr>
<tr>
<td>* Dan would respond to the teacher in short phrases—once he told the teacher he would have to think about it. He responded with “I don’t know” many times</td>
</tr>
<tr>
<td>* Dan pushed his chair in when leaving the class after the teacher told him they always pushed their chairs in when they left—he did it automatically most of the time after that</td>
</tr>
<tr>
<td>* Once the teacher asked Dan to scoot a chair up next to his teammates meaning for Dan to sit in it, Dan scooted the chair up, but didn’t sit—he walked off—he did exactly as he was told—this happened on one other occasion</td>
</tr>
<tr>
<td>* When the teacher asked Dan to sit down he did so</td>
</tr>
<tr>
<td>* John would sit calmly and listen when the teacher talked to the class</td>
</tr>
<tr>
<td>* John would carry on conversations with the teacher, especially about things that interested John</td>
</tr>
<tr>
<td>* Dan would do what the teacher asked him to do</td>
</tr>
<tr>
<td>* John would follow the instructions of the teacher</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Category #10: Students with disabilities carrying out assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>* John sat and copied information he had missed from the previous class session</td>
</tr>
<tr>
<td>* John was given no direct assignment other than copying the notes</td>
</tr>
<tr>
<td>* Dan asked to find sounds on the computer and write their names on a worksheet—he did more than once—it became part of his routine</td>
</tr>
<tr>
<td>* Dan would locate a teammate in the library as requested by the teacher</td>
</tr>
<tr>
<td>* At the end of one period Dan was shown how to turn off the video monitors and then asked to turn all of them off—he did so</td>
</tr>
<tr>
<td>* Dan was asked to turn off all the Macintosh computers at the end of one period—he did so</td>
</tr>
<tr>
<td>* Dan took a permission slip home to be signed and brought it back</td>
</tr>
<tr>
<td>* Dan did not put papers in his notebook as requested by the teacher on one occasion</td>
</tr>
<tr>
<td>* Dan looked for a printer ribbon for quite a while as requested by the teacher</td>
</tr>
<tr>
<td>* Dan put all of the computer mice in their racks as requested by the teacher</td>
</tr>
<tr>
<td>* Many of Dan’s assignments were housekeeping chores</td>
</tr>
<tr>
<td>* Dan did work with his team as a typer on the computer while team members dictated to him</td>
</tr>
<tr>
<td>* Occasionally Dan would help teammates at the teacher’s request</td>
</tr>
</tbody>
</table>
APPENDIX H

EXAMPLE OF SYNOPSIS OF TEACHER INTERVIEWS
<table>
<thead>
<tr>
<th>Preparation for Students with Disabilities</th>
<th>Perceptions and Expectations of the Students with Disabilities</th>
<th>Feelings for the Students with Disabilities</th>
<th>Reflections</th>
</tr>
</thead>
<tbody>
<tr>
<td>- The teacher stated that he had not in any way prepared the class for having Dan in the class (the student with autism)</td>
<td>- The teacher stated that John is usually derogatory toward what others say and do</td>
<td>- The teacher stated numerous times he regrets that John would not attend school regularly and had threatened to drop out of school</td>
<td>- The teacher felt the team had &quot;lost&quot; Dan—they didn't get Dan involved—if he had it to do over again the teacher feels he might team Dan up with another special ed student with milder disabilities</td>
</tr>
<tr>
<td>- At the beginning of the study the teacher stated that based on a past experience he felt the regular students would &quot;begin to take care of Dan as the semester progressed&quot;</td>
<td>- The teacher stated that John usually does barely enough to get by—almost as little as he can get away with</td>
<td>- The teacher discussed trying to talk through a problem with John—John's friend had had an accident and John felt it was his fault—the teacher stated how he had tried to console John</td>
<td>- The teacher said he would work up front to structure the team for Dan—get the team more defined as to Dan's role</td>
</tr>
<tr>
<td>- The teacher stated he had not coached the students at all regarding how to interact with Dan</td>
<td>- The teacher stated that he was unaware that children with autism were very sensitive to loud noises—when he was told he stated that he then understood why Dan was so shaken over the loud noise caused by selling off the CDS cars</td>
<td>- The teacher stated that &quot;you have to go real easy with John&quot;—the teacher said he planned to get the team to incorporate some of John's ideas</td>
<td>- The teacher would want more up front help in Dan's case in being provided information regarding autism</td>
</tr>
<tr>
<td>- The teacher stated that he was unaware that persons who have autism are routine oriented</td>
<td>- As the semester progressed the teacher stated he was very surprised at what Dan could do</td>
<td>- As the semester progressed the teacher stated he was very surprised at what Dan could do</td>
<td>- The teacher said he wouldn't want much information regarding Dan personally because he didn't want to have preconceived ideas about him</td>
</tr>
<tr>
<td></td>
<td>- The teacher felt that John might be hesitant to do any writing on the computer because of the fear of being embarrassed at not being able to spell—it was noticed that John would manipulate objects and figures on the computer</td>
<td>- The teacher felt that John might be hesitant to do any writing on the computer because of the fear of being embarrassed at not being able to spell—it was noticed that John would manipulate objects and figures on the computer</td>
<td>- The teacher stated that it would have been beneficial to have talked with the special education staff after about two weeks into the study</td>
</tr>
<tr>
<td></td>
<td>- The teacher stated at one time that rather than frustrate Dan by requiring him to do an assignment, he let Dan just watch his team</td>
<td>- The teacher stated at one time that rather than frustrate Dan by requiring him to do an assignment, he let Dan just watch his team</td>
<td>- When asked if he received an IEP for Dan the teacher said yes, but that he probably put it in the drawer with the rest of them—again he said he didn't want to have preconceived notions about the student—the teacher gave an example of a student who had been in jail and was in one of his classes—I AM AFRAID THE TEACHER HAS DISABLED CONFUSION WITH DELINQUENCY</td>
</tr>
<tr>
<td></td>
<td>- At the suggestion that the teacher sees if Dan could copy data onto the computer the teacher stated, &quot;That's a good idea—I think I will try that&quot;</td>
<td>- At the suggestion that the teacher sees if Dan could copy data onto the computer the teacher stated, &quot;That's a good idea—I think I will try that&quot;</td>
<td>- The teacher suggested that it might be a good idea for the special ed teachers to participate in the technology class for a few days to get an idea of what goes on</td>
</tr>
</tbody>
</table>
REFERENCE WORKS


