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Data Entry as a Job Skill for
Students with Intellectual Handicaps:
A Production and Evaluation of a Training Program

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A Thesis Equivalent
in
The Department
of
Education

Presented in Partial Fulfillment of the Requirements
for the Degree of Master of Arts at
Concordia University
Montréal, Québec, Canada

March, 1992

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ISBN   0-315-73617-8

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ABSTRACT

Data Entry as a Job Skill for
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Christina Desormeaux

The following thesis-equivalent involved the development
and evaluation of a training program to teach students with
intellectual and developmental handicaps, data entry as a job
skill. The development phase involved the systematic design
of the instructional program, appropriate for the target
population. Following the development, two special education
instructors independently implemented the program. Data
entry skills were assessed during implementation with a
series of student performance evaluations. Differences
between and within student groups were compared. The
instructors completed evaluation forms for each lesson and a
general evaluation of the program, following its completion.
A Special Education Consultant and Instructional Design
Expert also reviewed the program. Although the results
indicated that the training program was effective and
valuable, recommendations for improvements to increase its
effectiveness are discussed.

ACKNOWLEDGEMENTS

Thank you to Dr.Steve Shaw, my thesis supervisor, for all his advice in school and out.

A very special thanks to Gurit Lotan, Barbara Richard, Elayne Roy, Carole Petche, Domenic Di Liello, Brenda Smyle and the people at the West Island Readaptation Centre for taking the time and energy to give this training program a chance.

Many thanks to all those friends and family who welcomed me into their home while I was in Montreal.

Thank you, Martin, for your endless patience, support and love.

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Chapter 1

Introduction

<u>Context of the problem</u>

As students with intellectual handicaps (IH) approach the time to leave school and enter the "adult world", one of the main goals of special educators is the preparation of these students for full-time employment and independent living. This preparation is often referred to as vocational training. Functional academics (e.g., money skills and time-management), travel-training, and life enhancement skills (e.g., proper attitude, good attendance, punctuality, attitudes toward safety, taking directions, respect for authority, getting along with others, work ethics, being friendly, and pride in a job well done) are examples of subjects covered in special education vocational training (Merachnik, 1987).

Work skills is another major component of vocational training (Okolo, 1988). This program is designed to give the student skills and experience to perform a job in the most independent manner possible. Work quality, work rate, and attending to a task are some of the areas focused on. Increasing the students' job skill repertoire is another important area in the work skills program. RPM Press, Inc (1986) of Verndale Minnesota compiled a comprehensive publication of vocational training curriculums for severely disabled workers, submitted by a multitude of rehabilitation facilities in Canada and the United States. The curricula included job skills such as Custodial Training, Microfilming, Laundry Training, Screen Printing Operations, Service Station Training, Food Service Training, Housekeeping Training, Motel Service Work, Dishwasher Training, Lawn Care, Basic Painting and Basic Hand Tools. A number of other sources confirm that these job skills are typical of those taught to students with special needs (Wehman, Hill, Wood, & Parent, 1987; Wehman,

Parent, Wood, Talbert, Jasper, Miller, Marchant, & Walker, 1989; Kregal & Wehman, 1989).

The selection of a job skill for students with IH must take into consideration the needs of the employer and student.

Employer needs

Without salable labor market skills, graduates sit at home doing nothing productive, be on waiting lists for sheltered employment or training, or just become permanent members of the unemployed population. When this occurs, it tends to be personally demeaning, denigrating, and debilitating for graduates of special needs programs (Merachnik, 1987).

To prepare students with IH optimally for successful employment, vocational educators must consider job skills that will be required to satisfy the present and future labor market. With the introduction of microcomputer technology, the entry level skills required by employers has changed dramatically in the past decade (Merachnik, 1987; Dick, 1987; Brown, 1989; Sarkees & West, 1990). For example, businesses are seeking employees with more sophisticated skills. Employers are more interested in job candidates trained in a wide range of business applications of microcomputers (e.g., word-processing, spreadsheets, and database). "The quality and quantity of future job opportunities are greater for people who know these skills" (Eichleay and Pressman, 1987). Six major trends will have an impact on clients with IH by the year 2000:

1. Higher academic skills will be required by employers, since very few jobs will be available for those who lack reading, writing, and mathematics.

2. Service industries will increase and manufacturing jobs will decrease. The traditional blue collar jobs that students with special needs are most often trained for will decrease in number.

3. Computer literacy will be required. The types of computer jobs that will be available include computer operators, computer technicians, and computer repair persons.

4. Adaptability and flexibility (transfer of skills) to another job will be requested by employers.

5. Competence in a job or range of occupational skills will be an asset.

6. Self-employment will continue to grow at a rapid rate in the future, resulting in decreased supervision at the work site. This means that time management skills are needed so that tasks and projects can be effectively completed.

Considering the increasingly demanding skills required by employers, students with IH are faced with an enormous challenge. Clearly, this population of future workers will be at a disadvantage in the labor market if not adequately trained. Special educators, responsible for assisting these students prepare for the jobs of the present and future, need to seriously consider the above-mention trends when planning and selecting a job skill for their students.

Student needs

The needs of the student must also be taken into consideration when selecting a job skill to be included in a work skills program. Job satisfaction, job security, and an opportunity for advancement and personal growth must be

considered (White, 1987). Competitive employment opportunities is a step in meeting the needs of students with IH. Competitive employment is defined as "work for at least minimum wage in work environments where there are predominantly non-handicapped workers" (Wehman et al, 1987). According to Wehman (1981):

1. All handicapped persons have a right to work at a competitive wage with non-handicapped co-workers and at a job that provides fulfillment and room for advancement.

2. Behavioral and rehabilitation engineering technology provides an empirical basis and should allow for the appropriate training and placement of many more handicapped individuals into gainful employment.

The benefits of competitive employment for students with IH are extensive enough to make it a major consideration when selecting a job skill to be included in a work skills program (Wehman, 1981; Wehman and Pentecost, 1983). First, it provides the worker with the opportunity for greater wages and benefits, giving this individual a true sense of economic and social value.

Competitive employment also provides integration of individuals with and without handicaps, a mutually beneficial experience: direct observation and contact of individuals with IH can increase expectations and perceptions of employers toward these people, ensuring continued hiring and retention; it provides the opportunity for persons with handicaps to meet, serve and socialize with non-handicapped people; and working with non-handicapped peers allows those with IH to learn to accept criticism and ridicule(a real-world experience) to which all individuals must adjust.

A third advantage of competitive employment is the opportunity for normalization. Working in a real company

alleviates some of the protective shields associated with more restrictive environments. Hours are more regular, the environment is not so organized, people are hired and fired. Experience in this setting increases the likelihood of obtaining and maintaining other competitive jobs.

Finally, the perception of the families and friends of a person with IH, is effected by the placement of this person in a competitive employment position. Their expectations and attitudes are increased and fears are reduced, all leading to a more supportive relationship. Thus, the overall effect on the individual with IH of placement in competitive employment inevitably leaves him or her with a feeling of fulfillment and an improved self-concept.

The use of the computer in special education vocational training has increased rapidly in response to some of the needs expressed by employers and students (Blaschke, 1985). It is being used as a vocational exploration and assessment tool, to assist in remediation of academic and survival skills, and to teach technical job-specific skills related to the workplace (Conover, 1991). This "new" technology has also brought revolutionary changes in the employment prospects of people with physical and mental disabilities. "Computer technology is bringing some of these students the tantalizing possibility of entering a world that used to seem completely out of reach- the world of competitive employment" (Buckley & Eichleay, 1989). Evidence shows that this tool is opening doors for students with IH that were previously closed (Cain, 1984; Fowler, 1988; Hummel & Balcom, 1984). This technology holds the possibility of normalizing the exceptional person in the school and in the work place. Physical barriers, communication problems and biological deficiencies may be overcome by this technology. As Eichleay and Pressman (1987) stated:

> Anybody, for example, who can speak into a microphone, or control the movement of an elbow or toe or raise an eyebrow, or move the head in one direction, or even

shift the direction of an eye gaze can control a computer. People are learning to teach those who function at lower levels of mental ability to use computers to learn skills we used to assume they were incapable of learning.

Data entry is among the most promising, trainable applications of the computer for individuals with IH. Basic data entry skills require academic skills from very low to very high, thus accommodating a wide range of clients. Data entry skills can be broken down into consistent, sequenced steps, a feature which optimizes acquisition of skills by many students with IH. Data entry tasks can also be repetitive, a need often associated with individuals with IH (Lindsey, 1987).

The problem

Unfortunately, data entry as a job skill is still new to the field of special education vocational training and there exists very little in terms of a comprehensive training package. There are a few programs extant, though, which demonstrate the emerging potential of this skill. A short term training program created by the Attainment Company (1991), called *Computer Data Entry*, asserts that it emulates computer procedures used in business. Its goals are to:

- train students to complete accurately a realistic, work-related computer task;
- increase the student's work rate with experience; and
- develop attending skills and appropriate work behaviors.

The program consists of a set of pre-designed database diskettes with a series of account sheets (records). The program has three levels of difficulty. Level 1 accounts require entry of just a code- "A" or "B". Level 2 accounts require entry of a dollar amount and the code. Level 3

accounts require entry or correction of all fields. For each level, a set of industrial norms for entering the information is established, in terms of speed per account and speed per task. This program does not have any lessons or teaching guidelines. It recommends, however, that the instructor "use any teaching method that helps the student develop these necessary skills" (p.2). In terms of teaching the students work-related behavior, the program suggests that the instructor "establish work rules that are common in the business world, and make sure your students follow them" (p.2).

Another program called *Evaluation and Training Using the Computer* (ETC), approved by the state of New Hampshire Division of Vocational Rehabilitation, provides services for the "handi-capable". Among these services is computer training. The program provides computer related training to clients with developmental disabilities (18 years and older) "so that they may have a clear option within an ever changing world marketplace" (Butze, 1989). The training consists of computer literacy and operational skills such as typing, keyboarding, data entry and word processing. Through direct instruction, students are taught to enter data from a document of printed material. Unfortunately, the author was unable to obtain more information about this program which is not for distribution at this time.

The most comprehensive data entry program found was presented at a Closing the Gap Conference (Microcomputer Technology in Special Education and Rehabilitation) by the Boston Public Schools, Special Education Department (Eichleay, 1989). This program, still in its developmental phases at the time of the presentation, covers five topics:

    1. Pretest

        a. Simple copying tasks

        b. Complex copying tasks

    2. Career awareness regarding data entry jobs

Includes videotape of students in data entry work study

3. Training
4. Verifying data
5. Posttest

After completing the course, students are skilled at entering data with average speed and accuracy required for entry level employment in the competitive job market. This model computer training program focuses on students with severe physical and visual impairments. At the Closing the Gap conference, Eichleay stated that they were currently expanding the program to include students with multiple disabilities and developmental delays. However, a follow-up article (Buckley & Eichleay, 1989) describing this project showed that they had not yet used this program with individuals with IH. The article announced that government funding was becoming very limited and the project was being terminated. Even if the project would have expanded to persons with IH, the design of the program would have required modifications. There are fundamental differences between the design of courseware for students with physical handicaps as opposed to those with IH. For the former, the theoretical base of the program content remains the same, while physical adaptations in the environment are made. For students with intellectual handicaps, instructional materials and methods are modified to meet the cognitive level of the students.

The solution

To summarize, selecting a job skill to be included in a special education training program is a critical step in assisting students with intellectual handicaps to obtain socially valuable and satisfying employment. The literature establishes computer data entry as a job skill well suited for students with IH, while meeting several of the present

and future needs of employers. The evidence, however, shows that very little exists in terms of appropriate instructional materials to train students in this job skill. The solution is to develop a vocational program to train students in data entry as a job skill.

Chapter 2 provides a description of each of the steps in the instructional development process of the training program. This includes a description of the resulting training package (e.g., lessons topics, teaching materials, testing tools, etc...).

Chapter 3 describes the evaluation phases which occurred during and after the development of the training program. A description of the participants, testing procedures and evaluation instruments is provided.

Chapter 4 includes the results of the expert evaluations and student performance evaluations.

Chapter 5 is a discussion of the results of the evaluations including recommendations for revisions and a discussion of the study.

Chapter 2
Development

The design of instruction for the data entry training program was based on Dick and Carey's (1978) systems approach model. Each of the steps in the instructional development process are discussed in this chapter. It should be noted that the development of this training program occurred over a period of several years. Time spent during an instructional design course and small internship contributed to the development of the final product.

Identification of the instructional goal

The content of the vocational training program is based on other data entry programs (Attainment Company, 1991; Butze, 1989; Eichleay, 1989) and data entry skills most requested by employers (Eichleay & Pressman, 1987). In addition to teaching skills associated with the database, it was decided that keyboarding should be a part of the training program. This decision was based on research indicating that keyboarding instruction enhances a computer training program (Saka, 1986; Schellenger, 1987; Texas Board of Education, 1985; Hines, 1984). Keyboarding instruction increases speed, spelling skills, understanding of punctuation, and self-confidence (Storey, 1985). It should be noted that the alternative to touch typing is referred to as "hunt and peck". As one author stated, "business educators would be appalled to see young students "hunting and pecking" as a method of typing, a habit considered inexcusable" (Hoot, 1986).

The goal of the data entry program is defined as:
Students will independently use a database software package to enter, retrieve, and edit information in a pre-designed database demonstrating correct keyboarding skills and an understanding of the characteristics of the database including its components, menus and commands.

The data entry skills covered are mainly psychomotor (requires the learner to perform a motor skill using some cognitive skills) and verbal (requires the student to state/list or describe information presented).

Psychomotor skills:
- know how to use the database program
    commands
    sequence of commands
- demonstrate correct keyboarding skills

Verbal skills:
- know the characteristics of a database
    menus & screens
        command functions
        components

Initially, the goal of the package was divided into two parts. The division was based on:

- size of the instructional goal;
- classification of the instructional goal; and
- time constraints for teaching the goal.

Part 1, described above, constitutes the package discussed in this thesis-equivalent. Part 2 would focus on generalizing the skills learned in Part 1 to a variety of situations while demonstrating appropriate job-related skills (e.g., consistent, organized, conscientious, and suitable employer and co-worker relations). It is the author's intent that the goal of Part 1 be introductory. Equipped with the skills acquired in Part 1, the learner would be ready to apply these skills in a wide variety of situations and begin preparation for using these skills in a real working environment.

It is the author's belief that initially presenting the introductory skills (Part 1) in a controlled setting, such as

a school or training setting is in the best interest of the student. Successful and deficient instructional procedures and materials within the lessons and training package can be systematically identified and corrected through observation of the learners and instructors, thus optimizing learning, retention and success of this skill in the real work environment.

Instructional analysis

An instructional analysis resulted in this goal (main skill) being broken up into three main skills:

1. Demonstrate correct keyboarding skills
2. Use the database
3. Describe the characteristics of a database

The instructional goal was divided into these three main skills because they represented different learning outcomes, requiring different instructional strategies. Each main skill was then divided into a series of subskills, which are necessary in order to achieve the main skill. Table 2 provides a summary of the three main skills, and their subskills.

Table 1. Main skills and subskills

Main Skill	Subskills
Demonstrate correct keyboarding skills	Locate home keys, use correct fingering of letter combinations & use shift keys
Use the database	Use the file commands (save, load, quit), edit information (delete, add and replace), manipulate the cursor, access and manipulate information (sort, search, and print)
Describe the characteristics of a database	Describe the menus, screens, and components of a database

An instructional analysis chart (Figure 1) illustrates the relationship among the skills. The chart is structured in a hierarchy but it is important to note that most of these skills could be learned separately, and in a variety of sequences. Based on research and the intended learners (their inexperience with keyboards and databases), the chart was designed as seen. The skills are initially learned separately without reference to other skills (except the subskills) rather than in combination, as might occur in a regular classroom. For example, a student in a regular classroom may learn to add and delete information within the same lesson. However, with this population, it is easier for them to grasp a concept presented in isolation , practice it, and then proceed with the next concept. When all the subskills are mastered and the main skills attained, the skills are combined to achieve the goal.

Instructional objectives

Instructional or performance objectives were derived for each of the skills from the instructional analysis chart (Figure 1). Objectives define what the learners should be able to do when they have completed a unit of instruction (Gagné et al, 1988). For this population, the objective represents the "ideal" performance level.A list of all the subskills and their instructional objectives may be found in Appendix A.

Learner analysis

The training program is intended for students with intellectual handicaps enrolled in a vocational or pre-vocational program. Their age ranges from 12-20 years old. The development and design of the training program was partly based on an analysis of four students from the target population, enrolled in a vocational class at Summit School (for students with developmental disabilities) in Montreal. These were not the students who participated in the

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Figure 1: Instructional analysis chart of data entry skills
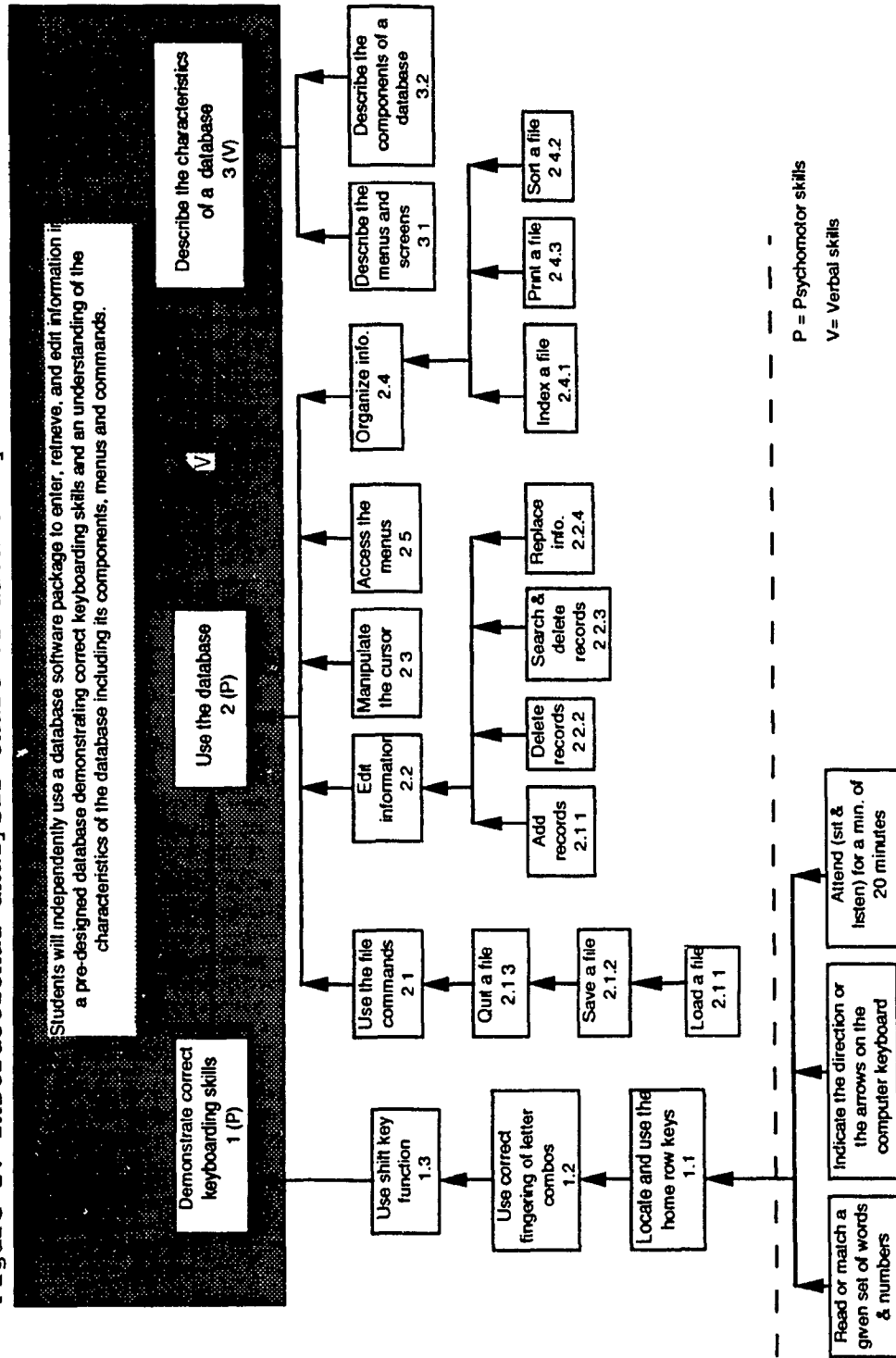
implementation of the training program, however, they shared similar characteristics and were from the same learning environment. The information regarding the academic achievement and behavior profile of these students was obtained from Progress Reports of the academic year 1988-89.

Academic level

These students participated in the following programs in 1988-89: Functional Reading, Functional Math, Work skills training, Newspaper, Language, French, Social Skills, Relaxation, Weight Training, Computer, Gym, Art and Library. Relevant to the present study, in terms of affecting the method and sequencing of the lessons, is a description of the following programs and the general level of the students in each:

- **Math**

The functional math program is designed to teach basic concepts in arithmetic, which finds application in daily life. The emphasis is on money transactional skills, banking and the use of a calculator. All of the students had a complete understanding of numbers, operations and manipulation of these numbers.

- **Reading**

The reading program is designed to develop and maintain reading skills to enable the students to function effectively in the community. All the students could read effectively and achieved good comprehension levels. Some of the students required assistance with comprehension. However, they readily ask for help if needed.

- **Work skills**

This program is designed to give students skills and experience required to perform a job in the most independent manner possible. Work quality and rate (comparable to

industrial standards), attending to the task, work etiquette and job skill repertoire are the areas focused on. Some of the office jobs include clerical skills (e.g labelling, collating, photocopying), packaging, and filling out and delivering orders for educational supplies.

Three of the students took part in a work study which involved on-site job training and independent work (paid). These included working on an assembly line at a hockey shields packaging company, :uuming at a paper company and working in a mailing room at a pharmaceurical company (i.e., removing mail from the slot along with pre-labelled envelope). The students were all successful with their jobs, although the positions were only temporary.

• Computer skills

All of the students had experience with drill programs or basic word processing. They were not "afraid" of the computer and were used to having at least one in the classroom. They were not accustomed, though, to a formal computer class.

General characteristics

Certain characteristics of students with intellectual handicaps influenced the instructional design of the training program.

• Language

Many of the students have difficulties communicating because of behavioral, emotional and biological problems. At the age level, the newspaper is used as a tool to develop language and communication skills and general knowledge by reading, listening, observing, writing, speaking and discussing.

- **Social skills**

    An important focus of attention placed on these students is the development of social skills. A few of the students participated in a program called "Mind Your Manners". It is aimed at helping young people fit in and feel comfortable in a variety of situations: at home, at meal times, at school, in public, and while meeting people and making conversation. These students were aware of these social skills and can generalize them in different social settings. They were all polite and well-mannered, yet sometimes, they needed to be reminded to practice this. They all, however, "get along" with each other and the staff of the school which they attended.

- **Attention span**

    Generally, these students had good attention spans. However, because of their learning disabilities, some tended to lose focus if a lesson was too long or uninteresting.

- **Motivation**

    The four students analyzed were eager, enthusiastic and motivated to learn new things, although this is not always the case. Motivational deficits can be a problem for students with learning disabilities and intellectual handicaps. Methods for enhancing motivation levels are described in the Instructional Strategy section of this chapter.

- **Learning environment**

    They were all accustomed to a classroom setting with a teacher as the medium of instruction. Teachers and staff at the school which they attended encouraged these students to participate and become involved in the process of learning. These student were accustomed to hands-on learning.

- **Teacher/learner relationship**

     The students were comfortable with their teachers and
refered to them on a first name basis.   When the students
were participating in a work skill program, the teachers were
more formal, taking on the role of employer.

- **Cultural and socio-economic background:**

     These students were all english-speaking Canadians with
Italian, Greek, Jewish and English backgrounds and are
considered "middle-class".   This learner characteristic had
minimal effect on the instructional design.   In some cases,
though, language deficits of the learning disabled student
may be because of cultural differences and lack of
experience, because of low income.   However, in the present
case, there was not a problem.

- **Behavior patterns**

     In special education, behavior is more often noted if
there are difficulties associated with it (e.g. aggression,
inappropriate behavior, withdrawal, etc.).   In general, these
students do not have major difficulties. Some should be noted
since they may effect the instructional design in terms of
how the teacher will interact and deal with the students.

     A common difficulty is inappropriate attention-seeking
by talking unnecessarily or bothering peers.   A program for
this sort of behavior would involve encouraging a positive
manner with peers, awarded with checks which add up to earn a
social event (e.g., a movie), and praise.   The students are
reinforced often for good behavior as opposed to punished or
negatively reinforced for poor or inappropriate behavior.
Many of the students have poor self-esteem and low-
expectations which result in learning deficits.   Programs to
gain confidence, self-esteem and success-oriented experiences
are used to help them overcome these problems.

     Some of the students have a tendency to talk back and
object when confronted with a situation.   This would be

regarded as highly inappropriate at the work place. The student is taught to accept directions gracefully and comply to them promptly through demonstrations and reinforcement.

Another difficulty, common to several of the students is lapses in attention and high distractibility. Students are reinforced for attending a lesson and reminded to participate in the lesson when they become distracted.

It was important to take into consideration the academic level and general characteristics of the learner when designing this instructional package. Because of the special population of students and their varied backgrounds, experiences and behavior patterns, the design was very different than if it had been intended for "regular" students of the same age.

Development of tests

Tests were developed to measure the instructional objectives (Appendix A) introduced in the lessons of the training program. The instructional objectives represent the "ideal" level of performance for these students. It can be said that the student has obtained the objective if he or she is independent on all the steps in the skill. As Baine (1982) states, though, the goal may not be independence. The special nature of these students demands that each student be evaluated according to their individual progress. It may take several trials before the student can independently do the task. It is left up to the judgment of the instructor to advance a student to the next skill even if he or she is not independent on all steps of the skill. The more independent a student is, though, the more likely he or she will succeed in this kind of job. If a student is having difficulties with more than one or two of the skills, then he or she should be re-assessed for the training program. The following is a discussion of each of the tests developed.

Entry behavior test

The entry behavior test (Appendix B) should be administered to any students who may enter the training program. Entry behaviors are those skills that must be mastered by the learners from the target population before beginning instruction. This is not simply a list of things that the students know or can do, but only those skills necessary to begin instruction (Dick & Carey, 1978). Entry behaviors should be defined in the form of behavioral objectives that describe the social, psychological, academic, sensory, physical, communication, and vocational skills that are prerequisite to entry into the training program. The results of entry behavior tests may provide information about the suitability of the vocational training program to the target population. Results can determine (a) if there were learners who did not have all the entry skills and who succeeded in the training program, and, conversely, (b) if there were learners who had all of the skills but who were unsuccessful in completing all of the training program. This information may suggest the need for addition, deletion, or modification of skills listed as prerequisite to beginning the training program. Also, new skills may be incorporated or omitted from instruction (Baine, 1982).

Initially, the entry behavior for this training program was the identification of letters and numbers on the keyboard. However, the first field study of the training program, with students of varying levels, showed that this entry skill was insufficient for successful acquisition of the skills in the training program. It suggested that a minimal reading level of grade two may be necessary to begin the instruction. This minimal reading level facilitates reading computer screens, moving between menus and working with data. It also suggested that functional-readers, who have learned to read entire words, may also be able to complete the program. Thus, the entry test was revised to

include test items that requires the student to read or match
a set of words and numbers.

The first field study also showed that directionality
should be tested. This skill is necessary when using the
arrow keys on the computer keyboard. Using the arrow keys is
necessary for manipulating the cursor when correcting
mistakes, moving between menus and accessing records.

Two behaviors are also considered important for this
skill. The recorder is asked to refer to the student's
teacher for this information. The first is whether the
student has the capacity to attend to instruction (sit and
listen) for a minimum of 20 minutes at a time. This is the
minimal amount of time that it takes for the instructor to go
through the pre-instruction and instruction presentation
components of the lesson. The second behavior is the
student's preference for solitary or group activity. Data
entry tends to be a solitary activity and may not be suitable
for someone who prefers working in a group.

Posttests

When a new skill is introduced in a lesson, the
students must be tested at the end of the lesson to determine
to what degree he/she has achieved the objective. This is
given in the Student Participation part of the lesson
(towards the end when they have had some practice). There
are three kinds of posttests that were developed:

1. **Keyboarding tests** (Appendix C) are aimed at measuring
speed and accuracy of keyboarding skills. The recorder
indicates the number and types of errors on the test sheet.
Words per minute is also calculated.

2. **Task analyses** (Appendix D) provide a breakdown of each
data entry skill into discrete steps. A recorder indicates
at what prompt level the student is performing at each step.
The prompts are arranged from least intrusive, indicating the

learner's decreased independence as he or she moves down the scale (refer to the recording key on the test sheet). This testing instrument is commonly used with students with IH and is one of the main assessment tools used at the school in which the students in this study attend.

2. Terminology tests (Appendix E) provide feedback on the students "understanding" of key concepts and terms used in data entry.

Development of instructional strategy

Several factors were considered when selecting the instructional strategy for the lessons. The format of a selection of instructional programs, used by special educators, was considered (Allington, Cramer, Cunningham, Perez, Robinson, & Tierney, R., 1985; Englemann, & Carnine, 1976; Booth, Booth, Pauli, & Phenix, 1986; Laubach, & Laubach, 1987; Cook, Esposito, Gabrielson, & Turner, 1987). Familiarity and consistency with programs used by special educators facilitate its use.

Another important factor taken into consideration when designing the instruction for these students, was their motivation level. It is not uncommon that students with learning disabilities and intellectual handicaps have motivational problems (Licht, 1983; Wiens, 1983). Motivation plays an important role in *how well* and for *how long* a student will work at one time. Enhancing motivation can increase effort, learning and performance (Adelman & Chaney, 1982). When designing instruction for students with special needs, the following components should be considered (Baine, 1982, Weiss, 1988; Keller, 1987: Deshler, Schumaker, & Lenz, 1984; Cohen & Beattie, 1984; Gleason, 1983; Wiens, 1983; Kopp, 1982; Adelman & Taylor, 1982):

Ownership:
- Provide a wide variety of topics
- Provide chances for students to decide on topics
- Provide chances for students to choose between assignments
- Provide opportunities to self-monitor and self-evaluate
- Set realistic goals (in conjunction with the learner)

Relevance:
- Provide meaningful activities
- Ensure that topics are important to the learner
- Provide topics that relate to the learner's future

Feedback:
- Ensure that suggestions for positive feedback reflect the fact that the student is in control of the event
- Provide feedback that focus on the learner's actions, not the teacher's perceptions
- Provide regular and systematic feedback on progress and problem consequences

Appropriate time allocation:
- Ensure that there is time to complete activities
- Ensure that there is time for practice and feedback
- Create short sessions so that attention is maintained

Age and developmental level:
- Provide age-appropriate activities
- Match activities to students developmental and motivation level

Instructional objectives:
- Include new skills as well as old skills
- Ensure that the order of objectives are flexible and can be adapted to students' different needs and levels
- Include missing prerequisites for learning and performing needed skills

Considering the factors stated above and those suggested by Dick and Carey (1985), an instructional strategy for the lessons was established. A lesson is considered a learning module that will take an estimated one hour of teaching time. The sum of all the lessons adds up to 24 hours of instruction. In some cases, lessons may have to be repeated, depending on the level of the students. A sample of a lesson appears in Appendix F. The lesson components are:

- Pre-instruction
- Instructional Presentation
- Student Participation
- Testing

Pre-instruction:
This section includes three components:
- **Motivational component**
Plenty of reinforcement and encouragement is required before **each** lesson. A constant reminder that what the learners are doing is important, necessary and helpful, as well as good for their future, are examples of intrinsic reinforcing statements. A more immediate or external reinforcer may include a promise to play a computer game for five minutes at the end of the lesson.

- **Review**
These students must be given the opportunity to ask questions about the previous lessons since it is essential that they are firm on one skill before advancing to the next. Even if the students do not have questions about the previous lesson it cannot be assumed that they "understand". Therefore, a brief review of the previous lesson is important. If a new skill was introduced, the steps are reviewed.

- **Preview**

This includes a brief description of the instructional
presentation to follow. To simply say, "Today we will
learn to use the search command to find specific
information in the files" is a sufficient preview.

Instructional presentation

The instructional presentation component of the lesson always
involves group instruction, in which the students are given
an explanation and demonstration of a new skill. Sometimes,
it will be a review of a series of skills (e.g., editing
features). The lesson topics were derived from the
instructional analysis chart (Figure 1) and comprise one or
two of the subskills. Table 2 provides a list of the lesson
topics and their suggested sequence.

Student participation

When the instructional objective is psychomotor, the student
will need to practice the skill after it has been presented.
At least half of the class time will be devoted to practice
of the skill learned that day. Feedback should be constant
throughout this practice component of the lesson. It is
important that the student be shown the _correct_ way to
perform the skill, even if this means that the instructor
demonstrates _again_, then observes the student as she or he
does it.

Testing

When a lesson covers a new skill, this must be tested at the
end of the lesson (after practice). This should take place
during the Student Participation section of the lesson. This
section of the lesson directs the instructor to the correct
tests to use and the instructions for using them.

Table 2. Lessons and topics

Lesson	Topic
Lesson 1	Introduction to the instructional goal
Lesson 2	Locate and use the home row keys: Introduction
Lesson 3	Locate and use the home row keys: Using the computer keyboard
Lesson 4	Locate and use the home row keys: Using the keyboarding program
Lesson 5	Use correct fingering of letter combinations: Practice with two letters
Lesson 6	Use correct fingering of letter combinations: Practice with four letters
Lesson 7	Use the shift key function
Lesson 8	Review and practice of keyboarding skills
Lesson 9	Introduction to the database
Lesson 10	Describe the components of a database
Lesson 11	Describe the menus and screens: access the menus
Lesson 12	Use the file commands (LOAD, SAVE, QUIT)
Lesson 13	Manipulate the cursor
Lesson 14	Add records to a database: record form
Lesson 15	Add records to a database: list form
Lesson 16	Delete records from a database:one record at a time
Lesson 17	Search and delete: a specific group of records
Lesson 18	Replace information in a database
Lesson 19	Review of editing features
Lesson 20	Sort a file
Lesson 21	Index a file (IBM users only)
Lesson 22	Print a file
Lesson 23	Review of organizing features
Lesson 24	Overview of the goal

Media selection and grouping

The main medium of instruction is an instructor. The role of the instructor is to introduce skills, demonstrate, reinforce and monitor the students. The instructor provides immediate attention and answer questions while the students are receiving instruction and practicing.

A computer system is another medium of instruction. The first part of instruction, keyboarding techniques, is best learned via computer assisted instruction. It is logical that to learn keyboarding skills, one should learn and practice with a keyboard. Selection of a keyboarding software package depends on the reading level of the student, however, most of the software packages cover the same skills. The students also learn on the computer with a database program. The database program should be simple enough for the level of these students yet have the features specified in the instructional analysis.

Development and selection of instructional materials

The following instructional materials were developed and packaged in a print-based manual and titled *Data Entry as a Work Skill: A Vocational Training Program for Students with Special Needs*. This manual includes:

- Lesson plan for all lessons
- 24 lessons with complete instructions for each lesson including a "Materials Required" and " Preparation" section to assist the instructor
- Activity Sheets for lessons (samples Appendix G)
            Keyboarding activity sheets
            Database activity sheets
- Test sheets for each skill and a testing guide
- Reference sheets
- Instructional Objectives
- Software listings

In a addition, software is necessary for instruction but is not included in the package.

- Keyboarding program
- Word Processing program
- Data Entry program
- Diskettes with Pre-designed database files

Summary of chapter

The development of this vocational training program was a process that occurred over a period of several years. An instructional analysis of the skill of data entry followed Dick and Carey's systems approach model included the following steps:

Identification of the instructional goal

Instructional analysis

Instructional objectives

Learner analysis

Development of tests

Development of instructional strategy

Media selection and grouping

Development and selection of instructional materials

Following its development, the vocational training program was evaluated. The next chapter covers this topic.

Chapter 3
Evaluation Method

The process of evaluation is necessary at various stages during the development of any product (Dick & Carey, 1985). Much has been written about the distinction between formative and summative evaluation (Baine, 1982; Dick & Carey, 1985; Geis, 1987; Kandaswamy, 1980; Stakenas & Mayer, 1983; Weston, 1986). Kandaswamy (1980), however, found that the same tools and techniques are used during each type of evaluation regardless of whether the data are to be used in a formative or summative setting. The major difference between the two appears to be *how* the information is used. The data gathered during a formative evaluation is most commonly used to help the developer make informed decisions when making modifications to the instructional materials. A summative evaluation is more likely to yield data that can be used to make policy decisions regarding the adoption or discontinuation of an instructional package. Furthermore, Kandaswamy (1980) states that "when one is never certain about the termination of the developmental process, differentiation between summative and formative evaluation in this respect is an arbitrary act".

The evaluation of this training program was considered both summative and summative. The data obtained during three distinct phases was used to make decisions regarding changes to the instructional materials and its acceptance as an appropriate and "valuable" vocational training program. The first two phases occurred in the early development of the training program. Changes to the training program as a result of these evaluations will be discussed. The most comprehensive evaluation phase was the last, which included student performance feedback and a set of expert evaluations. This phase will be discussed in detail and the results presented in Chapter 4. Figure 2 illustrates the three phases of evaluation.

Figure 2. The three evaluation phases
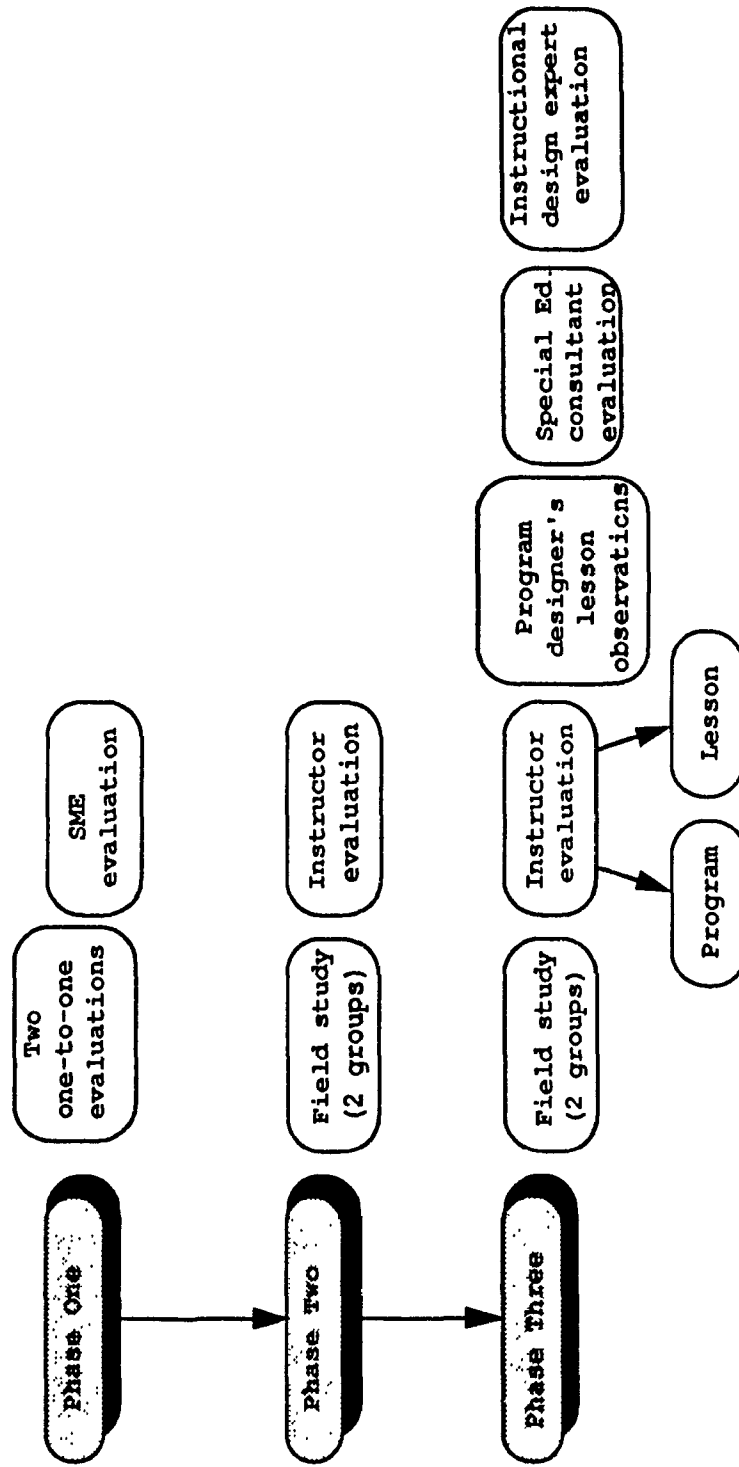
Phase One

When the training program was first developed during an instructional design course, an appraisal by a subject matter expert (SME) in special education and two one-to-one evaluations were obtained. The SME approved of the lesson format, test materials and general instructional strategy selected. The SME suggested test instructions and steps be more explicit for the recorder so that no judgements be necessary on their part. The one-to-one evaluations suggested revisions to wording and phrases. Based on the feedback of SME and students, modifications were made and the balance of the program was developed.

Phase Two

Following the one-to-one evaluation, a field study was attempted. Two test groups were established at Summit School (for students with developmental disabilities) in Montreal. The aim of this evaluation was to collect data for the following purposes:

- to identify successful and deficient instructional procedures and materials which could be taken into account when planning revisions of the program
- to determine the effectiveness of the program to train these learners to achieve the specified objectives
- to determine the worth of the program for vocational training organizations

Unfortunately, this field study was not a success. There were several reasons for its failure. The instructors were given all the necessary teaching materials to conduct the program, although they received little in terms of training. It was also the function of the instructional designer to periodically observe the classes, check that lesson

evaluations were being completed and that the students were being tested. Due to extraneous circumstances, this support did not materialize. This situation led to incomplete and inadequate data.

Although the results of the data were insufficient for full analysis, some of the suggestions requiring immediate and necessary changes in the program were taken into consideration when the final version was developed. "Fine-tuning" of spacing, punctuation, and sentence structure was suggested as a way to make the training program manual more readable and professional. Testing instructions were added to the test sheet directly, instead of appearing in the lesson. The entry behavior test was modified: the reading level was increased so that readers must be able to read or match a set of words, not just letters; a directionality test was added; and the number of test items in the keyboarding test reduced. The training program manual was placed in a binder instead of a bound package to facilitate photocopying of activity sheets and tests.

Phase Three

Fortunately, a second field study was successful. The remainder of this chapter provides a description of the test group selection procedure, the test groups, debriefing sessions, scheduling procedure and evaluation instruments.

Test group selection procedure

It was anticipated that at least one or two test groups would be from Summit School, just as in the first field study. Since the author was familiar with the Summit School staff and students, she approached several instructors with students from the target audience in their class and asked them if they would like to participate in the evaluation of a computer training program. They were told that the following

conditions would have to be met before test groups could be established:

- two to four students between the ages 12-20 (who could mastered the Entry Behavior Test),to receive the instruction
- an instructor to teach the training program
- acceptance by the team leader for the instructor to teach the training program
- time available in the schedule to teach the program
- a computer available for each student
- a printer

They were also told that they would be provided with a training manual, all the necessary software, and inservice training. They were asked, should they decide to take on this mission, to fill out evaluations regarding the lessons and program. Fortunately, two groups satisfied all the conditions.

Description of test groups

As stated in the Learner Analysis section of Chapter 2 (p.13-18), the training program is intended for students with intellectual handicaps enrolled in a vocational or pre-vocational program. The students who participated in the evaluation of the training program were part of the target audience. The information regarding the academic achievement and general characteristics of these students was obtained from Progress Reports of the academic year 1991-92. Table 3 provides a description of the two test groups. They were very similar in terms of educational focus, but there academi and social level were different.

Table 3. Description of test groups

Group 1- 12-19 yrs	Group 2- 14-17 yrs
• intellectual handicaps, developmental delays, mild retardation and some behavior problems	• intellectual handicaps, Down's Syndrome (2 of the students) and autistic behavior patterns (2 of the students)
• math level ranges from grades 2-3	• add and subtract up to 4 digit numbers using a calculator only
• minimum of a grade 2-3 reading level	• functional sight readers
• good expressive and receptive language with some problems communicating thoughts and feelings	• good expressive and receptive language skills, but may experience articulation problems and avoid eye contact
• can effectively attend to an instructor for 30 minutes at a time	• can effectively attend to an instructor for a maximum of 15-20 minutes at a time
• motivated learners but need positive reinforcers (Nintendo, MacDonalds,...) to increase their work production	• motivated learners but need much positive reinforcement to maintain and increase their productivity level
• learn in the classroom or in a work skills setting	• learn in the classroom, but mainly in a work skills setting
• computer experience word processing, using graphics to creates signs and cards and drill programs; can independently set up and shut down a computer	• computer experience using the word processor to copy functional words,lists, and sentences; experience with drill programs; can independently set up and shut down a computer
• work skills and job station experience	• work skills experience with an emphasis on job stations
• may display one or more of the following behavior patterns: distractibility, difficulties following directions, inappropriate language (swearing) and behavior toward peers and staff, and poor attitude	• may display one or more of the following behavior patterns: problems following instructions, problems relating to others, inflexibility (rely heavily on routine), and problems staying on task.

The instructors for the groups were the homeroom teachers of the students. They had similar work experience, although Instructor 1 had more teaching and computer experience. Table 4 outlines a description of the two instructors.

Table 4. Description of instructors

Instructor 1	Instructor 2
• Special education teacher (12 years)	• Special education teacher (7 years)
• responsible for teaching functional academic and work skills programs, setting instructional objectives and implementing behavior programs for a group of 9 students with intellectual handicaps	• responsible for teaching vocational, functional academic, and work skills programs, setting instructional objectives and implementing behavior programs for a group of 9 students with intellectual handicaps
• experience using educational and application software in a school setting	• experience using educational software in the school setting
• experience conducting and implementing computer classes in a computer room; has had a computer in his classroom for the past 5 years	

Inservice training

Before implementing the training program, both instructors were given two inservices. The topics covered were:

1. Overview of their role in this project
2. The training program package
    a. introduction to the topic (main goal)
    b. overview of the materials
3. Evaluation materials
    a. how to use them
    b. when to use them

4. The training manual
   a. general discussion of the sections
   b. following the lesson format
   c. using the test materials
5. Practice using the training package

Scheduling procedure

Following the inservice training, a schedule was set up for teaching the training program. Each class was allotted two one-hour sessions a week, to be given in the computer room in Summit School (Group 1 had one class per week in their classroom, however the necessary computers were supplied).

Instrumentation

The instruments used to collect the data were:

(1) Instructor's evaluations (lesson and program)
(2) Program Designer's lesson observations
(3) Special Education Consultant's evaluation
(4) Instructional design expert evaluation
(5) Student performance evaluations (entry behavior test and posttests)

Instructor evaluations

• Lesson evaluation

The objective of this evaluation was to acquire information regarding the instructor's opinions of each lesson. The information was used to identify successful and deficient instructional procedures and materials within a lesson, to be considered when planning revisions of the program.

• Program evaluation

The objective of this evaluation was to acquire information regarding the instructor's opinions of the

program. The information was used to identify successful and deficient instructional procedures and materials within the program, which can be used when planning revisions of the program. The information was also used to determine the effectiveness of the program to train these learners to achieve the specified objectives

Program designer's lesson observations

The objective of this evaluation was for the program designer to gather information (through observation) on the following lesson features:

- content of the lesson (inclusion or exclusion of lesson components)
- instructional strategies used (modelling, prompting, blackboard use...)
- student interest
- different tests being used (keyboarding, data entry, terminology)
- different types of activities being used
- different materials being used (keyboarding program, activity sheets,...)

The information was used to identify successful and deficient instructional procedures and materials which can be used when planning revisions of the program, which may not otherwise be determined in the instructor's evaluation of the lessons Observations also provided reliability for the instructor's evaluation of the lessons. This time was also used to confirm that the lesson evaluations and student tests were being completed and to provide assistance for instructors if they needed it.

Special education consultant evaluation

The objective of this evaluation was to acquire information from a special education consultant responsible for assisting in the selection of training programs for the

target population. The information was used to determine if
the training program is suitable for the target population
and to determine if the program format is suitable for the
special education instructor.

Instructional design expert evaluation

The objective of this evaluation was to acquire
information regarding the instructional design of the
program, including such aspects as course structure, design
of lessons, selection of media and testing tools. The
information was used to identify successful and deficient
instructional procedures and materials which can be used when
planning revisions of the program.

Student performance evaluations

Students were tested before the course began (entry
behavior test) and after the presentation of the information
(posttests).

• Entry behavior test

There was only one entry behavior test developed,
described in Chapter 2, to determine if the training program
was suitable for the student. Since it had not yet been
determined who the instructors would be, the Program Designer
(author) administered this test.

• Posttests

Several kinds of posttests, described in Chapter 2,
measured the learners' performance. These included:

1. Keyboarding tests
2. Terminology tests
3. Task analyses

Instructions for using these tests appear in the testing
section of each lesson. The instructors were responsible for

testing each student at the end of a lesson to determine to what degree he/she had achieved the skill objective. The data obtained from these tests was used to compare performances between students within a group and between the two test groups.

Summary of chapter

This chapter discussed the three phases in the evaluation process of this training program. Phase Three was the most comprehensive, in which a field study yielded results from two groups of students from the target population. The instructors from each group evaluated each lesson and the training program. Several experts including a Special Education Consultant, Instructional Designer and Program Designer (the author) evaluated the training program. The evaluation instruments and procedures were described. The next chapter describes the results of the third phase in the evaluation process.

Chapter 4
Results

Instructor evaluations

Program Evaluation

The object of this evaluation was to obtain the opinions of the instructors regarding the training program so that informed decisions can be made when planning revisions of this training program. Determining its worth and appropriateness as a potential work skill for these students was also an objective. Groups of questions addressed different topics. Table 5 presents the topics and the questions associated with them. Refer to the instructor's program evaluation form in Appendix H for the actual questions.

Table 5. Evaluation topics and associated questions

Topic	Associated questions
Instructional goals and objectives	3,4
Instructional materials	
• Teaching organizers	1,2,5,11,12,13,14,23
• Software and hardware	8,9,10
• Activity sheets	26,27,28,29,30,31,32
• Reference sheets	6,7
Lesson strategy	17,18,19,22,24,25,33
Teaching strategies	20,21
Learner attitude	15,16
Suitability of training program	34
Instructor's training	35,36,37
Other comments	38

Instructional goals and objectives

The first section of the training program includes an introduction to the program goal and objectives. Only one of the instructors read this section, although both instructors expressed a clear understanding of the goal and objectives of the training program and believe that all the skills should be included. However, they expressed some concern that the students may not have been clear on the goal and objectives of the training program. It was suggested that the students may benefit from seeing how the skill fits into different work settings by showing them actual computer printouts from each.

Instructional materials

Ease of use, appropriateness, interest level of the students and recommendations for revisions were considered for each type of instructional material used in this training program.

• Teaching organizers

Several components were built into the program to help the instructor organize and prepare for instruction. A section called "Using the program" includes a preview of the program materials, general instructions on how to use them, a lesson plan and testing guide. Neither instructor found this section useful.

Three lesson organizers were designed to assist the instructor. Both instructors found the "Materials required" and "Preparation" components of the lesson very helpful when gathering materials and preparing for a lesson. Preparation time was considered reasonable, although one instructor stated that some preparations not specified in the lesson were sometimes required. One component of the lesson called "New terms" was intended to provide the instructor with a quick reference of new terms presented in a lesson. Neither instructor found this component helpful.

- **Software and hardware**

    The instructors ran into a few problems when using the software. Both instructors experienced problems with the pre-designed data disks. These diskettes would sometimes "crash" and the information partially or completely lost. One of the instructors had to make another pre-designed disk to replace a damaged one. The students had some problems using the software (aside from learning the skills associated with them) when problems with the disks occurred. Both instructors stated that time spent on technical problems was disruptive to the lesson and frustrating for the students. They suggested that the data entry instructor have basic computer experience (i.e., trouble-shooting skills) so that technical problems can be solved quickly.

- **Activity sheets**

    Keyboarding activities:

    Group 1 found the keyboarding program interesting but not the keyboarding activity sheets. Group 2 found both activities interesting, although the instructor suggested that the activity sheets include less letter combination drills and more word/sentence drills. Both instructors felt that keyboarding is an important skill. They both observed that these activities did not appear to improve the students' keyboarding skills, but more practice to master the skill may have yielded better results.

    Database activities:

    Group 1 appeared to enjoy the database activity sheets. Instructor 1 felt that the amount of categories (3-4) in each database was just enough for these students. The students did not have any difficulties reading the activities or completing the work associated with them. The instructor suggested other database topics such as "Cars", "Canadian cities", and

"Countries". This instructor suggested that an interesting database activity may be for the students to create their own database file from scratch, then use this file on a daily basis (e.g., maintain a record of student attendance).

Group 2 did not show the same enthusiasm for the database activities. Although the amount of categories in a database was not a problem, some students had difficulties completing the activities associated with them.

- **Reference sheets**

The instructors used all the reference sheets when requested in a lesson. Neither expressed the need for more reference materials.

Lesson strategy

A group of questions addressed the topic of the lesson strategy selected by the program designer (the author). An evaluation for each lesson provides more details regarding each section in the lesson (to be discussed later), although, the instructors expressed the following general comments regarding these components.

- **Pre-instruction:**

Reviewing a skill presented in a previous lesson was found time-consuming and not always necessary. Preview of the following lesson was more helpful for the instructor than for the students. It helped clarify the objective of the lesson. A visual preview was found more effective than an auditory one.

- **Instructional presentation:**

For Group 1, the amount of information presented in a lesson varied but was usually just enough. For Group 2, the "chunk" of information presented was usually too much.

Instructor 2 often combined the "Instructional presentation" and "Student participation" components because she felt that this "hands-on" learning was more effective with her students. Instructor 1 also found this combining of the components helpful for certain skills.

- **Student participation:**

     The students in Group 2 required constant supervision during this component of the lesson, but those in Group 1 worked more or less independently.

     The transition from one lesson component to the next was considered smooth. Instructor 2 suggested that shortening the "Pre-instruction" by eliminating the review would be helpful in decreasing the length of the lesson.

     Both instructors expressed the need for an increase in time spent on keyboarding skills before moving on to the database skills.

     Both instructors felt that time to review previously learned skills to ensure mastery is present, before the introduction of a new skill, is necessary for these students. It was suggested that lessons covering the same skill be added to the training program.

Teaching strategies

     The appropriateness and effectiveness of different teaching strategies present in the training program were evaluated.

- **Group instruction**

     This strategy was more effective for the higher functioning group (Group 1) than the lower (Group 2). The lower group responded better- to a one-to-one strategy.

- **Blackboard or flip-chart presentation**

     The blackboard was only used with Group 1. Instructor 1
used the blackboard to help the students focus on what he was
saying. It was found very useful and effective when
reinforcing what was being said. It provided the learners
with another stimulus to help them understand the material
being taught. The blackboard was also more convenient than
an easel, as was suggested in the program manual, since it
was close at hand and provided an easy medium for adding and
deleting information written on it.

- **Computer presentation**

     Both instructors found this strategy effective and
necessary when introducing a new skill.

- **Use of examples and non-examples**

     This strategy was only effective with Group 1.
Instructor 2 predicted that this would be confusing for her
students, so she chose not to use it.

- **Modelling**

     Both instructors found this teaching strategy useful and
effective, mainly used when introducing a new skill or
demonstrating an old one.

     Other strategies used by the instructors, but not
specified in the program, included "question and answer" to
encourage student involvement in the lesson and work
experience charts to provide relevance for the learners.

Learner attitude

     Since maintaining a high level of motivation is
important for increasing production levels of students with
IH, an incentive component was built into the program. The
instructors found that the students enjoyed having the
opportunity to "play" with other software at the end of the

lesson. These students selected their own games. At first, Instructor 2 selected a game for her students, but eventually they were given a choice. The students in Group 2 were not bothered, though, by missing this reinforcer.

Suitability of training program for these students

Instructor 1 believed that this was a suitable skill for his students. Instructor 2, however, expressed a mixed opinion. She felt that it was more suitable for the students who could read than for those who could not.

Instructor's training

Both instructors were initially apprehensive about teaching this training program. They were most apprehensive about teaching skills that they were unsure of and those which the students found difficult. Some essential teaching prerequisite skills expressed by the instructors include basic experience with using software and hardware, a firm grasp of the specific data entry skills introduced in the program and practice using the teaching materials prior to starting the program.

Other comments

One of the instructors commented that while teaching this program, she learned many interesting technical terms and skills. She also said that, overall, with some adjustments, it is a good course for the students.

Lesson evaluation

The two instructors completed an evaluation for each lesson they delivered (including lessons repeated). Table 6 shows the lessons that each instructor completed and evaluated. The object of this evaluation was to obtain the opinions of the instructors regarding the lesson components, materials, procedures and student attitudes. Each of the

questions in the lesson evaluation are presented with a summary of the instructors' responses.

Table 6. Lessons completed and evaluated by instructors

Lesson no. and topic	Instructor	
	1	2
1 Introduction to the instructional goal	√	√
2 Locate and use the home row keys: intro	√	√
3 Locate and use the home row keys: using the computer keyboard	√	√
4 Locate and use the home row keys: using the keyboarding program	√	√
5 Use correct fingering of letter combo: practice with two letters	√	√
6 Use correct fingering of letter combo: practice with four letters	√	√
7 Use the shift key function	√	√
8 Review & practice of keyboarding skills	√	√
9 Introduction to the database	√	√
10 Describe the components of a database	√	√
11 Describe the menus & screens: access the menus	√	√
12 Use the file commands (LOAD,SAVE,QUIT)	√	√
13 Manipulate the cursor	√	√
14 Add records to a database: record form	√	√
15 Add records to a database: list form	√	√
16 Delete records from a database: one record at a time	√	√
17 Search and delete: a specific group of records	√	
18 Replace information in a database	√	
19 Review of editing features	√	
20 Sort a file	√	
22 Print a file	√	
23 Review of organizing features	√	
24 Overview of the goal	√	

General Questions:

The instructors were asked to consider the general dynamics of the lesson.

Was this lesson a repeat lesson? If so, did you do all or only part of the lesson?   If only part, which? Explain.

Instructor 1 only repeated Lesson 20 (Sort a file) since there was time in the schedule. He also thought that the students could have used more practice with this particular skill. Instructor 2 did not repeat a lesson. However, she did state that, had there not been time constraints, she would have repeated most of the lessons until the students were firm on each skill.

If the skill in this lesson was dependent on prerequisite skills, did the student need a review of the old skill (other than in the review section)?   How did you review?

Whenever a skill in a lesson was dependent on prerequisite skills, Instructor 1 reviewed the old skills. Generally, this occurred during "Pre-instruction". The students often needed more than just a quick review by the instructor. They sometimes needed to go over all the steps themselves, before proceeding to the next skill. Instructor 2 did not spend extra time reviewing prerequisite skills, other than during "Pre-instruction".

How was the size of the group for this lesson? Too large, small or a good size?

Both instructors reported that a group of three to four students was a good size for all the lessons. Instructor 2 only ran into some problems in Lesson 22: Print a file. He said that it was "difficult to juggle the 4 students making printouts every couple of minutes".

Overall, did the lesson run well? Why or why not?

Generally, all of the keyboarding lessons ran well for both groups. At times, Instructor 1 felt rushed, as in Lesson 4, when there was not enough time to adequately review old skills and also present new material. During some lessons, both instructors would like to have spent more time on a previously learned skill but felt obligated to press on to the next skill. This occurred in Lesson 5, when the students were not yet firm on typing in the home row keys, yet they advanced to two-letter combinations.

Most of the lessons covering the data entry skills went well for both groups. From Lesson 3-16, Instructor 2, changed the strategy of the lessons, because the group presentation strategy was not going well. She found her students could not focus on the skill being presented unless they were actually working on it. After she changed her strategy from group instruction to one-to-one instruction, she reported that the lesson ran more smoothly.

Questions about the lesson sections:

The instructors were asked to consider each of the lesson sections in terms of clarity of instructions (for the instructor and students), adequacy of materials, time spent in that section, and student interest.

Program Materials

According to both instructors, the program materials were adequate for most of the lessons. At times, the instructors supplemented the lesson with some materials. This was more the case for Group 1 than Group 2. The only extra material that Instructor 2 required was in Lesson 2, in which she required a different drawing of the keyboard than was provided (as in Activity 1).

Instructor 1 often supplemented his lesson with materials such as extra activity sheets, written instructions and blackboard presentations. He stated that the students

could have used some prepared instruction sheets as in Lesson 20 and 23, when they were sorting and printing files. During these lessons, the students would also have gained from more printouts of the pre-designed database files, sorted different ways. Some samples were provided in Appendix D of the program manual, but these were not sufficient. Several examples from each of the pre-designed databases were found necessary.

Preparation

Both instructors reported that they had time to prepare before each lesson. Instructor 1 had to prepare more than was suggested only when he had supplemental materials.

Pre-Instruction

In general, the instructors found the directions in this component clear and had adequate time (1-10 minutes) to cover the three components in this section (motivation, review, preview). By Lesson 8, Instructor 1 found this component somewhat repetitive, particularly the motivation section. Sometimes he would skip the motivation section when he believed that they would not have time to play a game at the end of the lesson.

Both instructors were sometimes confused by the review section. They reported being unsure about how detailed this review should be (i.e. Lesson 4 and 5). Instructor 2 often skipped the review section because she found it time-consuming (i.e. Lesson 4-8).

Instructional Presentation

Generally, both instructors considered the directions clear for this component of the lesson. However, Instructor 1 stated that the instructions for Lesson 17: Search and delete- a specific group of records, were not clear, leading him to present the skill incorrectly.

Instructor 1 spent between 5-30 minutes in this component of the lesson. The interest level of the students in Group 1 depended on the complexity of the skill being presented and how much hands-on work they had. These students were attentive and listened if the instructional presentation was short (about 10-15 minutes), but quickly lost interest if the instructor talked too much (about 20-30 minutes). For example, the students needed motivation to maintain interest during lessons in which terminology were presented, as in Lessons 10 and 11. The students tended to show more interest in lessons with database skills than those with keyboarding skills.

In order to maintain the attention and interest of the students in Group 2, the instructor often combined the "Instructional Presentation" and "Student Participation" components of the lesson. Together, these components lasted between 25-50 minutes.

Student Participation

With the exception of Lesson 19, "Review of editing features", Instructor 1 considered the directions clear in this component of the lesson. In Lesson 19, he felt that the directions were vague, so he created his own activities for that lesson. The amount of time Group 1 spent practicing a skill varied between 20-30 minutes, depending on the complexity of it. The students were usually able to complete the activities provided in this section.

As stated earlier, Instructor 2 combined "Instructional Presentation" and "Student Participation". Most of the students completed the activities in this section, although the instructor felt that they could have used more practice.

During "Student Participation", the instructors were also asked to give the students free time, as reinforcement for "good" work. Most of the time Group 1 was left 3-10 minutes at the end of the lesson for a computer game or free time. Group 2 often didn't get free time at the end of the

lesson. Rather, the students continued practicing a skill, while the instructor tested.

Testing

Generally, the instructor for Group 1 found the directions for testing the database skills (i.e., adding records, deleting records,etc...) clear. However, he was initially unclear about the directions for the keyboarding tests. He was unsure what was considered keyboarding "mistakes". This instructor required clarification from the author before testing keyboarding skills. Usually there was enough time to test all the students in Group 1 during "Student Participation", but sometimes there was not (e.g., Lesson 5). When this occurred, the instructor would test the students later that day or the next day.

The instructor for Group 2 also considered the directions for testing clear. She commented that when testing keyboarding skills, the test should be similar to the activities that they were working on in the lesson. For example, in Lesson 5 the students practiced typing in two-letter combinations. She suggested that the test for speed and accuracy should look exactly the same as the activity sheet, instead of like the test in Appendix C which has sentences.

Other comments or observations:

Instructor 1 commented when a lesson was particularly difficult to teach (i.e., Lesson 10,"Describe the components of a database" and Lesson 20, "Sort a file") and when it was particularly easy to teach (i.e., Lesson 12 "Use the file commands").

Instructor 2 commented that the concepts presented in Lesson 10 were too difficult and not necessary for her students. She felt that these concepts could be taught incidentally, during the presentation of other skills. Instructor 2 also commented that she did not enforce proper

keyboarding skills with her students because it was too frustrating for them.

Program designer's lesson observations

Table 7 summarizes the lessons that the program designer (the author) observed. Although not all of the lessons observed were the same for each group, the topics were similar.

Table 7. Lessons observed by program designer

Lesson no. and topic	Group	
	1	2
5 Use correct fingering of letter combo: practice with two letters		√
6 Use correct fingering of letter combo: practice with four letters	√	
10 Describe the components of a database	√	√
14 Add records to a database: record form	√	√
16 Delete records from a database: one record at a time		√
17 Search and delete: a specific group of r ords	√	
23 Review of organizing features	√	

The results of these observations basically confirmed what the instructors reported in their lesson evaluations. Some of the significant observations are discussed for each group.

Group 1

    This instructor followed the lesson plan very well. He usually included all of the components in the lesson. When there were time constraints (i.e., when the lesson started late), he would sometimes condense the "Pre-instruction" component and shorten the "Instructional presentation". The flow of one lesson component to the next seemed smooth, despite repeated interruptions by students and staff entering and leaving the room for a variety of reasons. During one observation, the lesson was interrupted four times in ten minutes!

    Instructor 1 was always prepared with copies of the activities, tests and other teaching materials. Throughout the lesson he used teaching strategies such as modelling, examples/non-examples, eye-contact, reinforcement, and question/answer. He constantly observed his students during "Student participation", providing them with feedback regarding their progress.

    The observations confirmed those of the instructor that these students were more interested in the database activities than the keyboarding or terminology ones.

Group 2

    The instructor for this group was also always prepared with copies of the activities and tests. She appeared to be comfortable with the material being presented. She used teaching techniques such as hand-over-hand prompting, positive reinforcement, and modelling. At times she did not use the correct terminology. She referred to the diskette as a "cassette" and often said "the thing" when referring to a concept such as a category.

    As she reported in her lesson evaluations, she significantly deviated from the lesson plan by shortening the "Pre-instruction" and eliminating the "Instructional presentation". Most of the lesson the instructor went from

student to student demonstrating the skill, while the other students practiced, or waited.

The students in this group were significantly more dependent on the teacher for cues than Group 1. Group 2 often waited for the instructor to directly prompt them, before moving on to the next step.

Special education consultant evaluation

An educational consultant responsible for assisting in the selection of training programs for vocational students (as in Group 2) attending Summit School was asked to evaluate the training program. The following is a list of the questions and answers provided by the consultant:

1. Is the content of this program suitable for the special education students in the vocational program?

The content is suitable. The presentation of the material varies with a student's reading and comprehension abilities.

2. How does the format of the program manual compare with others used by instructors in the vocational classroom? Is it similar or different?

We rarely use a "manual" on our team. When ever we locate a "program" we always alter and/or augment it to suit our students' individual needs.

3. Given that this program takes a semester to implement, is this length of time comparable with other vocational programs? If not, how long do they usually run for?

To complete this program would take longer than a semester. Again, the length of time it would take to teach these concepts (so that a student was firm on the concepts)

is dependent on the students' abilities, the amount of practice time and classroom time. We found we needed to practice the skills to a greater degree than was indicated in the manual.

4. Do you think that this program would fit in with the other programs that are going on in the vocational classroom? If not, why?

See question 5.

5. Could you see this program becoming an integral part of the vocational program? If not, why?

I am answering 4 and 5. Yes, the program can fit in with other programs, and it could be a part of a vocational program. Several issues come into play: (a) a teacher's comfort level with the computer, (b) student's access to the computer, and (c) potential work for students "completing" the program.

6. Do you think that the data entry is a realistic job skill for special education students?

I am not entirely sure that data entry is a realistic job skill for all students. My exposure as to what companies need and want is limited. Within this province my other concerns would be, are there many "English" data entry positions available (another issue to tackle). If the forms were set up to match what was on the computer screen (or visa versa)... a student could always match.

7. Any other comments?

This manual is a good start into the "working computer era" for students with mental handicaps. This technology is constantly evolving, so must our teaching of that technology. Without this program we might not have started a data entry program or even have thought of the next step.

Instructional Design evaluation

A professor from Concordia University with instructional design (ID)experience, was asked to evaluate the training program. The evaluation form is in Appendix I.

After reviewing the training program, the ID expert stated that the program goal and objectives were clear and complete. A relationship between the content and the objectives was also confirmed. The ID expert considered the lesson topics clear and in a logical order.

The ID expert remarked that the lessons could have been structured a number of ways and other components included, but the strategy selected was satisfactory. These remarks also applied to the testing and evaluation materials selected.

The ID expert commented that the training program "seemed to be a very thoroughly designed and developed project. (It) follows the basic principles of instructional design carefully".

Student performance evaluations

Figure 3 shows the skills tested for each student(S). See Appendix A for the instructional objectives of each skill. Only S1 and S2 of Group 1 were tested on every skill. The students in Group 1 missed being tested on a skill because they were absent from the lesson in which it was presented. Instructor 1 ensured that these students were taught the skills that they missed, at another time, but were not formally tested on them.

None of the students in Group 2 were tested on Skill 3.2: Describe the components of a database, because the instructor felt that this skill was too difficult for them to learn and unnecessary. The students in Group 1 were never taught the last four skills and were therefore not tested on them.

Figure 3. Skills tested for each student (S)

Skill	Group 1				Group 2			
	S1	S2	S3	S4	S5	S6	S7	S8
Skill 1.1: Locate and use the home row keys								
Skill 1.2: Use correct fingering of letter combos.								
Skill 1.3: Use the shift key function								
Skill 3.1: Describe the menus and screens								
Skill 3.2: Describe the components of a database								
Skill 2.5: Access the menus								
Skill 2.1.1: Load a file								
Skill 2.1.2: Save a file								
Skill 2.1.3: Quit								
Skill 2.3: Manipulate the cursor								
Skill 2.2.1: Add information								
Skill 2.2.2: Delete information								
Skill 2.2.3: Search & delete								
Skill 2.2.4: Replace information								
Skill 2.4.2: Sort a file								
Skill 2.4.3: Print a file								

Skills tested

Skills not tested

Generally, the students were only tested once on each skill; at the end of the lesson in which it was presented. Although the instructors were asked to test them during review lessons, both instructors stated that, they did not usually do this. They said that time constraints did not permit a second, follow-up test to be given.

The results of the keyboarding tests will be examined first, followed by the terminology tests, and finally, the task analyses. Except for the keyboarding tests measuring speed and accuracy, the results of each test will be presented in a table. The table will include the steps in each skill and the prompt level that the student was performing at each step. Performance patterns will be discussed.

Keyboarding tests

The students were given three keyboarding tests. The first test did not measure speed and accuracy as the other two skills did. As in a task analysis, the instructor marked the prompt level at which the student was performing at each step in the skill. These prompt levels were:

  I = Independent
  V = Vague verbal
 SV = Specific verbal
  G = Gestural
  M = Model
  P = Physical prompt

Table 8 shows the prompt level that each student was performing at for each step in Skill 1.1: Locate and use the home row keys. Half of the students attained the skill objective since they were independent on all of the steps when tested at the end of the class. Instructor 1 indicated that S1 required modelling to show him the order of typing. Apparently he was pressing AAAA instead of ASDF. S5 and S6 of Group 2 appeared to have difficulties with this skill.

Table 8. Skill 1.1- Locate and use the home row keys

Test item	Group 1				Group 2			
	S1	S2	S3	S4	S5	S6	S7	S8
1. Place your left hand on the letters ASDF starting with the index finger on the F	M	I	I	I	P	SV	I	I
2. Place your right hand on the letters JKL; starting with the index finger on the letter J	M	I	I	SV	P	SV	I	I
3. Using the correct fingers, type in the letters ASDF	M	I	I	I	P	SV	I	I
4. Using the correct fingers, type in the letters JKL;	M	I	I	SV	P	V	I	I

The results from the keyboarding tests that measured speed and accuracy are presented in Table 9. A sample of one of these tests is in Appendix C. Instructor 2 pointed out that these tests were particularly difficult for her students since they did not learn to type sentences during the activities. Since the keyboarding tests were particularly time-consuming, Instructor 1 often reduced the number of test items.

Table 9. Mean words per minute (wpm) for Skills 1.2 and 1.3

	Group 1				Group 2			
	S1	S2	S3	S4	S5	S6	S7	S8
Mean wpm of the Letter combinations	4.9	5.7	5.2	4	.7	3.7	1.4	3.2
Mean wpm for the Shift key function	4.7	6.5	3.5	3.2	.9	1.7	.9	1.3

An observation of the scores shows that Group 1 averaged a faster keyboarding speed than Group 2 on the Letter combinations test (4.9 wpm > 2.3 wpm) and on the Shift

key test (4.5 wpm > 1.2 wpm). Neither Groups came close to the entry level speed of 30-45 words per minute as suggested by Eichleay, 1989.

In general, both groups were quite accurate when they typed (about one to three errors per sentence). Typing errors included omission of letters and words, duplication of letters, extra spacing between words, and spacing omissions. There was an increase in typographic errors when they were required to use the shift key function.

Terminology tests

Two lessons covered terminology associated with data entry. The test items on the terminology tests were not a series of steps as in the task analyses. Rather, they required the student to "point", "name", and "match" parts of the database. The recording key for this test had three options:

> I = Identified independently
>
> V = Vague verbal
>
> SV = Specific verbal

Table 10. Skill 3.1- Describe the menus and screen

Test item	Group 1				Group 2			
	S1	S2	S3	S4	S5	S6	S7	S8
Point to the main menu: 1. What is this menu called?	SV	I		I	SV		I	V
Point to the record screen: 2. What is this screen called?	SV	I		SV	SV		V	SV
3. Point to where it tells you how many records are in the file	V	I		I	SV		V	SV
4. Point to where it tell you what records you are at row	SV	I		I	SV		V	SV
5. Point to the file name	I	I		I	I		I	I

Both groups were tested on the first terminology test
(Table 10). Only S2 could independently identify all the
menus and screens. The only test item that all the students
were independent on was *5. Point to the file name*.

Instructor 2 taught Lesson 10: Describe the components
of a database, but did not test the students on the material
covered in it. Table 11 presents the results of the tests for
Group 1. S2 and S3 successfully located and named all the
components of the database file. S1 had difficulties with the
terminology on both tests.

Table 11. Skill 3.2- Describe the components of a
database

	Group 1			
Test item	S1	S2	S3	S4
1. Point to and read/match the name of the file	SV	I	I	V
2. Point to the record	V	I	I	SV
3. Point to and read/match each category	V	I	I	I
4. Point to and read/match the data in the record	I	I	I	I

Task analyses

The task analyses tests required the students to go
through a series of steps. At each step, the instructor
marked the prompt level at which the student was performing.
The recording key for the prompt levels was the same for all
the task analyses. There were six prompt levels:

I = Independent

V = Vague verbal

SV = Specific verbal

G = Gestural

M = Model

P = Physical

The students were taught three file commands that would help them use the database program more independently. The steps of all three skills are presented in Table 12. Although students S3 and S4 were not formally tested on these skills, Instructor 2 stated that they learned the steps. It can be seen on the proceeding skills that they were, indeed, independent on these skills. The other two students in Group 1 attained the objective on all the file commands. The students in Group 2 who required assistance only needed verbal prompts before successfully completing the step.

Table 12. Files Commands- Load, Save and Quit

	Test item	Group 1				Group 2			
		S1	S2	S3	S4	S5	S6	S7	S8
L O A D	1. Insert the program disk in drive 1	I	I			I	I	I	I
	2. Turn on the computer	I	I			I	V	I	I
	3. Turn on the screen	I	I			I	V	I	I
S A V E	1. While holding down the Apple key, press the letter S	I	I			SV	SV	I	I
	2. Replace the program disk with the data disk (press spacebar)	I	I			I	I	I	I
Q U I T	1. Press Esc twice	I	I			SV	SV	I	SV
	2. Press #6 Quit (press return)	I	I			SV	V	I	V
	3. Take out the disk from the diskdrive	I	I			I	SV	I	I
	4. Turn off the computer and screen	I	I			I	SV	I	I

The series of steps, seen in Table 13, gave the students practice moving between menu screens. All but one

student had trouble with the last step in this skill. They
needed a verbal reminder to press escape twice to return to
the main menu.

Table 13. Skill 2.5- Access the menus

Test item	Group 1				Group 2			
	S1	S2	S3	S4	S5	S6	S7	S8
1. Press #2 to select Edit a database from the main menu (press return)	SV	I		SV	SV		I	I
2. Replace the program disk with the data disk (press the spacebar)	I	I		V	I		I	I
3. Press #2 Add or Edit Records (press return)	I	I		V	V		I	I
4. Replace the data disk with the program disk (press the spacebar)	I	I		I	V		I	I
5. Press Esc twice to return to the main menu	SV	SV		SV	V		I	V

Skill 2.3 gave the students practice moving the cursor
within a record to access categories and edit errors. Five
of the eight students attained to objective for this skill.
S3 and S5 had difficulties with test items two and three
which required the student to edit errors in the text.

Table 14. Skill 2.3- Manipulate the cursor

Test item	Group 1				Group 2			
	S1	S2	S3	S4	S5	S6	S7	S8
1. Use the arrow keys or return/enter key to move up and down the categories	I	I	I	I	V	I	I	I
2. Without erasing all the letters in a word, insert a missing letter	I	I	SV	I	SV	I	I	I
3. Without erasing all the letters in a word, correct a mispelled word	SV	I	SV	I	SV	I	I	I

Although there were nine steps to adding information to a database (Table 15), three of the students in Group 1 could independently add information to a database file. S4 missed many classes and parts of the classes that he did attend. This may account for the reminders he needed on almost half of the steps. S5 and S6 needed verbal prompts for most of the steps, even after a second trial. Overall, Group 1 did better than Group 2 on this skill.

Table 15. Skill 2.2.1- Add information

Test item	Group 1				Group 2			
	S1	S2	S3	S4	S5	S6	S7	S8
1. LOAD A FILE	I	I	I	I	I	V	I	I
2. Press #2 Edit a database from the main menu (press return)	I	I	I	I	V	V	I	I
3. Replace the program disk with the data disk (press the spacebar)	I	I	I	I	V	V	I	I
4. Press #2 Add or Edit Records (press return)	I	I	I	SV	V	V	I	I
5. Replace the data disk with the program disk (press the spacebar)	I	I	I	I	V	V	I	I
6. While holding down the Apple key, press the number 9 (to go to the last record)	I	I	I	SV	V	SV	V	V
7. Press return until you are at the top of a new record	I	I	I	SV	V	SV	V	V
8. Begin adding information to the first category (press return after category)	I	SV	I	I	I	I	I	I
9. SAVE A FILE when all the records are added	I	I	I	SV	SV	V	V	V

Three of the students in Group 1 attained the objective for deleting records from a database file. Table 16 shows that S3 needed some verbal prompting for the two steps that were Apple commands. The instructor was unclear by test item 9 which asked the student to check that all the requested

records were deleted. The form of the question was considered
ambiguous.

Group 2 was less independent at deleting records than
Group 1. They needed many verbal prompts before moving on to
the next step. Instructor 2 stopped introducing new skills
after this one because the tests clearly showed that they
were having problems with even this basic data entry skill.

Table 16. Skill 2.2.2- Delete records

Test item	Group 1				Group 2			
	S1	S2	S3	S4	S5	S6	S7	S8
1. LOAD A FILE	I	I	I	I		V	I	I
2. Press #2 Edit a database from the main menu (press return)	I	I	I	I		V	I	I
3. Replace the program disk with the data disk (press the spacebar)	I	I	I	I		V	I	I
4. Press # 2 Add or Edit Records (press return)	I	I	I	I		SV	I	I
5. Replace the data disk with the program disk (press the spacebar)	I	I	I	I		V	I	I
6. Press down arrow key until the cursor is at the top the record to be deleted	I	I	I	I		SV	V	SV
7. While holding down the Apple key, press the letter D	I	I	SV	I		SV	SV	SV
8. Press the letter Y (press return)	I	I	I	I		SV	V	SV
9. Have all the requested records been deleted?	?	?	?	?		SV	I	V
10. SAVE A FILE after all the records have been deleted	I	I	V	I		SV	SV	SV

Table 17 shows that the skill Search and delete- a
specific group of records had many steps in it. Despite
this, the three students who were tested on it did fairly
well. They all had problems with step 11 in which they were
required to match the information on the screen with what was
written down on paper for them.

Table 17. Skill 2.2.3- Search and delete

Test item	Group 1			
	S1	S2	S3	S4
1. LOAD A FILE	I	I	I	
2. Press #2 Edit a database from the main menu (press return)	I	I	I	
3. Replace the program disk with the data disk (press the spacebar)	I	I	I	
4. Press #2 Add or Edit records (press return)	I	I	I	
5. Replace the data disk with the program disk (press the spacebbar)	I	I	I	
6. Press the down arrow until the cursor it is at the requested category	SV	I	SV	
7. While holding down the Apple key, press the letter F	I	I	SV	
8. Press return (Category)	I	I	I	
9. If the space is blank, type in the requested information (press return)	I	I	I	
10.If there is info. already, compare it to the info. to delete. If it matches, press return,if not, delete it & type in the info.to delete (press return)	SV	I	I	
11. If it matches, while holding down the delete key, press the letter D	SV	SV	SV	
12. Press the letter Y (press return)	I	I	I	
13. Repeat steps 5-13 until the message "Text not found" appears at the bottom of the screen	I	I	SV	
14. SAVE A FILE after all the records have been deleted	I	I	I	

The steps for replacing information (Table 18) were almost the same as the previous one. Similarly, the students were independent until step 5, but began to have problems after this. Step 9 was exactly the same as in the previous skill, on which they were all independent, yet three of the students required a specific verbal prompt in this skill.

Once again, S2 was independent on more steps than the
rest of the students.   S1 had more problems with replacing
specific information than search and deleting a specific
group of records.   S4 was shown the steps in this skill but
still needed verbal prompting for most of the steps in this
skill.

Table 18. Skill 2.2.4- Replace information

Test item	Group 1			
	S1	S2	S3	S4
1. LOAD A FILE	I	I	I	I
2. Press #2 Edit a database from the main menu (press return)	I	I	I	I
3. Replace the program disk with the data disk (press the spacebar)	I	I	I	I
4. Press #2 Add or Edit records (press return)	I	I	I	I
5. Replace the data disk with the program disk (press the spacebbar)	I	I	I	I
6. Press the down arrow until the cursor it is at the requested category	I	I	SV	SV
7. While holding down he Apple key, press the letter F	I	I	V	SV
8. Press return (Category)	I	I	I	SV
9. If the space is blank, type in the requested information (press return)	SV	SV	I	SV
10. If there is info. already, compare it to the info. to delete. If it matches, press return, if not, delete it & type in the info.to replace (press return)	SV	I	I	SV
11. Use the delete key to erase the info. in the category	SV	I	I	SV
12. Type in the replacement info.	I	I	I	SV
13. Repeat steps 6-13 until the message "Text not found" appears at the bottom of the screen	SV	I	I	SV
14. SAVE A FILE after all the records have been deleted	I	I	I	SV

The last two skills involved organizing the information by sorting it various ways then printing it out. Table 19 shows the steps for sorting a file, a skill prerequisite to printing a file. There were many steps in sorting a file but once again, the student did well. They all seemed to have

Table 19. Skill 2.4.2- Sort a file

Test item	Group 1			
	S1	S2	S3	S4
1. LOAD A FILE	I	I	I	I
2. Press #3 Print from the main menu (press return)	I	I	V	V
3. Replace the program disk with the data disk (press the spacebar)	I	I	I	I
4. Press #2 Sort Record (press return)	I	I	I	I
5. Replace the data disk with the program disk (press the spacebar)	I	I	I	V
6. Press the down arrow until the cursor it is at the requested category to sort (press return)	SV	SV	V	I
7. Press #1 (from A-Z) or #2 (From Z-A) (press return)	I	SV	I	I
8. Press the Esc key	SV	SV	SV	SV
9. Press #3 Print the current selection	I	I	I	V
10. Press #2 Table (across the page) (Press return)	I	I	I	V
11. (a) Press the spacebar to select a category, (b) then press the down arrow to move to the next category. Repeat a-b until all the categories to print are selected (press return twice)	I	I	I	V
12. Select #1 Screen (press return)	I	I	I	SV
13. Press the up and down arrow keys to view the records	I	I	I	SV

problems at the same steps. As a matter of fact, they had
problems with the same step as in the previous two skills.
In step 6 they were required to "Press the down arrow until
the cursor is at the requested category...". They seemed to
have problems understanding that they were not simply looking
for a record but specific information in a record.

After learning how to sort a file various ways, they
were taught how to obtain a printout of the file (Table 20).
The instructor was asked to mark a prompt level for step 2,
although it encompassed more than one step. Three of the
students required assistance for this skill. Only S1 was
independent on all the steps in this skill.

Table 20.   Skill 2.4.3- Print a file

Test item	Group 1			
	S1	S2	S3	S4
1. LOAD A FILE	I	I	I	I
2. SORT A FILE- steps 2-11(press return)	I	SV	SV	V
3. Press #2 Printer (press return	I	I	I	V
4. Turn on the printer	I	SV	I	V
5. Check that the paper is adjusted in the printer	I	I	SV	V
6. Press the spacebar	I	I	I	I
7. Tear off the listing from the printer	I	I	SV	I
8. Turn off the printer	I	SV	SV	V

Summary of chapter

The results of the training program evaluations were presented in the following order:

Instructor evaluations

- program evaluation
- lesson evaluation

Program designer's lesson observations

Special education consultant evaluation

Instructional design expert evaluation

Student performance evaluations

- keyboarding tests
- terminology tests
- task analyses

The instructors provided valuable information regarding the training program lessons and materials. Observations by the program designer(the author) of several key lessons were discussed. Expert reviews from a Special education consultant and Instructional designer were also presented.

In the next chapter, recommendations for revisions based on the evaluation results will be presented, followed by a discussion of the study.

Chapter 5
Discussion

The development of this training program was in response to a need expressed by employers and vocational students with IH. The data obtained following the development of this training program indicate that this product is an effective tool for training data entry as a job skill to students with intellectual handicaps. In the previous chapter, the results of the instructors, experts and student evaluations were presented. Recommendations for improvements to the training program to increase it's effectiveness were derived from these results.

Recommendations

• The entry level for this training program needs further consideration. Attempts to complete this program by students with only functional sight-reading skills were difficult. The students in Group 2 were less independent on a skill when they were required to read or match instructions on the screen or paper. It is likely that this group of students may be limited to only a few, simple data entry skills and tasks. This is not to say that they would never be able to learn higher skills. It may require another teaching approach, more practice, or a more simple database program before they could advance to higher skills.

• The group instruction approach selected for the "Instructional presentation" section of the lesson may not be the most effective method of introducing skills to these students, particularly those students with lower intellectual functioning (i.e., shorter attention spans, lower reading skills, etc,...) as in Group 2. These students may benefit more from a combination of group and individual presentation. For example, the students could be in front of their own computer going through the steps as the instructor introduces

them, instead of in a semi-circle watching the instructor model the skill.

• The keyboarding section of this training program requires several changes. Changes to the keyboarding activities from letter drills to word and sentence drills will probably improve keyboarding speed and accuracy by making the activities more meaningful and closer to the objective. Additionally, test materials for keyboarding must directly reflect what was taught and practiced in the lesson. For example, if the activities include words, then the test must include these words.

• Lack of time to practice skills and repeat tests was a major concern expressed by the instructors. Implementing the training program without the pressure to complete the program within a restricted time period (e.g., so the results could be used in a study) may resolve this problem.

• Although the acquisition of key terminology associated to data entry is important, it is suggested that learning may be facilitated if it is introduced incidentally, rather than specifically, as in Lesson 10 and 11. Presenting these terms in a more meaningful context may produce a better understanding of them.

Several important "lessons" were learned while undertaking this project. Although these instructors were kind enough to fill out all the evaluation materials accompanying the training program, it was discovered that this procedure is exceptional. There is simply not enough time, with all the other programs and activities going on in the classroom, to do this for every new program introduced. It is no wonder that only 2% of instructional materials are tested on learners (Baine, 1982)!

In this study, only two instructors used the training program. Although the feedback from their evaluations was valuable, it was difficult to make confident decisions when planning revisions to the program with such a small sample.

It was also discovered that testing the students repeatedly was time-consuming and unrealistic in this setting. It would have been optimal to obtain several test trials for each skill taught. However, time and energy did not permit this. It was impossible, therefore, to make any comments regarding retention of these skills over time.

Systematically teaching these students proper keyboarding skills is ideal but perhaps unrealistic. This skill, requiring discipline and practice, proved to be frustrating for a majority of the students in this study. The results of the keyboarding tests indicate that these students need much more practice before becoming reasonably fast typists. It should also be noted that the transfer of the keyboarding skills to the data entry tasks was accomplished by only one of the students. Incidentally teaching the students proper keyboarding skills may be just as, if not more effective, than systematically introducing them.

The nature of these learners requires that any training program used to teach them a skill must be adaptable. Planned instruction assumes that the learners are homogeneous. The time and energy spent on systematically designing instruction is a productive process when it is known that the product can be used with a large group of learners. In special education, though, most of the learners, even within a classroom are "the exception to the rule". Only certain characteristics of the learners and learning environment can be predicted when instruction is being planned. A program that is flexible within a variety of situations will be much more effective in this type of learning environment.

Summary

It was established that data entry as a job skill is a promising competitive employment opportunity for persons with intellectual handicaps and developmental disabilities. Having established its importance, the next step was deciding how to effectively teach this job skill to students with IH. This study concentrated on systematically designing and improving a training program to teach this job skill. The development was based on many dimensions including the learners, the instructors, existing training programs, and components of "good" instructional design. Although the feedback from the learners and expert reviews indicate that this training program is effective as a method of teaching data entry as a job skill, revisions for improvement were recommended. Having improved it to a degree of satisfaction, it would then be beneficial to compare it to other instructional methods to determine "how well" it compares to other approaches. An experimental or quasi-experimental study might atte pt to answer this question. Only then could it be said that this is the more effective method of teaching data entry as a job skill to students with intellectual handicaps.

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Appendix A
Instructional Objectives

The objectives listed below begin with the **entry skill** then the three **main skills,** followed by their **subskills.** Each of the objectives will include the three following components:

(1) A **description** of the behaviour the student is expected to perform

(2) The **conditions** under which the performance will be carried out

(3) The **criteria** for acceptance of performance that is sufficient to pass the objective (Gagne et al, 1988).

ENTRY SKILLS:

Read or match a given set of words and numbers
Objective: Upon request, the student will read or match a set of words and numbers.

Indicate the direction of the arrow keys on the computer keyboard
Objective: The tester will point to each of the arrow keys on the computer keyboard and the student will indicate (point or say) its direction.

Attend instruction for a minimum of 20 minutes at a time
Objective: The student will attend (sit and listen) to instruction for a minimum of twenty minutes at a time.

MAIN SKILL 1: Demonstrate correct keyboarding skills
Objective: Given a computer keyboard, the student will copy six short sentences without more than two errors at a rate of twenty words per minute, using correct keyboarding techniques, as defined in subskills 1.1 to 1.3.

Subskill 1.1:   Locate and use the home row keys
Objective: Given a computer keyboard, the student
will locate and correctly place his/her fingers on the
home row keys (ASDF JKL;), then use them.

**Subskill 1.2:   Use correct fingering of letter
combinations**
Objective: Having achieved objective 1.1 the student
will use letter combinations to copy six short sentence
without more than two errors at a rate of twenty words
per minute.

Subskill 1.3:   Use the shift key functions
Objective: Having achieved objective 1.2 the student
will use shift key combinations to copy six short
sentences without more than two errors at a rate of
twenty words per minute.

MAIN SKILL 2:   Use the database

Objective: After demonstrating correct keyboarding skills,
the student will then use the database program demonstrating
the following skills (as defined in the subskills 2.1-2.5):
use the file commands, edit information, manipulate the
cursor, access and manipulate information, and access menus.
The student will independently demonstrate the above skills
upon request by a supervisor.

Subskill 2.1:   Use the file commands
Objective: Given that a database file has been set up
and the program booted, the student will use the LOAD
command to load a specified file. He/she will them use
the SAVE command to save the file on to the computer's
permanent memory then use the QUIT command to leave the
program.

Subskill 2.1.1: LOAD a file

Objective: A student will load a given database program.

Subskill 2.1.2: SAVE a file

Objective: Having made changes to a database file, a student will use the SAVE command to save the changes.

Subskill 2 1.3: QUIT a file

Objective: Having saved a database file, the student will use the QUIT command to leave a database program.

Subskill 2.2: Edit information

Objective: Given that a database is set up on the computer, the student will edit information in a database without the assistance of a supervisor, by either deleting, adding or replacing the information that has been specified according to the specifications of the supervisor.

Subskill 2.2.1: Add records from a database

Objective: Given that a database is set up on the computer, the student will add records to a database file, the specifications of which will appear on a listing and explained by a supervisor.

Subskill 2.2.2: Delete records from a database- one at a time

Objective: Given that a database is set up on the computer, the student will delete a record from a database file, the specifications of which will appear on a listing and explained by a supervisor.

Subskill 2.2.3: Search and delete- specific group of records
Objective: Given that a database is set up on the computer, the student will search and retrieve records from a database file, then delete them, the specifications of which will appear on a listing as specified by a supervisor.

Subskill 2.2.4: Replace information
Objective: Given that a database is set up on the computer, the student will replace information in a database file, the specifications of which will appear on a listing as specified by a supervisor.

Subskill 2.3: Manipulate the cursor
Objective: Given that a database is set up on the computer, the student, upon request of a supervisor, will manipulate the cursor the following ways:
• Move within records using the arrow keys and return/enter key
• Correct mistakes using the delete/backspace key, spacebar and arrow keys
• Correct mistakes using the insert and arrow keys

Subskill 2.4: Organize information
Objective: Given that a database is set up on a computer, the student will sort or index a file in alphabetical or numerical order and/or print a file as specified by a supervisor.

Subskill 2.4.1: Index a file (IBM only)
Objective: Given a database is set up on the computer, the student will index a file in alphabetical or numerical order, and save it as a new file, as specified by a supervisor.

Subskill 2.4.2:   Sort a file
Objective: Given a database is set up on the
computer, the student will sort a field in
alphabetical or numerical order, as specified by a
supervisor.

Subskill 2.4.3:   Print a file
Objective: Given a database is set up on the
computer, the student will print a   file, as
specified by a supervisor.

Subskill 2.5:   Access the menus
Objective: In a given database program, the student will
move between and access menus without the assistance of a
supervisor.

MAIN SKILL 3: Describe the characteristics of a database

Objective: When asked, the student will describe and
demonstrate an understanding of the menus, screens, and
components of a database.

Subskill 3.1:   Describe the menus and screens
Objective: Upon request, the student will identify
the main menu and record screen. The student will
identify the parts of the record screen.

Subskill 3.2:   Describe the components of a database
Objective: The student will locate and name the
components of a database.

Appendix B
Entry behavior test

Entry Behaviour Test

STUDENT: _____ **DATE:** _____

RECORDER: _____

TEST ITEMS

(1) Make a photocopy of the list of words/numbers on the reverse of this page. For each word/number on the list, ask the student to read it. If the student cannot read, give the student a card (found in the back of the program) and ask the student to match it with one on the list). Check read, match, or other for each of the words/numbers

	read	match	other
LOAD			
SAVE			
QUIT			
EDIT			
ADD			
DELETE			
REPLACE			
SORT			
SPACEBAR			
PRESS			
NAME			
PHONE			
YEAR			
1			
2			
4			
6			

(2) At the computer keyboard, point to the following keys with these arrows on them. Ask the student to indicate the direction.

	YES	NO
↕		
↓		
←		
→		

Refer to the student's teacher when answering these questions:

(3) Does the student prefer group or solitary activities?

(4) Can the student attend for at least 20 minutes at a time?

ADDITIONAL COMMENTS:

Appendix C

Keyboarding test

Keyboarding Test

STUDENT: _____

DATE: _____

RECORDE⁻ _ _____

SKILL 1.2: USE CORRECT FINGERING OF LETTER COMBINATIONS

OBJECTIVE:
Having achieved objective 1.1, the student will use letter combinations to copy six short sentences without more than two errors at a rate of twenty words per minute.

PREREQUISITE SKILLS:
Locate and use the home row keys

INSTRUCTIONS:
• Set up a computer with a word processing program and open a file (make sure the Caps lock key is down).
• Make a copy of the Student Sheet on the following page.
• Say to the student "Place your fingers on the home row keys and type following sentences".
• Indicate type of errors (mis-typed letters, omitted letters, spacing mistakes) by circling them on the test item
• Indicate the number of errors in a sentence
• Use a stop watch to time the average number of words typed per minute (WPM)

WORDS PER MINUTE (WPM = 26 + TIME) : _____

TEST ITEMS	NUMBER OF ERRORS	COMMENTS
1. TOM ATE THE CAKE		
2. THEY SAW A PRETTY PONY		
3. SHE SAW THE DUCK		
4. LOOK AT THE LITTLE PIG		
5. A FUNNY BOY RAN BY		
6. PLEASE JUMP DOWN		

COMMENTS:

Appendix D
Task Analysis

Task Analysis Sheet

STUDENT: _____

SKILL 2.2.1: ADD INFORMATION (Dataquest)

OBJECTIVE
> Given that a database is set up on the computer, the student will add records to a database file, the specifications of which will appear on a listing and explained by a supervisor

PREREQUISITE SKILLS:
> Load a file, Save a file, Quit

INSTRUCTIONS:
> • Give the student a Database Activity Sheet with at least one record filled in
> • Give the student a corresponding predesigned database file disk and program disk
> • Say to the student "Load this file and add these records to it

RECORDING KEY

I= Independent
V= Vague verbal
SV= Specific verbal
G= Gestural
M= Model
P= Physical prompt

DATE:									
RECORDER'S INITIALS:									

TEST ITEMS

1. LOAD A FILE									
2 Press #2 Edit a database from the main menu (press return)									
3. Replace the program disk with the data disk (press the spacebar)									
4. Press #2 Add or Edit Records (press return)									
5. Replace the data disk with the program disk (press the spacebar)									
6. While holding down the Apple key, press the number 9 (to go to the last record)									
7. Press return until you are at the top of a new record									
8. Begin adding information to the first category (press return after each category)									
9. SAVE A FILE when all the records are added									

COMMENTS:

Appendix E

Terminology test

Terminology Test

STUDENT: _____

**SKILL 3.2: DESCRIBE THE COMPONENTS OF A
          DATABASE FILE**

OBJECTIVE:
    The student will locate and name the components of a database file

RECORDING KEY

I = Located and named
     independently
L = Located only
     (non-reader)
V = Vague verbal
SV = Specific verbal

INSTRUCTIONS:
- Set up a computer and open a pre-designed database file
- At the record menu, read each TEST ITEM
- Use the RECORDING KEY on this page the mark the prompt level for each TEST ITEM
- For non-readers, print the information on paper and ask the student to match it to the words on the screen

DATE:							
RECORDER'S INITIALS:							
TEST ITEMS							
1. Point to and read/match the name of the file							
2. Point to the record							
3. Point to and read/match each category							
4. Point to and read/match the data in the record							

COMMENTS:

Appendix F
Lesson sample

•••••••••• **LESSON 15: Add Information to a Database- List Form**

MATERIALS REQUIRED:

• Markers (several colors)

• Easel with blank paper

• Database Activity Sheets- record form (retained from the previous lesson

• Database Activity Sheets-list form (Appendix A 17-22) and corresponding diskettes with the pre-designed database files

• A computer for each student

• Each student's TA Sheet for *Skill 2.2.1 Add information* (from the previous lesson)

PREPARATION:

• Set up a computer and open one of the pre-designed database files

• Set up an easel and reproduce one of the Database Activity Sheets-list form

• Make one copy of each Database Activity Sheet- list form

PRE-INSTRUCTION

Begin the lesson by having the students sit in a semi-circle in front of a computer

Motivate the students:

• Welcome the students to another data entry class

• If the lesson is going to include a computer game at the end of the lesson, as a reinforcer for "good" work, explain this to the students

Review:

• Review the steps for adding records to a file

Preview:

• Today the students will continue to add records to a database but the data will be presented differently: list form instead of record form

INSTRUCTIONAL PRESENTATION:

- Explain that they will see data presented to them in different ways. In the last few lessons, it was in record form (show the students the Database Activity Sheets from the previous lesson)

- Explain that they may see is in another way- the **list form** (show them the Database Activity Sheets- list form)

- Explain that in the record form, the fields are at the side and only a few records can be viewed at the same time. With the list form, the fields are at the top and many records can be viewed at the same time

- Begin to add information to the file at the easel (use TA sheet)

- Having added several records, access the file on the computer and add them to the file

- Show the students some of the Database Activity Sheets- list form

- Together, fill in a few records in each

STUDENT PARTICIPATION

- Have the students go through the steps for adding records into the database

TESTING

- This lesson did not introduce a new skill, however, the presentation of the data was different than that of the previous lesson

- Use each students Task Analysis Sheet for *Skill 2.2.1: Add information*

- Refer to the test sheet for instructions on how to give the test

---

New Terms

list form

NOTE: Retain the Database Activity Sheets- list form, that were filled in this
lesson, for use in later lessons

Appendix G
Sample activity sheets

Database Activity Sheet:
List Form

File name: Movies

TITLE	TYPE	RATING

ACTIVITY 5

INSTRUCTIONS:
Copy the following two letter combinations

---

jy jy jy jy jy jy jy jy jy jy jy jy jy jy jy jy jy jy

lo lo lo lo lo lo lo lo lo lo lo lo lo lo lo lo lo lo

sw sw sw sw sw sw sw sw sw sw sw sw sw sw

sx sx sx sx sx sx sx sx sx sx sx sx sx sx sx

fb fb fb fb fb fb fb fb fb fb fb fb fb fb fb fb

jm jm jm jm jm jm jm jm jm jm jm jm jm jm jm

;p ;p ;p ;p ;p ;p ;p ;p ;p ;p ;p ;p ;p ;p ;p ;p ;p ;p

aq aq aq aq aq aq aq aq aq aq aq aq aq aq aq

k, k, k, k, k, k, k, k, k, k, k, k, k, k, k, k, k, k,

az az az az az az az az az az az az az az az az

;/ ;/ ;/ ;/ ;/ ;/ ;/ ;/ ;/ ;/ ;/ ;/ ;/ ;/ ;/ ;/ ;/ ;/

Appendix H

Instructor's evaluation of the program

INSTRUCTOR'S EVALUATION OF THE PROGRAM

Instructor: _____   Date: _____

Instructions: Answer the questions as completely and honestly as possible. Use the back of the form if you need more space to write. You may need to refer to the program manual to assist you in answering some of the questions.

---

1. Did you find the section on **Using the Program** (p. 4 -8) helpful in preparing for the course?

2. Did you find the **Instructional Analysis Chart** on page 3 of the program manual helpful in seeing how the skills related to each other?

3. Are there any skills that you would add or omit in this program? Explain.

4. Was the goal of the program and the instructional objectives clear to you? To the students?

5. Was the **Testing Guide** on page 7- 8 helpful?

6. Did you use all of the reference sheets? In not, which ones did you not need?

7. Could you have used other reference sheets? Please describe what kind?

8. Did you have any problems running the database, keyboarding or word processing software? If so, what kind of problem?

9. Did the students have any problems with the software?How?

10. Do you think that it requires computer experience to run the software used in this program?

11. Did you have any difficulties finding materials within the program manual (i.e. tests, activity sheets, reference sheets,...)? Please specify.

12. Did you find the **Materials Required** section of the lesson helpful when preparing for the lesson?

13. Did you find the **Preparation** section of the lesson helpful when preparing for the lesson? Are there any directions that could be added to this section?

14. How did you find the amount of photocopying? Was finding the time to photocopy a problem?

15. Were the students motivated by having the chance for free time at the end of the class?

16. Did you provide the students with a reinforcer or did they select one? What kind?

17. Do you think that reviewing the instruction from the previous class was helpful for the students?

18. Do you think that previewing the instruction for the lesson to follow was helpful for the students?

19. In general, was the "chunk" of material in the **Instructional presentation** section of the lesson too much, not enough or just enough for the level of your students?

20. Consider the instructional strategies or techniques listed below. Was that technique appropriate for your students? Was it an effective way of presenting the material? Did you have any problems using the technique?
Group instruction • Blackboard presentation • Computer presentation •
Use of examples and non-examples • Modelling

21. Did you use any other strategies or techniques when doing your instructional presentation? If so, please describe them.

22. Did the students mostly work independently during **Student Participation** or did you have to provide them with constant supervision?

23. Was the **New Terms** component of the lesson helpful? If so, how?

24. How was the transition from one lesson component to the next (e.g. instructional presentation to student participation) ?

25. Can you suggest any changes to the lesson format? Please specify how and why you would change it?

26. Did the students find the keyboarding activities interesting?

27. Would you make any changes to keyboarding activities? If so, how would you make them different?

28. Do you think the keyboarding skills helped the students type in the information in the data entry activities faster and more accurately?

29. Did the students enjoy the database activities?

30. Were there too many, not enough, or just enough categories in a database?

31. Can you suggest any other databases that the students may find interesting? Please specify the topic and suggested categories.

32. Would you make any changes to the database activities? If so, how would you make them different?

33. Can you suggest any changes to the format of the program? Please specify how and why you would change it?

34. Do you think that this program is suitable for the group of students you taught?

35. Did you feel comfortable delivering this instruction? If not, can you suggest any ways to help the instructor feel more comfortable?

36. Could you have used more inservice training before or during implementation of the program? If so, in what area(s)?

37. Are there any skills that you think are essential for the instructor to have in order to teach this program?

38. Any additional comments?

Appendix I
Instructional design expert's evaluation

Instructional Design Expert's Evaluation

1. Is the goal of the program stated clearly? Is it complete?

2. Are the objectives of the program stated clearly? Are they complete?

3. Is there a relationship between the content and the objectives?

4. Is the content well structured?

5. Are the lesson topics clear and in a logical order?

6. Is each lesson well structured?

7. Do the lessons contain all the components of good design?

8. Given the stated objectives, are the tests appropriate for them?

9. Was the selection of the delivery system (instructor) appropriate for this type of instruction?

10. Are the evaluation materials complete?

11. Are there any other approaches to evaluating the program that could have been used?

12. Any other comments?