**TVOntario**

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TELIDON AND EDUCATION:

A FORMATIVE EVALUATION FOR

THE TVONTARIO FIELD TRIAL

1981 - 82

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by

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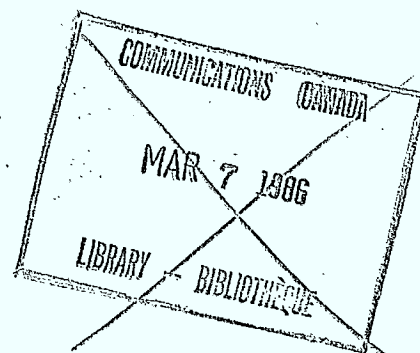
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## ACKNOWLEDGMENTS

ABSTRACT 16 - 1982

TELIDON AND EDUCATION:
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(TVOntario, Office of Project Research, Report No. 16-1982, 161 pp.)

A major research evaluation of Telidon in education has recently been
completed. The study, based on the TVOntario field trial, examines how Telidon
was used and explores the system's strengths and weaknesses in the
educational applications undertaken.

Telidon, a videotex system that allows color graphics and text to be stored in
a computer and displayed on a television set, was deployed in a major field
trial administered by TVOntario. The trial involved more than 45 educational
sites, including elementary and secondary schools, colleges, universities,
libraries, and special institutions. A formative evaluation was conducted by
the Office of Project Research to explore Telidon's impact and potential
in education. The study was intended to provide information that could be
applied to the continuing development of Telidon.

The research methods included: a survey of major participants; personal
interviews and questionnaire surveys of students, teachers, and others involved
in the field trial; observational data from extensive visits to the Telidon
sites; and two in-depth studies of Telidon use at secondary schools, including
a controlled study of educational effectiveness.

The research explored a variety of issues:

- How Telidon was used: the educational applications of Telidon that were
  attempted, differences among participating institutions, learning about
  Telidon versus learning with Telidon...

- Factors affecting Telidon use: the effect of administrative patterns at each
  educational institution on Telidon use, the role of the Telidon coordinators
  at each participating institution, differences between experienced and
  inexperienced Telidon users...

- Perceptions of Telidon: the interest and appeal Telidon generated among
  students, teachers, and others during the field trial, participants feelings
  about Telidon's strengths, weaknesses, and possible future directions...

- Technical issues: software - the branching structure, indexes... Hardware -
  logging on, using the key pad, the speed of the system...

- Sequence creation: the design, planning and implementation of sequences for use in education

Research and findings are presented in two separately bound reports. The first contains a description of the field trial and research methods and a discussion of all findings of the formative evaluation.

> <u>Telidon and Education: A Formative Evaluation</u>
> <u>for the TVOntario Field Trial 1981-1982</u>
> (Office of Project Research, Report No. 16 – 1982, 161 pp.)

Readers interested in a summary should consult the second report, an abridged version of the full report, featuring a synthesis and discussion of all findings.

> <u>Telidon and Education: Summary of Research and Findings</u>
> <u>from the TVOntario Field Trial Formative Evaluation 1981-1982</u>
> (Office of Project Research, Report No. 18 – 1982, 27 pp.)

Three supplementary reference reports have also been prepared, each focusing on one aspect of Telidon in education. All findings contained in these reference documents are included in the two general reports. One of the reference works describes the application of Telidon as part of a distance education pilot project. The second is a preliminary study of the educational effectiveness of one instructional sequence developed and used during the field trial. The third report, which will be of interest to future sequence producers, contains evaluations of selected sequences that were produced by field trial participants and TVOntario staff.

A support document is also available, containing the questionnaires and interview protocols used by the research team.

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TABLE OF CONTENTS

A NOTE TO THE READER

This research evaluation, requested by the TVOntario Telidon project manager, presents the findings of research on the final year of the TVO field trial, 1981-82.

Readers interested in a summary and discussion of the research on Telidon in Education should read chapters 1, 4, and 7. Chapter 1 describes the field trial and the research effort. Chapter 4 summarizes the Telidon activity in the participating institutions. Chapter 7 is a synthesis and discussion of all the data collected during the research evaluation.

Readers requiring greater detail are urged to read chapters 2, 3, 5, and 6 as well. Chapter 2 describes the research methods employed. Chapter 3 provides a detailed account of the Telidon activity during the field trial. Chapter 5 gives a summary of research on selected Telidon sequences from the TVOntario database. Chapter 6 gives the results of a survey of field trial participants.

See Appendix C for a simple explanation of how Telidon works, and the Glossary for definitions of the technical terms employed in this report.

An abridged version of this report is available: Telidon and Education: Summary of Research and Findings from the TVOntario Field Trial Formative Evaluation, 1981-82.

CHAPTER 1    INTRODUCTION

What is Telidon?

Telidon is Canada's move into the videotex and teletext market. These technologies permit text and graphics to be stored in a computer and displayed on a television screen. Scientists at the Communications Research Centre in Ottawa developed what was considered to be a superior videotex system, naming it Telidon.[1]

Telidon permits the creation and transmission of color graphics that TVOntario management, considered to be appropriate for educational applications. In 1978 the decision was made to explore these applications in a Telidon and Education field trial.

This field trial used two Telidon modes - videotex and teletext. To operate in the videotex mode, a mainframe computer was connected by phone line to more than 45 terminals across Ontario. Each of the remote terminals had a decoder, a modem, a color television, and a numeric key pad. The key pad, which is about the size of a pocket calculator, allowed for interaction between the user and the distant host computer.

By entering a number on the key pad, a user could retrieve discrete "pages" (one TV screen) from the mainframe computer. These pages were arranged in what was called a branching-tree structure. The user is provided with "menu" pages, which direct him or her to further pages. Most of the pages

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1. Telidon graphics are based on an "alphageometric" code. Instead of using the alphamosic type code that simply fills in grids on a screen, the Telidon code uses geometric primitives called picture descriptor instructions (PDI) to build up images.

are organized into series or "sequences" with one theme or topic or style. (For instance: a game in which the user identifies the flags of many countries, or a lesson in geometry.)

The Telidon hardware also operates in a wireless, teletext mode. In this mode, Telidon pages were transmitted through a spare capacity resident in the television broadcast signal (i.e., the lines above the TV image that the viewer may see when the picture, needing adjustment, rolls up or down).

In the teletext mode, a cycle of from 100 to 200 pages is broadcast continuously. The Telidon terminal "grabs" one page at a time into its local memory for display on the TV screen. The user chooses another page by entering a new number on the key pad and waiting for his/her terminal to retrieve it from the cycle.

TVO Telidon field trial

TVOntario is a crown corporation that is mandated to provide educational services to the people of Ontario, using televison and other media. With the announcement of the development of Telidon by the Department of Communications in Ottawa, TVOntario proposed to test both the technology and its applicability to education. The Telidon and Education field trial was born in 1978, funded mainly by the Department of Communications, but operated by TVOntario.

A Telidon project team was set up within TVO to carry out the field trial. The project team invited educational institutions to participate in the field trial. Each institution was asked to create a Telidon sequence that would meet any of its educational needs. In turn, these institutions

received a Telidon terminal that allowed them to access their own sequence as well as those produced by other institutions.

These Telidon participants fell into four categories: elementary and secondary schools; colleges of applied arts and technology (CAAT) and universities; public libraries; and special institutions (e.g., schools for the disabled).

Besides encouraging and supporting the production of pages from these local institutions, the Telidon project team also produced sequences for use by the field trial participants.

For the most part, all pages were produced by means of minicomputers, Norpak page creation terminals, at TVO's offices in Toronto. (These terminals were also called information provider systems or IPS terminals.) Once the pages in a sequence were produced on an IPS terminal, they were added to a "database" resident on a mainframe computer at the Department of Communications in Ottawa.

In this way participants throughout Ontario had access to a central database to which most had contributed a sequence. By the end of the field trial the TVOntario database consisted of approximately 60 sequences. Each sequence was unique, reflecting the producer's background and intentions.

Throughout the field trial the terminals could access another database on the Department of Communications computer. This database consisted of general information including weather, news, national statistics, some computer games, etc.. However, much of this information was often out of date and the branching structure and menu pages, though extensive, did not contain a great deal of information.

Later in the field trial much of the TVO database of educational sequences was replicated on the Bell Vista computer in Toronto. The sites participating in the field trial were able to retrieve Telidon pages from the Bell Vista computer. They had access to (1) a modified version of the TVO database, and (2) other information such as shopping, business information, games, etc.

Formative evaluation

The Office of Project Research (OPR) of TVOntario was requested to conduct an evaluation to begin the exploration of Telidon's impact and potential in education. This department worked closely but parallel with the Telidon Project Team.

OPR's research team conducted a formative evaluation of the impact and potential of this Telidon system during the last year of the three-year field trial. The last year, coinciding with the 1981-82 academic year, saw an expansion of TVO's Telidon activity. The delivery of new equipment, the addition of a second database (Bell Vista), and the availability of a cheaper data transmission system (Datapac) all resulted in an increase in the number of sites participating and in the activity at many sites. The bulk of the research effort took place during this last year of the field trial, which officially ended in June 1982.

The main goal of this evaluation was to provide systematic and coherent feedback from participants that could be applied to the continuing development of Telidon in education, and to explore potential uses rather

than merely assess present abilities that may be transitory. This information fell into five categories:

Utilization. How was Telidon being integrated into the educational and learning environment of each institutional type? Was it complementing, replacing, or modifying existing learning systems? Who were the main users in each group? Who are the potential users in each group?

Patterns of use. Which elements of the database were being accessed? By whom? For what purpose? How were the sequences chosen by users?

Sequence assessment. What contributed toward a sequence's appeal and learning effectiveness? What detracted? What were the roles of graphics and colors in the sequences?

Learning impact. What was the effect of Telidon on learning in specific populations?

Perception of those involved. How did users perceive Telidon? How did gatekeepers such as teachers, librarians, and university faculty perceive Telidon?

This report seeks to describe the strengths and weaknesses of Telidon at a given point in its development and as perceived by a wide variety of users.

It should be noted that logistics and timing did not allow for an opportunity to collect information on teletext -- the broadcast version using Telidon. Therefore this report deals only with the videotex version used during the field trial.

CHAPTER 2

METHODOLOGY

The following methods were used to gather information during the course of the evaluation.

1. Structured telephone interviews with site providers to monitor utilization of terminals

2. Visits of selected sites, and formal and informal interviews with participants at the sites

3. Informal observation of participants using the Telidon terminals

4. Interviews with page creators on their experiences of producing pages at TVO

5. Structured interviews with elementary- and secondary-school teachers on their reactions to specific Telidon sequences; these interviews were supported by a questionnaire that dealt with teachers' reactions to certain sequences and their criteria for choosing sequences

6. Two in-depth examinations of Telidon use at the secondary-school level:

    - a controlled experimental evaluation of a secondary-school sequence

    - a case study of Telidon as a component in teacher-independent distance education

7. Questionnaire- and interview-based examinations of student reaction to Telidon sequences:

    - two student evaluations of secondary-level curriculum-related sequences

    - a questionnaire that obtained student reactions to three postsecondary-level sequences

8. A questionnaire administered at the end of the field trial to participants who had been site providers and page producers

All research instruments used during the evaluation are collected in a separate publication. (See Telidon and Education: Research Instruments from the TVOntario Formative Evaluation, 1981-82.)

CHAPTER 3

OVERVIEW OF TELIDON ACTIVITY IN EDUCATIONAL INSTITUTIONS

This section of the report describes the activity that took place in various educational institutions during the last year of the Telidon and Education field trial at TVOntario. Some of the institutions had been involved with the TVOntario field trial for three years, but for the most part, this overview refers to the final year of the field trial when the database was at its largest, the technical problems of the first years had diminished, and participants' utilization efforts were greatest.

Terminals were deployed at a variety of institutional settings - public schools, junior high schools, secondary schools, community colleges, universities, public libraries, and special institutions. This overview documents the experience of these early users of Telidon in education.

Formal and informal interviews were conducted over the phone and during visits to the sites. These interviews, along with informal observations of Telidon use, served as data from which site reports documenting Telidon activity at each site were compiled.

This chapter presents an overview of Telidon activity at each institutional level based on the site reports of as many sites as it was practicable to include. The information is presented under the following headings:

1. Sequence creation -- the production of Telidon pages and sequences for inclusion in the field trial

2. Initial plans -- the plans for Telidon use projected by individuals at each site in the early stages of the trial

3. Location and administration -- the location of the terminal at each site and the nature of access to the terminal

4. Patterns of use -- the actual use of Telidon at the sites

5. Perception of Telidon -- the perceptions of the individuals using Telidon

The overview should be considered a representative, if not exhaustive, description of Telidon activity. The final section of this chapter is a synopsis of a case study of Telidon use in distance education.

## A. Elementary Schools

Telidon terminals were deployed in six public schools across Ontario in the last year of the field trial.[1] Data were gathered at five of these schools.

## Sequence creation

Three of the five public schools produced sequences for inclusion in the TVOntario database. However, two of these encountered difficulties in completing their sequences or having them available for use. These problems stemmed from difficulty in gaining access to the equipment required to produce sequences. This equipment, called an IPS Unit, was located only in Toronto and was in great demand. One school was more successful, creating

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1. The number of active sites fluctuated widely during the last year, and increased sharply in the final six months. The figures used in this report are based on a list of sites provided by the TVO Telidon project team in March 1982. The list appears in Appendix A.

four sequences for primary and junior levels. At this school a programming committee was formed to allow teachers to collaborate in the design of sequences. For the first sequence one teacher travelled to Toronto to produce pages on the IPS unit. The later sequences were designed by the committee on grid sheets that were sent to TVOntario for a Telidon team member to enter on the IPS unit.

## Initial plans for Telidon use

Three of the schools made plans to disseminate information about Telidon among their staffs by means of demonstrations, and the distribution of lists and reviews of useful sequences. Four of the schools planned to use Telidon to teach their students about new communication and computer technologies. All the schools intended to employ Telidon in curriculum-based teaching, though these plans were very general and dependent on availability of suitable sequences. At one school the teacher who supervised Telidon requested that TVOntario provide suggestions for use of the system with students.

## Location of Telidon terminal in school

In three of the schools the terminal was placed in the library while in the other two schools it was placed in a classroom. The Telidon terminals located in the library received more extensive use than those located in the classrooms. One teacher who had a terminal in his home classroom remarked that more teachers and students would have had exposure to Telidon if it had been located in the library of the school.

Administration

The administration and supervision of Telidon within each school was left
to the field trial participants, and consequently each site developed its
own method of using Telidon. Administration involved dissemination of
information about the Telidon terminal and sequences, and making the system
available for use.

Two schools were well organized in disseminating information about Telidon.
They undertook extensive reviews of the database and circulated titles and
page numbers of appropriate sequences. (In both these schools the terminal
was located in the library.) One of these schools, a separate school, was
especially active. The resource teacher (and library head) stimulated use
by going through the database for the teachers, making student worksheets
for sequences, making lesson plans for teachers, and personally approaching
teachers with suggested uses. Her enthusiasm and preparatory work even
encouraged those teachers who were not inclined to use or experiment with
Telidon.

At the third school where the terminal was located in the library, teachers
concentrated on using the sequences they had produced and did not actively
distribute information on other sequences or the use of the system.

At the two schools where the terminal was located in a classroom,
information was not actively disseminated. However, one of these schools
was handicapped by a great many technical difficulties and this seemed to
affect the school's attitude and utilization efforts.

Patterns of use

At one of the schools in which the system was in a classroom the teacher asked for assistance from the research team to devise ways to use the system with his students. Two researchers gave a demonstration of Telidon to his class and suggested sequences to the teacher that might be of interest to him for use with his students. Log sheets were provided for comments from the teacher after he had used a sequence.

Telidon was then used sporadically by the teacher as a demonstration of the technology and for individual student assignments with teacher supervision. The teacher previewed sequences before using them. The terminal was available to other teachers on a limited basis, but researchers noted that after six months other teachers at this school still did not know about Telidon.

In the other school that had its Telidon terminal located in a classroom, the teacher who initiated the school's participation in the field trial gave a demonstration to all the teachers in the school. Teachers and students could book time with the teacher when they wanted to use Telidon. This school had a terminal for a one-year period but was plagued by technical problems for the first nine months (the system crashed 75-90 percent of the time). Because Telidon acquired a reputation at this school of not being dependable, the teachers were reluctant to use it with their classes and even became discouraged about casually exploring the database. The teacher said that he had intended to distribute a list of sequences to the teachers to encourage class use but finally felt that this was unrealistic because of the frequency of technical problems. Several other

teachers at this school, who attended a demonstration of the system, said that the discrepancy between high expectations and actual performance had given Telidon a reputation as a "white elephant," and that this reputation had severely affected teacher utilization.

A third school, one with its terminal in the library, was much smaller than the four other public schools and attempted a more systematic and exhaustive promotion of Telidon. The principal, who, along with two teachers at the school, was the Telidon "contact," gave demonstrations to teachers and students and also gave a Telidon workshop. He went through the database and selected sequences he thought were useful for teachers and made his own table of contents with page numbers. He said that he had not found any sequences that could be used with kindergarten to grade 2 students but that there were sequences for grade 3 and up.

The teachers at this school booked time in the library when they wanted to use Telidon. They were interested and enthusiastic and found the equipment fairly easy to use. Their efforts were, however, thwarted because of constant system crashes. Poor transmission of pages on the long-distance phone lines to this site seems to have been the major source of difficulty. Also, until the last months of the field trial the teachers were aware of only one method of accessing the host computer; they were unaware of Datapac lines. Because of the system's unreliability there was almost no class use.

Students at this school were often "rewarded" with a chance to use Telidon after completing lessons, but this too became difficult because of connection problems. There was some use of the system for student projects (e.g., looking up information on a given topic). However, the expense of

long-distance phone bills was considered prohibitive. The Telidon users at the school were unaware of the cheaper Datapac phone connection they could have used. The school often used teletext because it did not break down as often and there was no cost with its use.

In the fourth school, where the terminal was located in the library, the teachers who designed and produced several sequences used them in class and in small groups. Two of the sequences were used for student drill exercises; the teacher would handle the key pad and display it for the students as a workbook or "blackboard." There was little other use of Telidon. Students were not permitted access on their own, and teachers not initially involved with Telidon did not become users of the system.

In the final school, the enthusiastic administrator of the terminal gave demonstrations, created support materials to go with the sequences, and gave personal encouragement to the teachers. In the library, Telidon was available for browsing and individual student use. There were sliding doors in the library that could close off space where classes could use the system with more privacy. Class use was at first limited, but had begun to increase; unfortunately, the terminal had been deployed close to the end of the school term.

## Perceptions of Telidon

Those schools from outside Toronto who had input pages for their sequences found travelling to TVOntario time-consuming and the actual page creation process frustrating. There were often problems with the IPS units and they felt that they did not receive adequate training and did not have enough

time.  The teachers who had created the most sequences were, in general, pleased with their work, but they had noted some errors and educational design problems with the sequences once they used them with their classes. Some sequences, such as an arithmetic drill sequence, did not permit the user to review pages already seen.

The resource teacher who had done a great deal to encourage Telidon use at her school noted that she herself had not had enough training from TVOntario.  She felt that the Norpak directions for use of the key pad were not basic enough and also said that the teachers at her school had found signing on to Telidon difficult.  She felt that more training was needed for them to become comfortable with the system. Teachers at this school said that there was a need for a simply worded but complete manual that explained the technology and the database.

Three of the elementary schools reported technical problems that severely restricted utilization.  Sometimes the connection was cut off during use and other times just signing on was impossible.  The two other public schools had technical problems but persisted in their efforts to use sequences despite technical annoyances.  Technical breakdowns in all schools reportedly disrupted classes and teachers said they did not have sufficient class time to attempt trial-and-error tactics to get the equipment working. They claimed it was always necessary to have backup plans when using Telidon.

Elementary-school teachers also reported having no time in the school day to preview sequences, but claimed that this was necessary to use them well. They said they needed written descriptions of the sequences and updates on additions to the database.  One principal noted that educational objectives

of sequences were not always clear - some sequences seemed to be more appropriate for drill purposes while others seemed to be for introducing material.

Teachers also noted that using the indexes was time-consuming. Some teachers said they would prefer an index by subject while others said they would like it by grade level.

Many teachers said that some of the pages were very slow in forming. The teachers at one school remarked that proper lighting was important and that the height of the terminal made reading difficult for young users.

The principal who had been facilitating Telidon use at his school felt that immediate limitations for Telidon were that the database was too small, the ports were too few, phone lines were expensive,[1] and there was no hard copy of the data available. However, he felt the system was a great motivational and graphic tool and that once technical difficulties were overcome it would improve. One teacher at the school that had experienced the most technical difficulties summed up his school's experience in the field trial by saying: "Telidon may provide information that is better than a book but so far it isn't as easy to open."

On the more optimistic side, many teachers noted that the students appeared to like using the technology and the teachers appreciated the enthusiasm it could generate. The graphics on some Telidon pages were a frequent source of marvel to teachers, though there were often complaints that some pages took too long to appear.

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1. Though TVOntario covered the long-distance costs of transmission between users and the host computer, some field trial participants, including this principal, seemed unaware of this.

## B. Junior High Schools

Telidon terminals were deployed in two junior high schools. Data were collected at both these schools.

## Sequence creation

These sites had science sequences created by teachers. One school was located in Toronto and the other close to Toronto, so there was no difficulty in coming to TVOntario to create pages.

## Initial plans for Telidon use

In one school the teacher who had created a sequence hoped to use it with his class. After he had completed the sequence he stated that he was not satisfied with it and so would not use it with his class. He found it boring and wanted to put in more drawings and shorter assignments and make it more interactive  A general objective of this teacher, who was responsible for Telidon at this school, was to introduce his students to the Telidon technology.

In the other junior high, the principal wanted to introduce the students and teachers to the technology. Teachers were to be encouraged to discover uses for Telidon, and one sequence produced by a science teacher at the school was to be used with students. Unfortunately, the teacher who had created a sequence found that he was not scheduled to teach this course and so was not able to use his sequence.

Location and administration of Telidon terminal

In one junior high, the terminal was located in the computer room. At this school information about the content of the database was not actively disseminated nor was Telidon use encouraged among teachers. Students were, however, often allowed to use Telidon on their own. The teacher who facilitated its use said that he had not tried to stimulate teacher interest because the room and the way it was set up were not suitable for teacher browsing or class use. He said that the room always had a math or science class using it.

In the other junior high the terminal was placed in the library, where it was signed on each day and then left available for teacher and student use. This school succeeded in attracting more teachers to the technology. Students were also encouraged to use and occasionally evaluate some of these sequences.

Patterns of use

In the school with the terminal in the computer room, the teacher allowed the students to use Telidon freely after they had finished their CAI work. In small groups, they selected sequences that appealed to them. According to their teacher, the students preferred those using a game format. They used the system index and also a paper index created by the TVOntario Telidon team in the latter part of the field trial.

At the school where the terminal was in the library the principal of the school gave demonstrations to the teachers and the librarian instructed students on how to use the system and encouraged them to browse. The

principal of this school said that teachers occasionally found sequences that related to their courses but that their curriculum did not permit time for sequence use or they found that they had already covered the topic. The librarian said that some students used Telidon on their own - often accessing sequences with a game format and often trying to make a game out of those sequences that had a different kind of format.

## Perceptions of Telidon

Both schools reported that students enjoyed the novelty of the technology. The students who were familiar with other computers considered Telidon's page appearance slow and teachers at both schools said that students would have liked the addition of sound.

Both schools felt that a good users manual was necessary for teachers to feel comfortable with the technology. Both schools had technical problems that interrupted use, but overall, they reacted differently. The teachers and students at the school that used other computers tended to be more accepting and less frustrated by technical problems than the other school.

The Telidon contact at the school with the terminal in the computer room felt that most sequences currently available had too much text for the students. He said that they didn't read it.

He had extensive experience with a computer-assisted mathematics course based on a large mainframe computer. He felt that Telidon was not as useful as that system in computer-assisted instruction applications because it did not interact with the student thoroughly, nor did it keep a record of student responses. However, he hoped Telidon graphics could be

incorporated into more sophisticated computer-assisted instruction programs. In general, he felt that one advantage Telidon had over other computer systems was the capacity to retrieve information from a very large database.

Teachers from the other school said that the alphabetical index was good only if you knew the name of the sequence, but not if you were looking for suitable sequences for class use. They called the sequences "programs" and preferred that there be an index by academic subject heading and then by grade level. They also said there should be user instructions, for either teachers or students, at the beginning of the sequences. Such instructions might explain how the sequences were intended to be used -- e.g.,as a game, or with pen and paper.

C. Secondary Schools

Telidon terminals were deployed at 11 secondary schools across Ontario; data were collected at 10 of these. Two of the secondary schools were French-language schools. One of the English-language schools used Telidon entirely as a component in a distance education course; it is reported in a seperate section. (See page 55.)

Sequence creation

The following chart presents a record of the eight secondary schools in which pages were created.

| No. of Schools | No. of Sequences Created per School | Page Creators |
|---|---|---|
| 4 | 1 | - Grade 13 student for science project<br>- French-language teacher<br>- Team effort<br>- Team effort |
| 2 | 2 | - One teacher at each school created two sequences |
| 1 | 4 | - Four teachers and librarian; each teacher created a sequence in own subject area |
| 1 (French) | 1 | - The teacher who created this geometry sequence left the school and it was not used |

The two schools using a team effort to create pages differed somewhat in their style of page creation. In one school, several English teachers chose a book that was taught at several grade levels as the topic of their sequence. They used a "language across the curriculum" approach in an attempt to make the sequence useful to students in different grades and at different levels. In the other school, the team consisted of several members from the school's Learning Resources Committee, special-education students, and volunteers. Research data were collected by the students for the content of the sequence and then the committee members designed the sequence and began creating the pages. Volunteers from the school completed the page creation process.

The page creators from all secondary schools varied greatly in their feelings about the process. Several of the schools found the page creation process time consuming and frustrating and some found travelling to Toronto to gain access to the IPS units a major impediment. One of the page creators said he had found page creation an enjoyable and easy task. The two teachers who produced two sequences each were extremely comfortable as page creators, and both felt they had learned from their first experience and improved their second sequences.

Initial plans for Telidon use

All seven of the English-language secondary schools intended their sequences for in-class use. In addition, most of the English-language schools and both French-language schools wanted to acquaint their students and teachers with the new technology. All the secondary schools also hoped to interest their teachers in using sequences other than their own

sequences for in-class use. They hoped to encourage teacher use through demonstrations and making the terminal available for teachers to go through the database and select useful sequences.

## Location of Telidon terminal in school

Six of the secondary schools had placed their terminal in the library, two were in classrooms, and one was in a teachers' lounge. As in the public schools, Telidon use by teachers and students was greatest when it was located in the library. The terminal in the teachers' lounge received the least use, but it should be noted that in this case limited use was intentional because the school principal was uncertain about the number of hours he could use Telidon without being charged for long-distance telephone costs.

## Administration

One school administered the system very efficiently because of the efforts of the resource teacher in the school's library. She made a simplified user's instruction sheet, developed the school's objectives for the field trial with other members of the Learning Resources Committee, went through the database, and categorized all sequences that were suitable for class use according to subject and grade level. This listing was circulated to all teachers in the school and was also given out when their Telidon team of three teachers went to eight elementary schools in the area to talk about Telidon.

Another school was somewhat less organized but followed a similar pattern
of "promoting" Telidon to teachers. At a staff meeting for all the
teachers in the school, the librarian in charge of Telidon gave a complete
demonstration of the technology and followed this up by "advertising" to
business and math teachers.

The other schools had more casual demonstrations and encouragement given by
the teacher or principal who had initiated the school's participation in
the field trial. At the two schools in which one teacher produced two
sequences in his subject, the teacher involved other teachers from his
department in the field trial. However, few other teachers became involved.

Patterns of use

In the school where the terminal was located in the teachers' lounge,
Telidon utilization was closely monitored by the principal. He went
through the database and told teachers in the school what sequences they
might be able to use with their class. He himself taught chemistry and
went through all the chemistry sequences on the TVOntario database with his
students, including one created as a course project by a grade 13 student
in his class. A business teacher became interested in Telidon and brought
his class to the lounge to introduce the students to the technology. There
was no free student use in this school.

Both French-language schools had their terminals in the library and use was
coordinated by librarians. It was available for teachers to become
acquainted with the technology and to encourage class use with existing
sequences. Very few of the teachers attempted to use any of the sequences

with students. Both sites had been plagued by technical difficulties and the teachers had become frustrated with the undependability of the system. Both French schools felt that the French database was too limited to be at all acceptable for any kind of school use. Students at both schools were, however, allowed free use of the system and teachers noted that they most often went through the game format sequences.

A French-language teacher at an English-language school had created one sequence and used it with his class. He had hoped there would be other sequences available for use with his class, but after going through the database he felt there were none. This teacher stated that he had given demonstrations to teachers at the school but that they had claimed they had no time in their classes for Telidon use. A researcher tried to stimulate more use in this school and gave a demonstration of several sequences to a group of teachers. One of the sequences was then used by two teachers and one of these teachers considered the sequence excellent.

The school that had three English teachers create a sequence for use with several grade levels had two teachers use the sequence with classes. One grade 10 teacher used the sequence in an active teaching style - almost as an "electronic blackboard." However, the sequence was found to be not totally acceptable for any one grade; students in grade 10 found parts of the sequence too easy and became bored, but became interested when the content was more at their grade level. No one teacher was in charge of Telidon at this school, but demonstrations were given by a school board official to interested teachers at other schools. Teachers showed little interest in adapting Telidon to their lesson plans and there was little free use by students. This may have been because of the location of the

terminal -- in a commerce classroom -- and the fact that it had to be booked ahead.

A teacher in one of the schools had created two geography sequences and he and other geography teachers at the school used these sequences. The terminal, located in a geography classroom, was used informally by students when the classroom was unoccupied.

A teacher at another school had created two math sequences and used these with his classes. He wanted to evaluate one of the sequences and cooperated with the Office of Project Research team in the implementation of a controlled experiment to assess its effectiveness. (The sequence evaluation appears on page 83.) The Telidon terminal, located in the school library, was available for free student use when not in class use, but was not frequently used.

The school that had created four sequences used all these sequences in the school. A math sequence and an English as a Second Language sequence were used with one class each, and a theatre arts sequence was used by four classes. A sequence on library research techniques was available for student use in the library. A business teacher wanted to introduce his students to the technology and gave an assignment to his students to "look things up" in Telidon. He later felt that this was an inadequate and unstimulating way to use Telidon.

The secondary school with the most organized administration of Telidon also had the most extensive use pattern. Teachers had created only one sequence, but used the rest of the database widely. Demonstrations were given to all the students in this school and the system was available for

free student use when not being used by classes. Fourteen elementary classes from schools in the area came to the school and used sequences that had been selected by their teacher. Seventeen classes in the high school used sequences in class. Sequences selected for both elementary and high-school classes were geography, language arts, health, or safety sequences. The resource teacher had arranged for a data phone extension cord to be installed, so the terminal was available for general use in the main area of the library and for class use in a small room off the library. Some classes used a sequence in small groups of students while others stayed as one group and passed the key pad around. The Telidon team of three teachers at this school also gave demonstrations to the administrative board of the school and parents.

Perceptions of Telidon

At the French schools:

- The librarians stated that to be most useful, sequences must be tied to the curriculum; there was no time to cover extra material.

- They noted that students preferred "game" sequences and they felt this type of sequence should not be available on Telidon because it distracted students from more serious learning sequences.

- Both librarians praised the graphic abilities but felt they should be used to teach rather than embellish the pages.

- One of the librarians felt that although he saw potential for developing useful sequences, most of the sequences available during the field trial seemed too easy and tried to "please" rather than teach.

- One librarian commented on student use of the key pad, saying that the students would have preferred the key pad templates and the arrangement of the button to be similar to those on calculators.

At the English schools:

- Several teachers said that Telidon would only be useful in the schools when it had a very large database, providing the teacher with a variety of resources.

- Many teachers felt that the the sequences must be more closely tied to the curriculum. They felt that there was no time for material that was not directly related to courses.

- Many teachers wanted sequences to be listed, in the system indexes and in any support materials, according to subject and then according to grade. Most of these said that the indexes on the system should include some form of cross-referencing if possible.

- Almost without exception, the teachers interviewed felt a need for a complete paper catalogue or listing of the available sequences. Some suggested including all or some of the following: summaries, educational objectives, suggested uses, and page numbers of the sequences available. They claimed that such a listing would make lesson planning with Telidon easier and would encourage use of the system.

- Many teachers felt that the ideal lesson preparation would involve previewing the sequences. And some teachers stressed that their time was already at a premium - they reiterated the importance of written summaries, which would allow lesson planning at home and would not tie up the terminal.

- Many of the teachers who expressed interest in Telidon, but who did not become actively involved in its implementation, felt that there was a need for a simple but complete technical manual. Besides clear instructions for accessing pages, a manual might include troubleshooting tips or suggestions on what to do in case of difficulties.

- Some of the teachers and librarians who initiated Telidon activity at their schools said teachers often found signing on to the system uncomfortable, even after repeated use.

- The structure of the database was also unclear to many teachers after repeated use and some teachers suggested workshops or written explanations of the "branching-tree structure" of the pages.

- One teacher claimed that refinements to the system prompts and responses were also necessary because if the prompt made the teacher look foolish, highschool students would use this as a reason to disrupt the class.

Some of the teachers who had created sequences for class use were satisfied with them and felt they worked well in class. However, teachers using other teachers' sequences were more critical and often found problems or errors or did not completely understand how to use the sequence. Some teachers were very critical of their own sequences and realized, after they were completed, that the design and sequence format should have been different. Some teachers considered sequences that had many pages of text uninteresting and represented poor use of the medium.

While teachers were often uncertain about how useful they considered Telidon for teaching, almost all who had seen students use Telidon remarked that the students enjoyed using it, paid attention to the screen, liked to control the pages, and perhaps because it was a novelty, were enthusiastic about using the technology.

D.  Community Colleges

Telidon terminals were deployed in nine community colleges across Ontario.
Data from four of these sites are reported.

Sequence creation

Three of the four colleges created sequences for the TVOntario database. At
one college an English instructor created two sequences on developmental
English, and attempted to use the branching structure in his lesson design.
He felt that he had improved his page creation skill as he gained
experience.

The two other sequences were produced with team efforts.  In one college a
group of students and instructors designed a sequence based on a course in
graphic design. One individual then put the pages into an IPS unit
available in that city.  He reported that he felt isolated and frustrated
working on his own.  There was no final check of the pages by the group or
instructor and a number of errors were noticed when the sequence was
available on the system.

The other team effort was for a sequence based on an entire year's course
work in television production. The material was prepared by the instructor
and then students completed a story board and flow chart.  Four students
travelled to Toronto to produce the 112 pages.  They found the page
creation process frustrating and time consuming and had problems when an
IPS unit malfunctioned.

Initial plans for Telidon use

All four of the colleges wanted to learn about the Telidon technology. Only one of the sequences created was truly curriculum-based; this sequence on television production was derived from an instructor's lecture notes for a first-year television course. The other sequences produced at the colleges were related to curricula but were intended as supplementary to the course and as a sample sequence to help students become acquainted with the characteristics of Telidon.

Location of Telidon terminal at the college

The college that had produced the curriculum-based sequence had the terminal placed in the instructor's office area. The other colleges had their terminals placed in libraries or learning resources centres. The terminals located in the library or resource centre received extensive free student and staff use, while the terminal in the office area was accessed only by the Telidon supervisor's students.

Administration

The instructor who kept Telidon in his office area allowed only his students to access the database and did not encourage them to use other sequences. He served as a gatekeeper, giving demonstrations of his sequence to other members of the college staff or interested outsiders.

In the other colleges demonstrations were given by the Telidon field trial initiator, and students and faculty were encouraged to explore the

database. These colleges supported learning about Telidon but did not actively encourage other faculty to create or find sequences for course material.

## Patterns of use

The instructor who initiated the curriculum-based sequence on televison production had his first- and second-year students go through the sequence in small groups at their own pace and at their convenience. Most students went through the sequence twice. He also administered pre- and post-tests. The post-test was completed as the students went through the sequence with the instructor. The students' participation was a course requirement. To avoid peak periods on the host computer, an attempt was made to schedule student group use early in the morning, but they found the computer was not available before 8:00 a.m.

One of the colleges had produced a graphic arts sequence based on the introductory course to graphic design. However, by the time the sequence was completed the school term was almost over and therefore no class use was undertaken. The sequence was stored on a Hempton unit to allow local control in accessing it and a small number of students evaluated the sequence at the end of the year. Demonstrations were given to administrators and potential external funding agencies as well.

The two other colleges gave demonstrations to classes interested in learning about the technology and encouraged individual student exploration of the database. One college, which produced a sequence on orientation to the library, found that it was only appropriate for new students at the

beginning of the school year. The terminal was also used to give demonstrations, for some information searches, and for casual use such as playing games.


Perceptions of Telidon

The two colleges that produced curriculum-based sequences, one on television production and the other on graphic design, were enthusiastic about the graphic capabilities of Telidon and felt that the technology would in the future be an important way of presenting visual information. One of these instructors felt that many pages currently in the database did not fully exploit this graphic capability but instead used it in a cosmetic fashion. The other instructor felt graphics that were slow to appear became redundant and frustrating when they were repeated in a sequence and when the sequence was seen a second time. This instructor said it would be better if the text appeared before the graphics in such cases. He also felt softer colors worked better than harder colors.

Both of these instructors used a team approach in creating their sequences. The instructor who produced the TV production sequence modelled his team after a television production team. He was very pleased with the end product and recommended that all sequences be produced by teams of specialists. The other instructor, who produced a sequence on graphic design, also recommended a team approach, though he was less pleased with his own sequence, noticing several errors in it. He urged that sufficient time and resources be allocated for the review and editorial phase of page production.

This same instructor felt that his own sequence was too simple for the first-year college students he had targeted it for and it seemed to him that Telidon had an effect of simplifying the material.

The instructor who facilitated Telidon activity at one of the two colleges that did not use Telidon as a component in a course recommended: (1) that page creation should be done by professionals, (2) that sequences created by teachers should be reviewed, (3) that the teachers themselves should be properly trained in production values. This instructor, who had produced sequences himself, felt that Telidon had only gone through the first steps of a new technology and that it eventually must become more interactive, and be linked with the microcomputer, the videodisc, and other emerging technologies.

The other college that did not undertake course-related use of Telidon felt that the field trial had given users an excellent way of learning about new technologies. They reported that they were now interested in obtaining an IPS unit and host computer. Their major reservation about the field trial was that the Telidon database was not updated enough.

The two colleges that had placed the terminal in the library complained of technical problems; they experienced difficulties in accessing the host computer (insufficient phone "ports," slow transmission of pages). They would have liked to have an alphanumeric keyboard, rather than a numeric key pad, which they found to be limiting. They were also critical of the database structure: one instructor said it was difficult to create sequences that used the branching structure effectively. Another felt that the database was difficult to update and therefore was too inflexible.

The Telidon initiators at all the college sites noted that students liked working with the technology. The radio and television students who had studied from the curriculum-based sequence said they preferred Telidon to studying from a textbook.

## E.  Universities

Telidon terminals were deployed in seven universities across Ontario.  Data were collected from five of these.

When TVOntario began its field trial of Telidon in Education, the university community in Ontario was immediately interested and many approached the Telidon project to participate in the field trial and obtain access to a terminal and the supporting equipment.  Most had enough personnel, administrative experience, possibilities for external funding, and motivation to undertake their own Telidon projects beyond the field trial, but appreciated the initial impetus that TVOntario was able to provide.

Since the universities' activities in the field trial were determined largely by the different administrative structures within the university, this overview is somewhat different from that of the other institutional levels. None of the universities reported here created curriculum- or course-based sequences as a direct result of participation in TVOntario's field trial. Rather, there was an emphasis either on using Telidon to display information about the university or on research and development of Telidon.

### Telidon at faculties of library science

Two of the universities became involved with Telidon through their faculty of library science.  The faculty and students in library science wanted to explore the technology as a means of organizing information and communicating with library users.

One of these faculties of library science created a first sequence on general information about the services of that city's libraries and a second sequence on information of concern to library science students. The terminal was located in an open area of the library. At first, demonstrations of Telidon were given to interested students and the public; later, seminars and workshops were given. This university experienced particular difficulty with utilization because its prototype equipment was never replaced. It had frequent breakdowns as well as the problem of having to go through the Ottawa host computer and pay phone charges. Users reported that no staff at this site had the time to keep updating their sequence, continue page creation, and keep up general administrative activities. Despite these difficulties, some individuals at the faculty remained interested, and with the help of the Telidon Project team, acquired outside funding to begin other research activities with Telidon.

The other university faculty of library science had more extensive Telidon activity and this was in large part due to the initiative of one faculty member. (This faculty member had been interested in Telidon before this field trial and encouraged others to become involved when a terminal was received from TVOntario.) The terminal was located in a library staff member's office and administration of the system was done by the media coordinator of the library staff. Demonstrations were given to library science students and other interested students, and the terminal was often available for casual student use. Questionnaires were provided for users and these were analyzed from time to time for the site's own information. The first sequence created by this site was done by a graduate student and was approximately 30 pages of information about the school of library science, including updates on seminars, information on courses, guest

lecturers, etc. Later in the university calendar year, the content of this sequence was updated and another sequence for library students on cataloguing books, on-line searching costs, literature, and local writers was created. A final sequence was created in the latter part of the field trial. This was a joint production with a local library and described events both on and off campus in the city. Two graduate students were hired to create the pages and these same students undertook a research project based on use of the sequence. Although the faculty of library science's terminal acquired from TVOntario was the first on campus, several other faculties, including the school of journalism, acquired terminals later. Several professors on campus were also hoping to begin research projects (e.g., on Telidon indexes, on electronic journalism).

Those involved with page creation from these two universities found the process frustrating and time consuming. They complained of difficulties in booking IPS units, IPS breakdowns, and lack of training. One page creator said a stylebook for Telidon page creation was necessary. The library science school that had created more sequences was hoping to purchase an IPS unit and terminal with the local library.

Both these universities felt the database needed more frequent updating and suggested that a catalogue of updates be available. The library science faculties also felt that spelling mistakes and bad formating of information were serious problems and should have been controlled. The slow appearance of complex graphics was also reported as a source of irritation for users.

Telidon in a university library

A third university had its Telidon terminal located in an open area in the university library with daily administration under library staff. When this university first acquired its terminal, a Telidon Committee was formed to set policy for and oversee Telidon activity on campus. The immediate goal was to become acquainted with the technology and introduce it to groups on and off campus. The committee was composed of members representing different university departments, and one of its first tasks was to approve a tree structure for the university's pages in anticipation of the time when page creation would be easier. The committee envisioned an internal focus (e.g., student information, student meetings) and an external focus (information coming from the university for the wider public) but assumed that initial emphasis would be on the latter. Later in the field trial, a library committee was formed to plan specifically for the library use of Telidon. Towards the end of the trial, a third committee was formed to oversee the future direction of Telidon on campus. To some extent, the members of these committees overlapped, but each committee was formed in reaction to a certain phase of activity and interest on campus.

Telidon demonstrations were given to interested groups both on and off campus.

The first sequence created by this university's Department of Information was a five-page summary of the week's activities on campus. It was written at the computer facilities on campus, accessed by a computer at TVOntario, and then modified to Telidon format by personnel from the Telidon Project team. Because the content was time-sensitive, it was transmitted through the broadcast mode. However, technical and administrative difficulties

arose with updating the broadcast mode cycle of pages, and so the sequence appeared sporadically and was often out of date, preventing the intended use of the sequence. Two longer sequences were created by a staff member of the university's educational practice department for display at events such as the university's open house and a local sports show. These sequences were created at TVOntario and were about research activities taking place at the university. A Hempton unit (permitting storage of pages in the memory of the terminal) was used at these events to avoid problems with phone lines. A fourth sequence outlining courses and activities for the university's summer session was also done at TVOntario. Finally, a fifth sequence of approximately 200 pages was created under the direction of the library committee . The content was library orientation, including how to use a library, bibliographic information, new acquisitions, and similar information.

By this time the university's Telidon activities had expanded and there were more terminals on campus. Page creation was done on site with equipment provided by another university. The university was by this time also participating in another field trial, had developed a campus network of Telidon terminals, and purchased its own Hempton unit. At the end of the field trial the university was prepared to continue with its investigation and use of Telidon for campus communication. A number of people had gained experience in page creation, content planning, and technical know-how.

One university staff member who served on two of the Telidon committees, and was involved in the field trial from the beginning, felt that the

immediate needs were better indexes, the addition of sound, and the addition of a keyboard.

Another staff member who created most of the pages for this site felt that page producers should be trained in the use of the tree structure, and that experienced page producers could use training in advanced page creation techniques. Looking back, she said that the TVOntario field trial had allowed university personnel to "get their feet wet."

Telidon in computer science departments

Two other universities were involved in the field trial through their academic computing staff. Both these universities wanted first, to explore the Telidon and videotex technology, and second, to research and develop the technology. One of the unversities created a first sequence describing continuing-education courses available in business. They saw this type of Telidon information, the kind that had a "short shelf life," as a good alternative to printed catalogues. The main aim of this sequence was, however, to provide a vehicle to concentrate their research and development activities. More specifically, they wanted to find an efficient method of creating pages without using the traditional IPS unit. They succeeded in creating pages on a university mainframe computer similar to the one at the Department of Communications in Ottawa and developed a program to convert standard format ASCII into Telidon format ASCII. Color and typeface commands could also be sent from the terminal. They could not, however, generate graphics, but the time and money saved on text generation could easily allow later creation of graphics on an IPS unit. They were thus able to use information already available on their computer system instead

of laboriously having to create each page from scratch. They could also get a hard copy of their pages.

The terminal at this university was in a locked equipment room in the academic computing area,but was available for demonstrations and informal student use. Those involved with Telidon at this university felt that Telidon technology as it now existed had several limitations. These were: frequent technical breakdowns, the limitation in the number of characters across the screen, the pages' lack of scrolling, the need to find information through menus, the lack of an alphanumeric keyboard for key word access, and the limited size of the current database.

The other university where Telidon technology was used by computing staff had two phases to its involvement with the TVOntario field trial. It first explored the technology to understand the behavior and performance of Telidon, and later started a "development" phase. In this later phase, users developed their own Telidon host computer software and documentation, called CCNG Telidon. This software required a full keyboard; they felt that full alphanumeric keyboards would soon be available. They also investigated the possibilities of direct transmission of data from page creator to host computer without use of a floppy disc.

Toward the end of the field trial, this university had developed extensive Telidon activities. They had a network of 25 terminals both on and off campus, were participating in another field trial, had sequences created by various faculties, and were planning materials in community and industrial applications. Several students were employed through Telidon and the university was helping other colleges and universities in Ontario with their Telidon planning.

## F.  Libraries

Telidon terminals were deployed in six public libraries across Ontario.
Here we report on three of these.

### Sequence creation

Two of the three libraries created sequences. One of the libraries created
a sequence in cooperation with a community information service and a
university health sciences department.  The other library created a
sequence consisting of regional information. Both sequences were created
for the general public.

### Initial plans for Telidon use

One of the libraries was especially interested in demonstrating Telidon to
the public as an example of a new technology.  Its staff claimed that there
was a great deal of interest from the public in recent technological
development. The other two libraries also intended to give demonstrations
to the public and all the libraries hoped to use Telidon as another source
of information for regular visitors.

One of the libraries was sharing its terminal with a university faculty of
library science and it had plans to rotate the terminal to other libraries
in its regional system.

Location of Telidon terminal in library

One library had the terminal in an open area near its entrance, a second had it in a closed room off the main library entrance, and a third had it in a boardroom.

Administration

The staff at each library was responsible for Telidon, but in practice usually one staff member became more interested than others and most administrative work was left to this person. Two of the libraries advertised Telidon locally to stimulate public interest. One of the libraries, in the latter part of the trial, made a paper index of the games, including page numbers, for the children, who were their most frequent users.

Patterns of use

At all three libraries, demonstrations to the public were given frequently. At one library, it was arranged that one be given for an hour every day. One library reported that in the latter part of the trial, when there were more sequences available, children were the most frequent users of the equipment. This library had printed a paper list of games and quizzes so that the children would not have to go through the tree structure step by step. This site reported that young children in particular liked the graphics.

Perceptions of Telidon

One of the libraries outside Toronto found travelling to Toronto and the whole process of page creation frustrating. Users claimed that page creation instructions were often inconsistent. This library had been very enthusiastic at the beginning of its participation but had encountered many technical problems and became discouraged. Staff found it particularly disconcerting when they had to respond every 30 seconds to prevent their system from being disconnected. This site claimed that problems with Telidon affected staff morale, especially when demonstrations had to be cancelled because of technical problems.

Another library stated that many of its public users reported that the information available was not better than information that could be obtained from books. They felt that a good use for Telidon was to provide a bank of current information but that the information available during the field trial was often dated. Two of the libraries were particularly critical of the organization of information in the database, saying that it was a "mishmash." They also felt that quality was inconsistent and that the content errors, spelling mistakes, and system "bugs" were unacceptable. One library suggested that an editorial position was needed to coordinate all the content. This same library commented that the graphics should be kept simple as the public became bored with the slow appearance of complex graphics.

One librarian felt that Telidon would be especially suited to community information (if it could be kept up to date) but that it would be time consuming finding information unless the user knew the page numbers. She stated that she also saw possibilities for title and subject searching but

that other computer systems may be able to do this better than Telidon.
The library that planned to rotate its terminal within its regional library
system, and actually started to do so, remained impressed with the idea of
creating its own network and was hoping to purchase a first terminal and
IPS unit in 1983.

G.  Special Institutions

While a number of special institutions were involved in the field trial, detailed information about the application of Telidon was obtained from five of these user groups: a postsecondary institution specializing in the training of medical technologists, two schools for the hearing-impaired, a group home for the disabled, and a museum.

Sequence creation

The medical institution produced a sequence on basic radiography incorporating text and graphics.  The sequence was created jointly by an instructor of radiography and a graphic artist.  The team produced the 74-page sequence on the TVOntario IPS units during a period of approximately 165 hours.  Most of this time was spent in the evening, with the disadvantage that often there was no one available to help with operational problems.

A content committee of teachers interested in Telidon was set up at both schools for the hearing-impaired.  Two sequences were created at one of the schools: one sequence designed by a grade 4 teacher for hearing-impaired elementary students, and the other developed by a communications resource teacher for both hearing and deaf elementary-school students.  Each teacher spent approximately 70 hours at TVOntario creating the sequences.  One teacher at the other school prepared grid sheets, but they were not processed to complete a sequence.

With the group home for the disabled, a committee comprising persons involved in media activities was originally formed to act as Telidon

information providers. During this field trial, three Toronto members of an association for the disabled created approximately 300 pages on TVOntario IPS units. The team spent two afternoons a week for approximately three months at TVOntario. They recorded information about resources for the disabled, such as transportation, housing, access to buildings, hotels, theatres, etc. The three page creators were aware that their material would require editing -- a skill they freely conceded they did not have. At the present time, the Telidon database has a 78-page sequence on resources for the disabled.

The museum produced a 71-page magazine sequence on the history of Canada's native people. Their first page creation team was trained by TVOntario Telidon staff, and their material was developed on the IPS units at the Department of Communications in Ottawa and also at Bell Canada's Information Provider Centre in Ottawa.

Initial plans for Telidon use

The medical institution investigated four specific objectives: Telidon's feasibility as a classroom teaching aid; Telidon's capability for the presentation of self-instructional programs; Telidon's use for the continuing education of professionals in the working environment; and Telidon's role in distance education programs.

The two schools for the deaf were interested in examining the potential of Telidon as an educational tool for the hearing-impaired.

The intent of the disabled group was to use Telidon to provide as complete an information service as possible for people with disabilities. The

purpose of the museum site was to explore the technology of Telidon for possible future use.

## Location of Telidon terminals

The Telidon terminal was located in the library of the medical institute. At one of the schools for the hearing-impaired, the terminal was placed in the resource room of the senior school, and in the other school it was kept in a locked, unused classroom. The group home for the disabled put the terminal in the dining lounge, together with other recreational equipment. The museum terminal was situated in the main foyer, near the front door.

## Administration

The chief librarian for the medical institute administered the use of the terminal and gave students and instructional staff Telidon demonstrations.

A teacher at each of the schools for the hearing-impaired was responsible for the terminal. There was interest on the part of most teachers at the two schools, but information about the system was not actively disseminated. At the group home for the disabled, the controller was in charge of the terminal until the residents became more familiar with its use and assumed the responsibility themselves.

The media/public-relations staff member was the principal contact at the museum.

Patterns of use

The staff of the medical institute undertook their own evaluation of the pilot sequence they had produced. The content of the sequence was sufficiently general that it could be viewed and assessed by a wide variety of people. Full-time students, medical technologists, clinical personnel, and support staff took part in the evaluation. Unfortunately, equipment breakdown caused problems during the evaluation.

At the school for the hearing-impaired where the terminal was located in a resource room, both students and teachers had full access to the system. Telidon was used for enrichment and demonstration of new technology. The students generally "system-played" during nonschool hours. The teacher in the resource room reported he would show a student a new sequence, and the use of the sequence would spread from student to student. Teletext was the main mode employed.

At the other school for the hearing-impaired, where the terminal was locked in a classroom, only teachers had free access to the system, but the students were permitted to use it under supervision. There was little instruction given to students about how to operate the system. Both schools reported difficulty in logging on the system.

At the group home for the disabled, there was concern about the cost of long-distance calls to the database, so the system was not used very often at first. This problem was resolved when TVOntario gave instructions for reaching the Toronto host computer. Later on, the site was advised that it could have as many free hours as it needed, using the Datapac number. The terminal was available to residents and staff throughout most of the day.

A logbook was maintained for users' comments. The residents spent considerable time on the system, particularly playing games; however, some used the sequence on resources for the disabled. A teacher who tutors residents twice a week expressed interest in using educational sequences but found the present content limited for disabled learners.

The terminal at the museum was available for access by the public, but use was limited because of frequent breakdowns, difficulty with logging on, and poor quality of teletext reception.

Perceptions of Telidon

The medical institution's own evaluation indicated that staff felt that Telidon could be a useful teaching aid. Telidon's graphics and interactive mode were seen to be very suitable for the presentation of instructional material. A self-instructional method was preferred by the participants in this evaluation. It also appeared to be a useful backup resource for tutorials and review. The main drawbacks reported were the slow response time, the method of accessing programs through the menus, and the small size and awkward placement of key pad buttons.

The following recommendations were made in the institute's evaluation:

- The institution should consider Telidon in its long-term program planning.

- Courses of a "general" nature should be developed for a wide variety of students.

- Self-instructional formats that maximize the graphics and the interactive abilities of the system should be developed.

- Sequences of text alone should be avoided.

- The number of mechanical delays should be reduced through better software.

Both schools for the hearing-impaired were interested in the bright, visual presentation of information. The major difficulty for hearing-impaired children was that the language level of much of the text on the database was too difficult for them to read independently. The size of the text was considered too small for some students, and one teacher commented, "If Telidon is to be used as a blackboard, why not use an actual blackboard?"

Generally, teachers viewed Telidon as an "add-on" technology that would not replace the traditional teaching methods. The graphic representation of "signing" in a sequence caused some debate among the teachers: the meaning of the signs was not always clear, and graphic signs were not seen as desirable when the effective use of the English language (not sign language) was the educational objective. Students were attracted to the computer, but teachers appeared more content to use traditional teaching aids.

All the teachers reported they would like a printed index of sequences by level, and a summary of the content. Teachers cited travelling to TVOntario to create pages as a drawback and felt it was difficult to be both an educator and a Telidon expert. The school concluded that it was a costly proposition for them to attempt to create sequences, and suggested that a much more economical way of doing this would be to have a team of expert programmers who could obtain ideas for sequences from educators in the field.

Representatives of an association for the disabled indicated they had learned much about Telidon technology and its possible applications for their user group during the field trial. The tutor for the residents at the group home reported that sequences teaching basic language skills for

adult literacy, creative writing, and mathematics would be very helpful for these handicapped, mature students. The three page creators from the association for the disabled admitted they did not have the editing skills necessary to complete their sequences on resources for the disabled. They would like to serve as a core to train other disabled persons, but said they would need more technical training and user instruction, and a professional editor. The association has now secured funding to develop a Telidon database of information geared to be a learning and reinforcement tool in the area of life skills to aid independent living.

The museum saw itself as a catalyst to stimulate interest in the use of Telidon by cultural institutions. They felt the field trial served to introduce Telidon technology to the staff of the museum. The museum would like to form a user group of museums in Canada, and is exploring extending this with museums in New York and France.

H. Telidon Utilization in Distance Education: A Case Study

During the 1981-82 academic year a pilot project was undertaken to examine the feasibility of using alternate delivery systems in education in northern Ontario. This project was a joint venture of a northern school board, TVOntario, the Ministry of Education, and its Correspondence Education branch. The TVOntario Telidon field trial participated in this pilot project. The project involved delivering a grade 13 physics course to a small northern Ontario high school.

The course was based largely on the ministry's correspondence course, complemented by microcomputer software, videotapes, and a Telidon sequence. The 120-page Telidon sequence on "light" covered three of the 12 units in the correspondence component and was created by two teachers and five students who travelled to TVOntario to produce the pages during the summer preceding the course.

In the northern community the Telidon terminal was located in a small room in the basement of the school at some distance from the room used for independent study. Students were given access to the Telidon room throughout the day. Fifteen students enrolled in the course; one failed to start and three dropped out, leaving 11 students to complete it.

For a number of reasons, including the difficulty of the course for the students, the original plan for the students to work independently with occasional help from a teacher/facilitator was abandoned several weeks into the semester. It was decided that the teacher should have a more active teaching role and that the principal should look after the administrative work.

At about the same time the students realized that they could cover all the material in the course by using only the print component of the course, which in this case was the correspondence section. The content of the other media components, including the Telidon sequence, overlapped material covered in the correspondence section. Because of this the original marking scheme had to be altered, to make the use of Telidon and the other media a requirement of the course; approximately 20 percent of the students' final mark was awarded for using the media components.

## Research

Two research officers from TVOntario attended course meetings at the school and interviewed several teachers and the students and the facilitator, once midway through the course and once near its completion. The students also completed a short questionnaire.

The students complained about the late arrival of the Telidon equipment and said that this had delayed the progress of the course. The students also referred to the difficulty they had in accessing the sequence via phone lines. They claimed it was difficult to get a phone line and that once connected, the pages appeared too slowly (at one quarter of the proper speed – 300 baud). This problem was, however, alleviated through the installation of a Hempton unit at the school that allowed local storage on cassette tape.

The students used Telidon in small groups, and with note taking, claimed that the sequence took four hours to go through. (Without taking notes, they could complete the sequence in approximately 30 minutes.) Most of the

students participating in the evaluation felt that Telidon handled definitions, examples, and graphic illustrations well but were less certain about about how well Telidon could handle the introduction of concepts and the summarizing of material. When asked to rate the usefulness of the various course components, including microcomputer lessons, Telidon pages, correspondence lessons, correspondence exercises, videotapes, teacher, facilitator, and textbook, the students rated the Telidon component as one of the least useful components of this course. Most students, however, reported that Telidon had made the course more interesting and said they would like to use Telidon again.

When interviewed, the teacher noted that:

- The students liked the Telidon graphics. He felt that the pages, unlike a book, should only use text when necessary. He felt the design of the entire sequence should have been more interactive, allowing students to respond more to the content. He noted that there were errors in the content, probably due to the lack of expertise in physics of the page creation team.

- He suggested that IPS (page creation) terminals could be located in schools to allow teachers' involvement and to reduce the cost of page production.

- With regard to the structure of this physics course, the teacher commented that much of the Telidon pages on "light" had been supplemental information and that he felt the content of the pages should have been more closely tied to the curriculum assignment questions based on them.

He also suggested that, rather than Telidon coverage of one full section of the course such as "light," his preference now would be for pages on specific difficult topics thoughout the course that lent themselves to graphic explanation.

- Overall, the teacher felt this pilot project had been undertaken with insufficient planning. The technology and funds had been available, but he felt that not enough thought or effort had gone into the design of the media software and the course structure, and that expertise or guidance in this area had not been available. He also felt that it had been a mistake to involve students so heavily in page production because mistakes had occurred.

Despite criticisms, the teacher remained enthusiastic about future possibilities for this type of course and regarded this experience as experimental. He claimed that all those involved had gained valuable experience in the administration, financing, and educational design of distance education projects employing new technologies.

Based on her experience, the facilitator for the course, like the teacher, recommended that Telidon pages should be clear of text except when necessary, emphasize the graphic capability, and have more student interaction with the content.

She felt it was important that the educators set the curriculum for the pages and create the pages themselves. She was critical of the reading level of the sequence, saying it was closer to that of the grade 11 students who created the sequence than the grade 13 students who were intended to use it. This discrepancy in reading level was one reason why

the Telidon sequence did not seem fully integrated into the course. She emphasized that it was extremely important to have the course hardware and software in place and ready for use at the beginning of the course.

CHAPTER 4


SUMMARY AND DISCUSSION: TELIDON ACTIVITY DURING FIELD TRIAL

A.  Summary

The research effort included 34 institutions across Ontario. In March 1982
there was a total of 47 active sites. (See Appendix A for list of sites.)


Table 1.  Number of Institutions Studied and Number That Produced Sequences

| Type of Institution | Number of Sites Studied | Number of Sites Producing at Least One Sequence |
| --- | --- | --- |
| Elementary school | 5 | 3 |
| Junior high school | 2 | 2 |
| High school * | 10 | 8 |
| College (CAAT) | 4 | 3 |
| University | 5 | 5 |
| Library | 3 | 2 |
| Special institutions ** | 5 | 4 |

 *Including a distance education pilot project.

**Including: one medical institute, one museum, two schools for the
  hearing-impaired, and one group home for the disabled.

## Schools

Of the 17 elementary, junior high, and high schools, slightly more than half were extensive users of Telidon. They undertook any or all of the following: (1) used the system in a curriculum-oriented application, (2) held a large number of demonstrations for teachers and students, (3) provided extensive free use for students and teachers. Only two or three of the schools could be said to have accomplished all three of these.

## Colleges

Of the four colleges of applied arts and technology, three produced sequences for the TVOntario database. One of the colleges produced and used a curriculum-based sequence, though it undertook very little exploratory work and few demonstrations. The other colleges used Telidon less formally, involving students and faculty in a more exploratory fashion, with the intention of teaching about Telidon. One of the colleges used its sequence as an introduction to the college library.

## Universities

All four of the universities in the study produced sequences. Two of the universities based their Telidon activity at their faculties of library science, two at faculties of computer science, and one in the university library.

## Libraries

Two of the three libraries produced sequences for the database.
Demonstrations were given to the public at all three libraries and free use
was encouraged as often as technical problems permitted.

## Special institutions

While the five special institutions did not fit into the foregoing
categories, their patterns of use are somewhat similar to those of the
other institutions.

The medical institute operated very much like the most active college; it
produced a sequence directly related to its course of studies and used it
with students, and evaluated it on its own.

The two schools for the deaf used their terminals in much the same way as
the elementary and junior high schools. At one school, which created a
sequence, students were given free access to the terminal and one teacher
made efforts to apply the system to the problems of teaching the hearing-
impaired. The other school, which did not create a sequence, restricted
access to the terminal, and did not apply Telidon to teaching. Of course,
these schools differed from the public schools in the number of sequences
that were of use to them and the method of using them with their hearing-
impaired students.

The museum site operated somewhat like a library. A sequence was produced
but it was not intended for a defined student body. The terminal was
available for public use.

The group home for the disabled was a more unusual site. A sequence on information for the disabled was produced. The terminal was used by the residents recreationally, but there was no formal educational use.

## B. Discussion

During the final year of the field trial, most Telidon use consisted of learning about the Telidon technology, rather than learning with Telidon. A tremendous number of demonstrations were given, first by the TVO Telidon project team, and later by field trial participants themselves, at all sites. These demonstrations — most aimed at teachers and instructors, a considerable number for students, library patrons, and interested others — outnumbered all other Telidon uses.

A second type of use which, while not involving as many people, was pervasive across the field trial, was what we have called "system playing." Many users, most often students at public schools that allowed free access to the terminal, would experiment with Telidon, pursuing one or more branches of the tree structure. Typically, however, this exploration was not a purposeful information search: the users were "exercising" or "playing" with the system. This play tended to take them outside TVO's educational database, where more elaborate indexes were available and a wider variety of content was offered (though often unavailable). A number of these system players voiced general disappointment about the dearth of "things" on the Telidon databases, though they were not very clear on what they would have liked to see more of. These young users were sometimes interested in game sequences — they enjoyed Reversi and checkers, for instance. These system players had no apparent difficulty in operating the

key pad, or conceptualizing the branching structure. They often used the system in small groups of two or more. Learning about Telidon took place in these social groups.

One aspect of Telidon's uses at all schools and postsecondary institutions was a general lack of curriculum-based use: that is, instances when Telidon was used in support of a teacher's or instructor's standard curriculum, whether with the whole class, or by individual students or small groups of students. There were of course some successful applications of Telidon to standard curricula. However, in most cases the teacher/instructor who used a curriculum-based sequence was also the author or primary page creator of that sequence. These highly motivated Telidon users produced a sequence with the intention of using it themselves - and went ahead and did so.[1] Unfortunately, these sequences were not picked up at other sites; the extensive demonstrations that took place at all sites did not succeed in securing curriculum-based sequences. In other words, TVO's educational database did not often function as a distribution system for curriculum-based sequences. Rather, the system tended to serve a more personal function - teachers would use their own sequences. There were certainly exceptions to this pattern, cases in which teachers discovered sequences of use to them that had been produced by other field trial participants, but this pattern was not observed at very many sites.

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1. Sometimes such plans did not come to fruition. In at least two cases such planned curriculum-based use was not carried out because of administrative changes - the instructor who produced the sequence found he was not teaching the course to which the sequence applied during the field trial.

It became clear during the field trial that the Telidon system was adopted differently at each site. Each participating institution was an administrative entity whose channels of power and communication influenced the diffusion of information on how to use Telidon. In some cases this led to the inadvertent exclusion of many possible Telidon users, those not closely affiliated with the TVO project team's initial contact. One simple example: the best way to learn about the key pad is by talking to someone who knows how to use it, and by trying it. But of course, individuals in an institution who are administratively isolated from the Telidon terminal (e.g., they were in a different department) or did not have the time, were hard pressed to become familiar with it. These restrictions on access to Telidon were major impediments to the use of Telidon in teaching core curricula.

This brings us to the critical role of the TVO project team's contact person at each site. These volunteers, who had ultimate responsibility for the Telidon terminal, were sometimes in positions that allowed them easy distribution  of information about Telidon throughout their institutions - for instance, if they were librarians, resource teachers, or administrators. These people had the time and expertise to circulate information about Telidon, and in some cases to legitimize it as an educational resource. However, many others, often teachers in secondary schools, colleges, and universities, were more limited by their subjects and/or departmental affiliations, not to mention the demands on their time that Telidon imposed. They could not distribute information effectively through their institutions. At some sites, exceptionally motivated "contact people" broke or extended traditional boundaries and stimulated Telidon interest, but this was rare. It should be added that even when the contact

person was well situated within the institution, he or she was still relied upon to promote Telidon, and their ability to do so varied according to their enthusiasm and available time.

These difficulties caused by administrative specialization were not as critical at the elementary schools in the trial. First, these schools tended to be smaller, and less structured internally than other institutions. (At one school a group of teachers became involved in the early years of the field trial and worked as a team throughout.) Second, in almost all cases the Telidon contact person was a librarian/resource teacher or a principal. (At one elementary school where the contact person was a classroom teacher and the terminal was kept in his classroom, almost no other teachers attempted use.)

Several other factors affected the penetration of Telidon in the participating institution. Insufficient printed documentation was one commonly mentioned problem. This problem exacerbated the difficulties in disseminating information about Telidon within a school. A blue booklet, Telidon and Education, was distributed to all sites early in the field trial, but it was almost never mentioned by the field trial participants, and it was seen only at a handful of sites during research visits. Interviews at many sites revealed a need for printed instructions and documentation of sequences; some interviewees suggested that these were prerequisites to the further spread of Telidon use. As one teacher put it, each teacher in a school needs a copy of available sequences at his or her own desk. At many sites users improvised and wrote out their own logging-on instructions to affix to the terminal.

There was some indication that more than one introductory demonstration is required at each site. Because of the demands on time, the hard-pressed TVO project team usually conducted one demonstration at each site. However, the research team discovered quite inadvertently that a demand existed for further demonstrations or workshops. At several sites when the researchers arrived it seemed they were expected to provide a demonstration or seminar on Telidon. At some sites researchers were asked for suggestions on how to apply Telidon. As one elementary-school resource teacher put it, the first demonstration was just too much for teachers to assimilate. She suggested that further workshops move beyond promotion and introduction of Telidon to specific instruction in how to deal with the technology (logging on, the database structure, etc.) and how to apply it to the educational setting.

In the public schools, where teachers unsophisticated in Telidon technology wanted simply to apply it to their teaching, there was some difficulty in using and understanding the branching structure. Commonly, teachers did not have a sense of "where they were" in the tree structure; for instance, they were not sure how to go back and repeat a page seen previously in a sequence. To select any page from a sequence, the user must know the page number. However, the numbering system for each sequence is arbitrary and does not provide the user with any easy clues as to how far back he/she must go. (Some sequences did not allow retracing or returning to a previously screened page, leaving a shadow image on the screen.)

Accessing individual pages causes problems for the Telidon system as the user must know the name of the page he or she wants. Alternatively, the user may use one of the indexes. However, there was some criticism of the indexes. First, the TVO database often only supplied a Table of Contents

Index that listed the sequences alphabetically by name. Users wanted fuller indexes, listing the sequences by subject and academic level. Second, the more sophisticated users complained that Telidon's hierarchical indexes were cumbersome, requiring the user to screen several pages of text for any one page of desired information.

Both experienced and inexperienced Telidon users expressed some difficulties with the logging-on procedures. Dialling the host computer and entering the appropriate codes were complicated and lengthy. Teachers tended to mention this process as disruptive in the opening moments of a class and complained that it broke the continuity of teaching if done during class. Logging on before the class was not always possible, or affordable.

The appeal of the Telidon screen and its images was demonstrated repeatedly. Users of all ages found the color and graphics interesting. At the secondary-school level both teachers and students expressed this feeling; teachers felt it might motivate students, and students felt it was great to have a change from traditional in-class presentation.

There was some problem, however, with the speed of the system. First, when the host computer was very "busy" with many terminals accessing it, the transmission of pages was slowed considerably, causing waiting periods during the screening of a sequence. Second, in some sequences complex graphics, which take some time to appear fully on the screen, are repeated several times in a sequence. Observational research with students of all ages showed that these graphics were often captivating the first time they were exhibited. However, when they are repeated in a sequence they become redundant, and users become bored or frustrated.

It seems that using Telidon in small groups of between two to six emerged as the most popular style of "viewing." Larger groups encountered difficulties in seeing the screen. In classrooms the room often had to be darkened for successful use. Individual use is certainly possible, and often occurred, but there seemed to be a tendency to the more social use of the system by small groups. At some sites small groups, rather than individuals, used the system in an effort to save on long-distance charges.

Design and planning for implementation of sequences

One concern expressed by users who applied Telidon to the curriculum was with the language level and complexity of the content of some sequences. Since a person must be literate to use Telidon, care must be taken that language levels in sequences match the subject matter and not be too hard or too easy for the intended users. Clearly, when a teacher or instructor used a sequence he or she designed, they were aware of the language level appropriate to their classes; however, at times the level they chose excluded other users. Several sequences that tried to appeal to a broad range of users tended to be too varied in their language level. Care must be taken to target the intended users and suit the content to them. Errors in content were considered unacceptable. And there was a demand for further editing of the content of sequences before they appear on the database.

Where Telidon was used as part of a distance education pilot project, the Telidon component was affected by problems that were intrinsic to the entire course. The lack of sufficient lead time for planning a course of this nature caused frustration and problems for all concerned. Perhaps

more serious was the lack of experience and expertise in designing curriculum-based sequences for use in distance education. This missing expertise affected all components of the course and in turn affected the experience of the students and the course leaders.

Technical considerations

At some sites the long-distance phone charges were seen as prohibitively expensive, tending to limit use of Telidon. There seemed to be confusion at some sites about how much of the phone charge each participating institution was responsible for. Some sites assumed that participation in the field trial included free transmission costs; others assumed they would be fully responsible. And of course, each site had different amounts of funding to support its participation. Near the end of the field trial the Datapac data transmission system was employed to make access to the host computer more inexpensive and dependable. This addition was welcomed by many participants -- since it lowered phone costs and provided an alternate route to the host computer. However, users at some sites were unaware of the Datapac system or how to use it. The subsidization by TVO of transmission costs makes it difficult to assess what users might be willing to pay.

Long-distance costs also caused some users to suggest that local storage of sequences was desirable and cost-effective. One example that provides a sense of how serious this consideration can be is the experience of a school at which close to 150 students used a sequence individually for approximately 20 minutes each. At one of the colleges, a curriculum-based

sequence was used in small groups rather than individually, in part to reduce phone costs.

The technical problems that were encountered, especially at the beginning of the field trial, prompted further requests for local storage of materials. It was felt that downloading would relieve the users' reliance on the host computer and the transmission lines, thereby increasing the system's reliability. In fact, at the distance education site where the success of the course required dependable operation of the system, a Hempton unit was employed to allow local storage of the sequence. Similarly, the Hempton unit, which allows the use of sequences recorded on audiotape and played back at the site, was used in several key demonstrations by the TVO Telidon project team.

Sequence creation

Twenty-eight of the 36 sites from which data were collected produced one or more sequences for the TVO database. The difficulty of travelling to Toronto to have access to an IPS page creation unit was often mentioned by field trial participants. One school, in which a group of elementary teachers worked as a team to design and create sequences, overcame the distance problem after they had gained some experience in Telidon; they designed their sequences on grid sheets, which they mailed to TVOntario, where their designs were entered on an IPS unit by the TVO Telidon project staff. Other schools reported success in working as a team, collaborating on the design, planning, and input of sequences.

Most page creators felt that they learned a great deal in their first experience and some who produced further sequences noted marked improvement and at the same time displeasure with their earlier efforts.

There was some displeasure with the time required to have a sequence edited and entered onto the database. This lapse -- between the time a sequence was "completed" by the field trial participant and the time it was available on the database -- delayed some plans for implementing Telidon at the sites. There was also considerable difficulty in updating or making corrections to sequences. No facility for such changes had been set up and therefore many corrections were never made.

Those colleges and universities that tried to use Telidon to distribute local information -- such as current events and courses offered -- found that the centralized creation and storage of sequences caused problems. Some of these branched out of the field trial, beginning to experiment with creating Telidon pages on their own IPS units, and storing pages on local host computers.

Perceptions of Telidon

The perception of Telidon by field trial participants reflected their backgrounds and experience with Telidon and other computers. Those participants with a greater computer sophistication tended to compare it with other systems and situate it among a range of computer communication technologies. The experimentation in Telidon at the computer science departments of two universities in the field trial yielded far-ranging opinion and insight. In some of the elementary, secondary, and special

schools, Telidon was compared with microcomputers. The cost and ease of local storage as well as the more flexible educational software were mentioned as the strengths of the microcomputers. At one junior high school, the teacher who supervised Telidon use had experience with computer-assisted instruction of mathematics based on a large mainframe computer. He felt Telidon was relatively poor as a computer-assisted instruction tool, lacking the interactivity of the other system he had used and the opportunity to treat each student individually. He hoped, however, that Telidon graphics could be incorporated into more advanced computer-assisted instruction systems in the future.

More inexperienced Telidon users, not as familiar with available computer technologies, suggested that Telidon should have audio capabilities.

Some public library patrons were disappointed with the amount of information available on the system.

Users' feelings about the pedagogical possibilities of Telidon varied from very positive to very negative, with most people cautiously optimistic. Some teachers felt their students would be motivated by the new technology, while a minority questioned whether attempting to entice students to learn through a new medium was a good thing.

The technical unreliability of the system led to a negative perception of Telidon in some cases. Teachers found it frustrating and difficult to organize lessons when they encountered technical breakdowns. Similarly, demonstrations and information searches at libraries were frustrated because of technical problems and this produced a negative attitude among staff and patrons.

Those participants who had invested time and energy as page producers and as key contacts at the various sites would often overcome these frustrations and retain a positive attitude. Others, who were less familiar with Telidon, and/or less experienced in computer/communications technologies, or simply less enthusiastic, often simply stopped trying to use the system.

CHAPTER 5

EVALUATION OF SELECTED SEQUENCES

During the 1981-1982 school year the TVO-Telidon field trial provided its

sites with approximately 60 "sequences" in the TVO database. These

"sequences" or series of Telidon pages covered various topics and were

oriented to different educational levels. Slightly more than half of the

sequences had been conceived and produced by individuals from local

institutions, at which Telidon sites were located. The remainder of the

sequences were produced by TVO personnel.

There was great variety in the topics and educational orientation of the

sequences in the database, ranging from sequences designed for

elementary-school students to those designed for university library users.

The following research methods were used to gather information about the

sequences on the TVO database:

- Evaluations of 17 selected sequences were held with small groups of
  teachers at elementary- and secondary-school sites. Questionnaire
  evaluation and focus group interviews were conducted with a total of
  117 teachers.

- Highschool and college students provided questionnaire
  evaluations of sequences they used in class or viewed in evaluation
  sessions.

- Elementary-school students were observed using Telidon on their own
  and in class.

- One highschool computer-assisted instruction sequence was evaluated
  for its educational effectiveness in a controlled study.

This evaluation research emphasized six aspects of sequences:

1. Appeal: the general appeal of Telidon and the specific appeal of each sequence

2. Technical: ease of reading the screen, the sequences' branching structure, etc.

3. Graphic: the role of graphics in the sequence and their effectiveness

4. Pedagogy: the educational impact of the sequence and its strengths and weaknesses in dealing with the subject matter

5. Level: the sequences' intended and actual audience, the conceptual and language level of the sequence

This chapter is a summary of the research on selected sequences that is presented in full in <u>Telidon in Education: An Evaluation of Selected Sequences from the TVOntario Field Trial</u>.

A.   Sequences for elementary and secondary school

Geologic mapping

Researchers observed three teacher-led uses of this sequence in a suburban school in a town near Toronto.  The teacher who created the sequence presented it to two grade 9 geography classes; his colleague used the sequence with his grade 12 class.  The sequence concerned material that was part of the core curriculum in geography.  At the conclusion of the presentation the students completed a questionnaire.

The sequence operated in the manner of a game with the user attempting to re-create a geologic map by "sampling" several parts of the terrain for different rock types.  The Telidon system provided the information on the rock types at different points in the terrain and the student was to draw a

map based on this information. The teacher logged on the system, and ran the game by asking his students to select points on the map for examination. Each student drew his or her own map, which was later marked by the teacher.

Findings

Students in grades 9 and 12 were overwhelmingly responsive to the appeal of the sequence and Telidon. Both grades thought the material was at the appropriate level. (The grade 12 class used the more complex section of the sequence.) Sixty-eight percent of the students expressed a preference for viewing the sequence on their own or in a small group rather than having an in-class teacher presentation.

The students reported no problem in reading the screen. However, the class seating arrangements were rearranged (moving closer to the screen), and the lights were dimmed before use.

The grade 12 teacher who used the sequence was in a unique position to comment on it. Though a close associate of the sequence designer, he did not participate in its design or production, yet he used the sequence with his students. He felt that the sequence, while not exactly "what he would have done," fitted into the curriculum quite well. He felt the greatest impediment to the sequence's use was fitting it to each teacher's lesson style.

This sequence was shown by the researchers to a gathering of approximately 15 heads of highschool geography/geology departments from one school board. The sequence was well received by this group - it was considered an

excellent method of teaching the difficult concept of sampling points in a terrain in order to re-create a map. However, some found the game lacked clear opening instructions for the user. They also felt that the students would have to understand some basic geology concepts before being able to use the sequence, and they cautioned that these prerequisites were not explicit in the opening of the sequence.

## To Kill a Mockingbird

Researchers observed the presentation of this sequence by a teacher to one grade 10 class. The school was in a small southern Ontario community. At the conclusion of the teacher-led presentation, the students completed a short questionnaire.

The sequence was a presentation of some literary aspects of the novel To Kill a Mockingbird. It used graphics, definitions, open-ended questions, and quotations from the novel in discussing ideas, themes, and stylistic matters. The sequence was created to permit any type of use - students in class, students on their own, etc. - and for all grade levels that use the novel (grades 9 to 13).

## Findings

The students' reactions to the sequence were generally favorable. They found the sequence appealing but were not as enthusiastic as the students in the previously described sequence. (They were much less likely to rate the sequence as "interesting.") Seventy-six percent felt that the Telidon presentation was an improvement over normal in-class presentations.

This sequence had been designed with a "language across the curriculum" style - in an attempt to appeal to users at several grade levels. In fact, this grade 10 class found the sequence's language and concept level to be mixed: 65 percent of the students felt that the first part was "too easy," and 56 percent of them felt that the second part was "just right." (Though even the second part was considered too easy by 43 percent of the students.)

The students expressed a preference for individual or small-group viewing of the sequence.

Thirteen highschool teachers at two other high schools screened the sequence. They felt the sequence presented the material logically and clearly. The sequence's graphic symbols were seen as one of its main strengths. Several teachers were concerned that it might be too simple and several felt that the students' participation is not called upon sufficiently.

## Tag the Flag

Tag the Flag is a game sequence that begins with the player's choosing a flag of a country at random. The user must identify the country by choosing either some clues, or the answer. If the user is incorrect or if he/she asks for a clue, information is provided about the country in question. Upon choosing the correct answer, the player is given more information about the country.

This sequence was probably the most popular in the entire trial. Its graphics were considered attractive and the game format was very

appealing. Thirty-two teachers who viewed the sequence rated it very highly on its technical aspects (ease of use, readability, speed) and its graphics and appeal.

One teacher who used this sequence with an elementary-school class of 25 noted that it is more suitable for a browsing approach than a formal class situation.

Tag the Flag and other game sequences like it had one aspect that may hamper them in curriculum-based use. Observation of elementary students indicated that there is a tendency for the user to run through the game, paying little attention to the information on the answer pages. The user assimilates the information necessary to play the game - such as information in the form of hints about the country in question - but is satisfied by a quick look at the correct answer page since this information is not put to use further on.

Globetour Game

This sequence, another game format sequence dealing with geography, was also received relatively well. The 32 teachers who screened it generally liked the graphics and information presented. They expressed concern that there was too much print on each page, that the text was difficult to read because of this, and that there were some poor combinations of colors. Some teachers felt it was too advanced for lower-grade children.

A class of elementary-school students was observed using the Globetour Game and Tag the Flag. It seemed that some pages contained inappropriately complex graphics. The graphics that embellish the opening pages or those

that provide information were enjoyed and used despite long composition time.  However, feedback pages, such as those providing the answer to a question posed on a previous page, should be immediate.  The delay caused by composition time was often frustrating or boring for the students.

## Museum of Man

Twenty-eight teachers screened this sequence. The sequence is a listing of information in two parts.  The first part is on the Museum of Man in Ottawa and the second is on the technology of early native Canadians.

Teachers found that this sequence provided information rather than instructional material or a game. The teachers felt the graphics were the sequence's major strength. The sequence was not considered as appealing as the Tag the Flag or Globetour games. The respondents felt the sequence was well organized. Several of them were concerned that there was too much text for easy reading and that the actual amount of information to be gained from the text was not all that great.

## Canadian Capitals

This game sequence was not as well received as the other game sequences. Its graphics were seen as attractive and they seemed to constitute its greatest strength.  However, it was criticized for the amount of time spent watching the map reappear. The sequence's educational design was considered to be somewhat flawed.  Sixty-one per cent of the 29 respondents felt that the sequence was not an improvement over traditional in-class methods.

Human Circulatory System

The sequence provides the user with diagrams and textual information on the human circulatory system. The opening pages provide a table of contents and the user can select those portions of the contents that are of interest.

This sequence was not considered appealing by the 20 teachers who screeened it at six different schools. However, it was rated fairly high for its graphics and pedagogical aspects.

Light

This sequence was designed and used for a distance education pilot project. It covered a section of the grade 13 physics course. The students in the course felt that the sequence dealt with definitions, examples, and graphic illustrations very well, but it was not highly regarded for the introduction of concepts.

The teacher who supervised the course found some serious errors in the sequence's physics contents. He also felt it could have been more interactive. He suggested that the sequence would have been better used selectively in the course, to explain concept, where its interactive and graphic capacity could be used, rather than covering a whole section of the course.

B.  Telidon instructional sequence:
    preliminary evaluation of educational effectiveness

The field trial involved several applications of Telidon sequences to standard school curricula.  A controlled research study was undertaken on the largest of these.  (A lengthier presentation and discussion of this study are available in Telidon and Education: An Evaluation of a Telidon Instructional Sequence.)

A highschool math teacher produced a sequence based on Ministry of Education curriculum quidelines for grade 9 mathematics students. The sequence, on a portion of the geometry curriculum called Dilatations, was the second Telidon sequence the teacher had produced.

With his assistance, the Office of Project Research conducted a study comparing students' learning from the Telidon sequence with their learning from a traditional in-class teacher presentation.

The sequence

The sequence was intended to be used as a computer-assisted learning unit with which students could learn  a self-contained topic of geometry on their own.  It represents one of the most effective uses of the branching structure employed by the field trial. Students were presented graphic and textual information, asked questions to which they could respond by choosing one of several (usually three) alternatives, and provided with appropriate responses.  Correct answers allowed the student to proceed; incorrect answers provided the student with further information and required him/her to "loop" back and redo the question.

Method

Six classes of grade 9 students were assigned to one of two conditions: experimental/Telidon or control/teacher-led.[1]

The Telidon group covered the material by working through the sequence on their own. This process usually took 20 minutes, during which they were supervised by an older student who assisted them with technical difficulties. After completing the sequence, each student wrote a test on the material presented in the sequence, and then filled out a short questionnaire.

The teacher-led group was taught the material in a classroom during one regular period. Administrative considerations made it necessary for this group to be taught by the same teacher who had produced the sequence. When the teacher had completed his lesson, students were given the same text as their Telidon counterparts.

Students at two levels of mathematics ability were included in the study: 64 were from standard mathematics classes and 57 were from advanced classes. The students in the regular class were required to cover this material in their course of studies, and so their test scores counted for a small portion of their final mark. The advanced students' test results did not count toward their course mark.

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1. Random assignment to the two conditions was not possible, so the results cannot be readily generalized. However, T-tests on six background scores - all standardized scholastic measures - revealed no significant differences, so the two groups were matched on all relevant background variables.

Results

Standard-level mathematics students

There was a large difference on the test scores of the Telidon and the teacher-led students. The Telidon group had an average score of 53.4 percent, while the students who studied in class had an average score of 72.9 percent. See table below. (T-tests indicated that this difference was significant at $p < .001$.)

Advanced students

There was no significant difference between the Telidon and teacher-led groups among the advanced students ($p < .001$). The Telidon group scored an average of 67.8 percent, marginally lower than the mean of 70.9 percent for the teacher-led group.

Table 2. Mean Test Scores by Cells

|  | Experimental | Control |
|---|---|---|
| Mean of general-level students' scores | 53.7 % (n=47) | 72.9 % (n=13) |
| Mean of advanced-level students' scores | 67.8 % (n=29) | 70.9 % (n=26) |

A possible interaction: mathematics ability and mode of learning

A direct comparison of the scores of advanced and standard class students is not possible since the two groups differed somewhat in their experience during the study. The standard-level group was covering material that counted for their course mark; the advanced students were not. However, if we ignore this difference and compare the scores of the two groups, there does seem to be an interaction of mode of learning and mathematical abilities: the advanced students did equally well whether using Telidon or being taught in class. The regular students, on the other hand, scored much lower if they used Telidon than if they were taught by a teacher. It would seem that regular students, those of average and below average abilities, seem to be handicapped by this sequence.

Reading scores

Students' reading scores were examined to see if they affected students' learning from Telidon. However, no such effect was found. Pearson correlations showed no appreciable relationship between reading ability and test score for the Telidon group compared with the teacher-led group.

Student reaction to Telidon

The students indicated that they enjoyed using the Telidon system. Males enjoyed using Telidon somewhat more than girls did (Chi Square = 10.98, $p < .05$).

With regard to the sequence itself, a majority of the students found the length of the sequence just right (65 percent), the diagrams and the drawings clear (69 percent), the vocabulary easy to understand (58 percent) and the instructions that led from page to page easy to follow (59 percent).

In their comments, students said they had a lot of fun using Telidon and several said the system was easy to use and Telidon was a good way to learn. Some, however, would have liked to ask questions and have had more explanation when they had difficulty in understanding a specific part of the sequence.

Eighty-five percent of the students think that the Telidon system is a good way to learn and 78 percent would like to use it with other courses. It should be noted, however, as enjoyment of using the system showed, more boys than girls would like to use Telidon in other courses ($p < .05$). Students claimed they would like to use Telidon in math classes but also in their English, history, science, French, and geography classes.

Conclusion

This evaluation illustrates that while Telidon may be perceived as highly appealing to students, its educational impact may still be problematic.

1. Below-average and average mathematics students - the regular group - received lower marks on a test if they used a Telidon sequence to learn the material than if they studied it in class.

The cause of this difference is not easily identified. It may be that these students required the interchange of questions and answers that the teacher's in-class presentation allowed. The sequence, though providing feedback, was essentially rigid in its manner and frequency of interaction with the student.

2. There is some indication that above-average mathematics students - the advanced group - do not have a significant discrepancy between Telidon and traditional in-class teaching styles. It may be that the sequence in question is suitable for advanced students and not for those with poorer mathematics skills. On the other hand, it may be that Telidon in general is best used with more advanced students who do not require the personal presentation and flexible feedback of the classroom. Future research and experience will tell.

These results must be considered very tentative: 1. The study was based on only one sequence. 2. The sample was very small. 3. The importance of the test results was greater for the regular group than for the advanced group. [1]

All students seemed to enjoy using Telidon. There was a tendency for male students more than their female counterparts to enjoy using Telidon and to be interested in using it in the future.

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1. This study indicates how the prerequisites of valid research and those of the administration of a field trial are sometimes at odds. Random assignment to conditions, and equivalent treatment conditions for each ability level, were necessary for a completely valid study, but they had to be compromised under the constraints of practicality. Researchers and field trial administrators should take note of this and weigh the benefits and costs of trying to undertake this type of study in a field trial that does not permit adequate control of research.

C. Postsecondary school sequences

This section deals with student evaluations of three postsecondary school sequences. A standardized questionnaire was used to elicit opinions and attitudes from each of them.

Video Flow

An instructor at a college of applied arts and technology produced the sequence "Video Flow" with the help of his students. "Video Flow" was an introduction to broadcast television.It was approximately 120 pages long, and the content was based to a large extent on the instructor's first-year lecture notes on television broadcasting.

The questionnaire was administered by the researchers approximately one week after the students finished viewing the sequence.

The students viewed the sequence on their own near the end of the school year. Twenty-three students used the sequence as a major portion of their credit course, and 14 students screened it as a review, having completed the course in the previous academic year. Many of them went through the sequence twice. The instructor then went through the sequence with them.

The students reported spending an average of 90 minutes going through the sequence the first time. They reported seeing all the pages in this sequence.

A group of highschool students screened about half the sequence at TVOntario, in four small groups. One student was designated to operate the

key pad. Teachers observed the viewing sessions. The testing sessions concluded with the administration of the questionnaires.

Results

The responses of the college group and the highschool group were not significantly different, and so are combined here.

The students reported a preference to view the Telidon sequence on their own (49 percent) or in small groups (39 percent). Twelve percent preferred in-class use.

Generally, the students had few complaints about the sequence's technical aspects: it was not difficult to read. However, some students (37 percent) felt that the pages took too long to appear, and 39 percent felt that certain topics in the sequence were hard to review.

The students found the sequence's graphics very helpful. They felt that the graphics made the sequence more interesting, improved their understanding of the material presented, and helped them learn.

Most students found the sequence and the Telidon system an appealing way to learn. The sequence was considered educationally effective, aiding in the understanding of concepts.

Most of the students found the material in the sequence neither too difficult nor too easy. The language level was also appropriate for them. The sequence seemed to operate as both a good introduction to the subject and a good review.

One typical comment was: "[The best thing about this sequence was the] clarity of the information. easy to understand and to follow... [but] it did not dig deeper into the material and explain more...."

## How to write a résumé

The staff of the the Learning Resource Centre at another college produced a sequence designed to teach students how to write résumés when applying for a job. The sequence is based on material developed previously for the centre. The sequence, approximately 35 pages long, was not part of a course but supported the college's efforts to supply remedial help or resources for students.

Eighty-seven students completed the questionnaire. Ninety-three percent of these respondents were first-year college students. About half the respondents reported viewing the sequence in small groups without an instructor present. The remainder reported that they viewed the sequence in the presence of the centre staff. Seventy-seven percent viewed all the pages, 7 percent more than half, and 17 percent less than half.

## Results

Forty-three percent expressed a preference to view the sequence on their own. Thirty-one percent preferred to see the sequence in small groups. Twenty-six percent preferred viewing the sequence with the staff.

The majority found the screen easy to read. However, more than a third of the respondents agreed that the pages took too long to appear (60 percent)

and that it was difficult to review selected topics within the sequence (77 percent).

The respondents found the graphics made learning more interesting and easy to understand. However, 45 percent agreed that the graphics did not improve understanding or provide information. Fifty percent disagreed with the statement that the diagrams helped them learn from the sequence.

Responses about the sequence level were also mixed: 54 percent found the material too simple, and 51 percent reported not learning anything new from the sequence.

In spite of the ambivalence of the role of graphics and the appropriateness of the level of material, the respondents were quite favorable in rating the sequence and Telidon in general for appeal. Most preferred the sequence to a presentation from a teacher or reading from a textbook.

The results of this sequence evaluation should be approached cautiously since we have limited information on viewing and testing conditions. The screening sessions were organized by college staff and no record is available. But the appeal of Telidon as an educational medium was quite evident. Again, the novelty effect was not controlled for and might be quite strong. Typical comments from the students were along these lines: The best thing about the sequence was its "novelty" and its "simplicity." The worst thing was that is was "much too simple" and the "letters were too small."

Compunications

"Compunications" differed from the other two postsecondary sequences in a number of ways. As a glossary of terms, the sequence was informational rather than instructional in design. Students did not need to go through the entire sequence; rather, it was intended that they look up the definition of terms as required. There were no graphics in this sequence.

The sequence was evaluated by a class studying twentieth-century technology at a third college. The instructor agreed to have his class of 21 second- and third-year students view and evaluate the sequence. It should be remembered that this was a somewhat artificial use of the sequence - it was intended as a reference but these students were not asked to approach it with reference questions in mind.

Most of the students reported viewing the sequence in small groups. However, the majority of the students reported a preference for individual viewing. About a third reported screening all the pages, another third reported viewing more than half, and the rest reported screening less than half. Neither the instructor nor the students helped in the production of this sequence.

Most of the respondents felt that the screen and text were not difficult to read. Fifty percent felt there was some difficulty in reviewing certain concepts in the sequence.

The sequence, and Telidon in general, were appealing to the students. However, 62 percent felt that a teacher's lecture would have presented the material more effectively, and 57 percent felt that a textbook would have been more effective.

Though the respondents felt that concepts were presented clearly, 48 percent of them found the material too simple. Eighty percent felt that the sequence was helpful as a review of familiar material.

Students typically commented: "(Telidon was) fast and direct (but there were) not enough explanations (of the terms)," "(explanations) were too simple."

## Comparison of "Video Flow" with "How to Write a Résumé"

A statistical analysis of the evaluations of the two sequences "Video Flow" and "How to Write a Résumé" was conducted, comparing the responses for each sequence.

Both sequences were appealing to the respondents: 77 percent agreed that the sequences made learning more interesting. Neither sequence was rated as having technical difficulties by the majority of respondents; 75 percent found no difficulty reading the screen for both sequences.

Respondents were more critical of the graphics in "How to Write a Résumé" than of those in "Video Flow." The graphics in "How to Write a Résumé" were used too often and did not provide information or help the users learn. "How to Write a Résumé" was also considered too simple, while "Video Flow" was not.

Both sequences were found to present concepts clearly, but "Video Flow" was found to be slightly better in helping the reader understand concepts.

D. Conclusions

During the field trial it was extremely difficult to find instructors/
teachers who used sequences with sufficient numbers of students to permit
evaluation. While teachers who had produced sequences were eager to help
in evaluation, it was difficult to find teachers without prior Telidon
experience who had used sequences in anything other than demonstrations of
the technology. Two factors emerge from this:

1. The results should be interpreted with caution. Prior research
experience suggests that the researchers' presence can bias the results to
reflect greater acceptance and appeal than are warranted. The great
novelty and prior promotion of Telidon could also be expected to inflate
ratings of appeal and interest.

2. Another bias was introduced in that the evaluation sessions were run by
researchers and/or the producers of the sequences, in almost all cases.
These individuals, with their own preconceptions of each sequence and their
familiarity with the technology, mediated between each sequence and the
evaluation respondents. This may have decreased the frequency of comments
about difficulties or fears in using Telidon.

3. The relatively low level of autonomous discovery and application of
Telidon suggests some difficulty with sequences or the process of accessing
them. In other words, while respondents may have indicated an interest in
using a sequence in their teaching, once they had screened it, actual
pre-screening rarely occurred. In fact, they only voiced their interest
when the research team made special efforts to expose them to it. (For a
discussion of this, see Chapter 4.)

Because each sequence was different in topic and style, it is difficult to say anything about sequences in general - it is best to refer to the original sequence in interpreting results. However, some things can be said.

- The appeal of most sequences was high among all respondents, teachers and students.

- Elementary-school students were observed as interested in the screen and stimulated by humorous graphics.

- Secondary-school students expressed an interest in Telidon as a change from traditional in-class or printed presentations.

- The graphics were attractive and stimulating. Some sequences showed that the graphics could be used to enhance learning. However, graphics must be used properly: complex graphics can become redundant and boring if repeated nonessentially in a sequence.

- Some teachers felt that certain sequences lacked sufficient introduction on how to use them with students.

- One class of students found different parts of a sequence to be at different levels of complexity. Teachers were concerned with matching sequences with their students' levels. Attention must be paid to matching curriculum, concept, and language levels for school-oriented sequences.

- One study suggests that the educational effectiveness of sequences may be different for students at different levels of ability.

CHAPTER 6

SURVEY OF FIELD TRIAL PARTICIPANTS

A.  Experience of Field Trial Participants

At the conclusion of the field trial a survey of the Telidon sites was
conducted to collect a systematic record of Telidon users'
experiences. A questionnaire was used to complement the information
from personal and telephone interviews that had already been
collected.

An attempt was made to survey those field trial participants who had
the most extensive involvement in the field trial. These individuals
were contacted by the TVO Telidon Project Team in the developmental
stages of the field trial.  They took responsibility for the Telidon
terminals in their institutions.  At some sites more than one contact
was made because Telidon experience was shared among them.  These
contacts were selected, in most cases, on the basis of their interest
in Telidon and their willingness to create a sequence for the TVO
database.

The questionnaire gathered information on the respondents' perceptions
of the following:

1.  What impediments were there to the utilization of Telidon?

2.  What was the strength of the Telidon system in education?

3.  What was their evaluation of the TVO database?

4.  What types of sequences were most appropriate for their uses?

6.  What types of printed documentation (if any) would improve utilization?

7.  What were their preferences for the organization of Telidon indexes?

8.  What were their responses to the technical configuration for accessing Telidon pages at each site?

9.  What was the experience of those who produced sequences?

A copy of the questionnaire is available in <u>Telidon and Education: Research Instruments from the TVOntario Formative Evaluation 1981-1982</u>.

Method

A list of 45 sites and 100 contacts at these sites was supplied by the Telidon project team.  Questionnaires were mailed to all these sites in May 1982; some sites received one questionnaire -- others received as many as eight.  Typically, each site was sent three questionnaires. The number depended on the participant list maintained by the Telidon Project Team. Additional copies were sent out to nonrespondents approximately three weeks after the first mailing. At the same time, a few additional names were added to the list.

Eighty-six respondents from 43 sites responded to the questionnaire. This is a response rate of 82 percent by respondents and 96 percent by sites (based on 105 questionnaires sent out).

The respondents

As mentioned above, the respondents were those individuals with the most extensive experience of Telidon - one might call them "sophisticated" Telidon users. However, it should be noted that these respondents invested a great deal of effort in the field trial, and the results should be interpreted in this light.

The respondents ranged from teachers to administrators and from those who used computers (other than Telidon) daily to those that never used one. Some had given demonstrations of Telidon and some had, as administrators at the site, simply approved participation. Fifteen percent of the respondents reported that their level of involvement was either giving demonstrations or approving site participation. The remainder of the respondents were more heavily involved. Most were involved in page production and use of the site terminal in various ways. The following tables summarize these characteristics of the respondents.

Table 3. Characteristics of Respondents at Sites

| Position at institution | Percent (N=86) |
|---|---|
| Teacher | 50 |
| Librarian | 21 |
| Administrator | 19 |
| Reseacher | 4 |
| Other | 6 |

Table 4.  Characteristics of respondents at sites (continued)

| Type of institution affiliated with | Percent (N=86) |
|---|---|
| Elementary | 17 |
| High school | 42 |
| CAAT | 14 |
| University | 11 |
| School for the disabled | 6 |
| Other {e.g., school board} | 11 |

Table 5.  Frequency of computer use before field trial

| | Percent (N=86) |
|---|---|
| Daily use | 36 |
| Monthly use | 16 |
| Yearly use | 16 |
| Never | 21 |

Table 6.  Reported involvement with Telidon during field trial*

| | Percent (N=86) |
|---|---|
| Conducted demonstrations | 44 |
| Used with students | 44 |
| Produced sequence | 63 |

* Could choose more than one.

1.  Perceived impediments to utilization

The questionnaire listed 15 possible impediments to the use of Telidon that had been reported from the sites. The respondents were asked to rate the degree to which they thought each was a utilization problem on a five-point scale, ranging from a "minor impediment" (1) to a "major impediment" (5). The table on the following page shows the average score for each possible impediment. They are ranked in order of decreasing seriousness.

The ranking of these impediments to use reveals several rough conceptual groupings.

Size of database and efficacy of its contents. Overall, the most serious problems seem to have concerned the size of the database. It was perceived as too small and lacking in appropriate or useful sequences. The three statements concerning the database were ranked first, second, and third; each received a mean score greater than 4.

Technical problems. The system's unreliability was a problem often mentioned in the telephone and personal interviews; it appears here in the questionnaire results as well. Two statements concerning technical difficulties ranked fourth and sixth. Since respondents were those field trial participants most familiar with the technology, this finding cannot be generalized to all potential Telidon users. Those who are not comfortable with the technology might consider technical problems a greater impediment.

Table 7. Respondents' Perceptions of Impediments to Utilization

| Statement Describing Possible Impediment to Use | Mean* | Rank |
|---|---|---|
| Not enough sequences of appropriate subject matter on database (e.g., history, chemistry) | 4.34 | 1 |
| Not enough sequences at appropriate educational level (e.g., primary, grade 12-13) | 4.11 | 2 |
| Database too small, with not enough useful sequences | 4.06 | 3 |
| Unreliability of system | 3.53 | 4 |
| Long-distance phone costs | 3.47 | 5 |
| Frequency of technical difficulties (e.g., can't sign on, pages disappear) | 3.28 | 6 |
| Nonavailability of printed summary information on sequences | 3.12 | 7 |
| Not enough Telidon terminals at your institution | 2.98 | 8 |
| Teacher or instructor resistance to integrating Telidon into curriculum or teaching style | 2.95 | 9 |
| Preparation time required to integrate a sequence into a lesson plan | 2.88 | 10 |
| The organization of the Telidon indexes | 2.86 | 11 |
| Logging-on procedure | 2.67 | 12 |
| The branching-tree structure that leads you from page to page | 2.51 | 13 |
| Location of Telidon terminal at your institution (e.g., in a room that is often occupied) | 2.19 | 14 |
| Insufficient class time | 1.93 | 15 |
| Unfamiliarity with the hardware (e.g., difficulties with key pad instruction) | 1.89 | 16 |

* Mean on a five-point scale: "minor impediment" = 1
"major impediment" = 5

Long-distance telephone costs. The cost of transmitting pages via telephone lines was seen as an impediment to use, receiving a mean score of 3.48. Phone costs were ranked fifth in the list of impediments, despite the fact that many sites were within local dialling of either the Ottawa or Toronto host computers. (Note: At the end of the trial a less costly system of data transmission - called Datapac - was made available. However, site visits indicated that some users were unaware of this mode of transmission.)

Behavioral-attitudinal impediments to use and support materials. The integration of Telidon into existing curricula and teaching styles requires considerable time, ingenuity, and commitment. The statements ranked 7,8,9, and 10 reflect these elements of Telidon use, with mean scores hovering around 3.0 on the impediment scale.

Presumably, a greater number of terminals at each site would facilitate examination of the database and preparations for use. (Note: most sites received one terminal each.) Similarly, the absence of printed support material -- in the form of descriptive summaries of the sequences -- was considered a major impediment to Telidon utilization. Telephone and personal interviews corroborate and amplify these findings: the time required to become comfortable with the technology and familiar with its potential was seen as an impediment to its use. The provision of printed indexes and summaries of the database was felt to be something that would have been very helpful. In fact, at some sites users improvised and produced their own summaries.

The organization of the Telidon index. Respondents felt that the organization of the index presented an impediment to Telidon use; its mean

score was 2.87, above the midpoint of the impediment scale. During the majority of the field trial the "table of contents" index was the only available one. This index listed the sequences alphabetically by their titles.

Logging-on procedure. The process of logging on -- dialling the host computer and entering appropriate identification codes - was considered to be less of an impediment, but still received a mean score above the midpoint. This seems noteworthy in light of the finding that unfamiliarity with the hardware, such as the key pad, is a very minor impediment (mean score of 1.89). It seems that the process of logging on itself causes difficulties. Again, the personal interviews illuminate this finding; several teachers commented that the logging-on procedure disrupted the flow of their lessons. This disruption was exacerbated whenever they had difficulties signing on (lack of available phone "ports," etc.). This finding is also useful, considering that equipment is available that allows users to log on more easily by pushing only one key on the key pad.

The following items were not considered to be major impediments to Telidon use, having means at or lower than 2.5 on the scale:

The branching-tree structure. Most respondents expressed little difficulty with the organization of the database and the instructions that led the user from page to page.

Location of Telidon terminal. On average, the physical location of the terminal in the institutional site was considered to be only a minor impediment to Telidon use.

<u>Insufficient class time</u>. A lack of class time was not considered an impediment to Telidon use.

<u>Unfamiliarity with the hardware</u>. Users' unfamiliarity with the Telidon hardware was not perceived as a source of difficulty. Users seemed able to adapt readily to the design of the key pad and other terminal hardware.

2. Perceived strengths of Telidon

Respondents were asked to indicate what they thought were Telidon's strengths as an educational medium. The responses to this open-ended question were categorized under the following headings. (A complete listing of the responses can be found in the appendix along with responses to a question on Telidon's greatest weaknesses.)

Graphics –– all comments concerning the color potential and layout capacities

Information retrieval –– comments referring to the capacity of Telidon to access many and/or distant databases

Appeal –– comments on the appeal to users inherent in the system, due to its novelty or motivational aspect

Interaction –– comments on the interactive nature of using Telidon

Alternative teaching styles – comments on how Telidon can replace or supplement traditional teaching styles, such as lectures, workbooks, in-class presentations, etc.

Other -- comments referring to specific uses such as Telidon and the handicapped

As the table on the following page indicates, responses were fairly well distributed among these topics. The graphic capacity received the most acclaim. Next most frequently commented on was the system's information retrieval potential. The users' ability to interact with the computer and the appeal that the system as a whole generates received the same amount of acclaim. .

Table 8.  What do you think is Telidon's greatest strength as an educational medium?

| Percent who commented on: | Percent (N=80) |
|---|---|
| Graphics | 30 |
| Information retrieval | 36 |
| Interaction | 25 |
| Appeal, motivation | 24 |
| Alternative teaching style | 21 |
| Other | 19 |

3. The TVO educational database

As reported above, respondents found the size and quality of the database an impediment to Telidon use. Several other questions were asked to specify aspects of the database requiring improvement and to ascertain unmet needs of the Telidon user. (For an evaluation of selected sequences from the TVO database, see Telidon Field Trial Report II.)

Evaluation of the database

In one question respondents were given a list of four "problems with the TVO database"; they were asked to choose as many as necessary.[1]

As the table on the next page shows, the results coincide with those of the impediment scale reported earlier in this chapter. As would be expected in the early stages of development, the greatest complaint was the size of the database. Next most often chosen was the opinion that sequences weren't clearly applicable to the curriculum. Fifty percent of respondents chose it.

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1. Though the four alternatives appear to be negative evaluations, they were chosen because it was felt they would best provide information that could be acted upon in the future, whereas a confirmatory statement of strengths already acknowledged would not.

Table 9.  Problems with the TVO Database

| Statement | Percent who chose statement* (N=86) |
|---|---|
| Too few sequences | 80 |
| Sequences aren't clearly applicable to curriculum | 50 |
| Lack of printed support materials | 42 |
| Sequences poorly designed | 33 |

* More than one statement could be chosen.

Forty-two percent of respondents felt a lack of printed support material. While not, strictly speaking, an attribute of the database, many respondents did feel that they would have used the database to better effect if they had been given appropriate support material.

Finally, a third of the respondents felt sequences were poorly designed. (For an evaluation of selected sequences, see Report II.)

Usefulness of different types of sequences

The questionnaire included two questions intended to assess what types of sequences, if any, were preferred by field trial participants. From extensive discussions with Telidon users and observation of actual use, a rough typology of Telidon educational sequences emerged. Most of the TVO database sequences could be classified as one of the four following types. The categories are not completely mutually exclusive, but they are intended to impose some order for purposes of evaluation and reflection.

INFORMATION, in which some form of information is presented and the user chooses what he/she wants, as in a reference library

INSTRUCTION, in which a structured lesson is provided, and the user proceeds by answering questions and following prompts, e.g., somewhat like computer-assisted instruction

EDUCATIONAL GAMES, a hybrid category that involves an interaction with the sequence, like answering questions, and the presentation of information in the form of a game

AUDIOVISUAL AID, in which the system is used primarily to provide sophisticated graphics, such as maps, diagrams, or charts

Respondents rated how useful each of the four different types of sequences could be in serving the needs of their educational institution. Respondents used a five-point scale -- 1 represented "not at all useful," 5 represented "very useful."

Table 10. Perceived Usefulness of Different Types of Sequences

| Types of Sequences | Not at all useful | | | | Very useful | Mean |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | (N=86) |
| | % | % | % | % | % | |
| Information | 0 | 11 | 24 | 21 | 45 | 4.0 |
| Instruction | 4 | 9 | 17 | 27 | 44 | 4.0 |
| Audiovisual aid | 2 | 10 | 21 | 30 | 37 | 3.9 |
| Educational games | 11 | 20 | 19 | 26 | 24 | 3.3 |

As the table on the preceding page indicates, informational, instructional, and audiovisual sequences were rated equally high. Educational games received a lower but still substantial rating of 3.3. These results indicate an interest in all types of sequences.

## 4. Needed educational resources

In attempting to shed further light on the needs of educational institutions, respondents were asked to choose what type of educational resource the institution required the most. They were asked to choose between two alternatives - structured learning materials (such as workbooks or computer-assisted instruction) and reference material (like an encyclopedia) -- or specify one of their own choice. As the table below shows, there was a clear preference for structured learning materials -- 60 percent of the respondents indicated a need for this type of educational resource.

Table 11.  Type of Sequence Most Needed

|                                        | Percent (N=79) |
|----------------------------------------|----------------|
| Structured learning materials (CAI)    | 62             |
| Reference materials                    | 35             |
| Other                                  | 3              |

5. Criteria for choosing sequences for use by students

Another section of the questionnaire examined the criteria that field trial
participants used in choosing sequences for use with their students.
Respondents were asked to rate eight different statements for their
importance in the selection of a sequence, assuming a larger database and
reduced technical difficulties. The ratings of each item on a scale of one
to five, from "not important" to "very important," were averaged and then
ranked in order of importance. The table below gives the statements and
their mean ranks.

Table 12.  Criteria for Choosing Sequence for Students

| | *Mean | Rank | **No. of Respondents |
|---|---|---|---|
| Review of the sequences on your own | 4.5 | 1 | (N=79) |
| Availability of a printed manual containing suggested uses and a précis of each sequence | 4.1 | 2 | (N=82) |
| Availability of a printed catalogue similar to those used for other AV material | 4.1 | 3 | (N=83) |
| Availability of a statement of educational objectives for each sequence | 3.7 | 4 | (N=83) |
| Availability of information on suggested uses as part of each sequence | 3.6 | 6 | (N=75) |
| Suggested use of a sequence by the Ministry of Education in its curriculum guidelines | 3.4 | 5 | (N=73) |
| Inclusion of a sequence by the school board on its list of selected resources | 3.2 | 7 | (N=60) |
| Familiarity with the author's work | 2.4 | 8 | (N=57) |

*Mean of a 5-point scale: "not important"  = 1
                        "very important" = 5

**Number of respondents varies because respondents could ignore statement
  if inappropriate for their institution or administrative position.


Personal review of the sequence is considered to be the most important

element in choosing.  Next is the availability of a printed manual

containing suggested uses and a précis of each sequence. Tied with this

choice is the statement on the availability of a printed catalogue similar

to those used for other audiovisual material. These three top items not only have the highest average ratings, but they are also heavily negatively skewed, compared with the other responses; in other words, the averages underestimate their importance. All three indicate a desire to become directly acquainted with the material before use. In light of other evidence - from questionnaire ratings of impediments to use and personal interviews - it seems that the first choice, personal review, is something of a luxury, given the demands on an educator's time. The second- and third-ranked statements - representing the availability of printed materials in support of the database -- would make Telidon more attractive by reducing the time required to become familiar with Telidon.

Considered less important are the availability of a statement of educational objectives for each sequence, the inclusion in each sequence of information suggesting ways it could be used, Ministry of Education or school board guidelines, and familiarity with the author's work.

## 6. The database indexes

In order to ascertain the indexing requirements of the TVO field trial participants, two questions were asked. One concerned an index of intended audiences and another an index of subjects or topics. Asked to choose between an index listing sequences by year in school and one listing sequence by school level, a large majority chose the latter. (See table below.) Another question comparing a listing by academic subject with a listing by key word indicated a clear preference for a listing by subject.

Table 13.  Preferences for Organization of Telidon Indexes

| | Percent (N=82) |
|---|---|
| Listing sequences by school level (e.g., primary school, CAAT, university) | 70 |
| Listing sequences by year in school (e.g., grade 3, CAAT level 2) | 30 |
| Listing by academic subject area (e.g., introductory physics, Canadian history) | 64 |
| Listing by key words (i.e., like a book's index) | 36 |

These results show that the respondents seem to desire a traditional system of indexing.  However, when choosing a sequence from the index, users might want further indication of what type of sequence they are accessing, besides information on the intended audience and the subject matter.  When asked if the TVO Telidon Index should differentiate between games, information, and instruction, 87 percent said yes, while only 8 percent said no, and 5 percent were not sure.

## 7. Printed indexes

Field trial participants were asked if a printed index supplementing the index on the Telidon system would be useful. As the table below indicates, almost 90 percent felt that such a supplement would be either useful or very useful. Only 7 percent felt it would not make a difference.

Table 14. Would a printed index supplementing the system index be useful?

|  | Percent (N=86) |
| --- | --- |
| Very useful | 70 |
| Useful | 18 |
| Somewhat useful | 5 |
| Would make no difference | 7 |

## 8. Information needs of inexperienced Telidon users

These experienced Telidon users were also asked to indicate what information their colleagues, unfamiliar with Telidon, might need in choosing a sequence. Of the responses to this open-ended question (N=75), 41 percent mentioned some form of instruction on how to use Telidon. These comments tended to deal with how the database was organized and how to find a sequence; more mechanical issues such as how to use the key pad were mentioned infrequently. And 53 percent suggested some form of index of available sequences. These comments referred to both printed and system (on-line) indexes.

9. Telidon and long-distance phone lines: the technical configuration

Though most of the field trial participants were not experts in computer communications, they did have the actual experience of using phone lines to retrieve Telidon pages from a host computer. Since some field trial participants had commented on this configuration during early interviews, a question was asked about this. Respondents were asked how effective the configuration of telephone links between distant decoder terminals and a centralized database was in their institutions. As the table shows, these results are somewhat mixed. One-quarter of the respondents felt the system to be ineffective; one-third felt it was very effective; the bulk felt improvements were needed.

Those who felt some improvements were necessary (40 percent) and those who felt phone lines were ineffective explained their answers. Some complained about too few "ports" or access routes to the host computer, some of transmission problems, and others felt the phone lines were too error-prone. Some respondents found long distance simply too expensive.

Table 15.  Perception of Remote Access by Phone

|  | Percent (N=86) |
| --- | --- |
| Very effective | 34 |
| Effective with a few improvements in telephone lines | 40 |
| Not effective | 25 |

## 10. Alternative technical configurations

To place the issue of the effectiveness of the telephone links in context, respondents were asked to rate four alternative technical configurations for accessing Telidon pages. Ratings on a five-point scale (from "not at all effective" to "very effective") indicated no preference among the top three choices. (See table next page.) Accessing sequences from a local computer, or an in-house computer, was considered to be as effective as the configuration employed during the field trial -- retrieving sequences from a central distant computer. Access to a limited number of sequences transmitted by teletext broadcast signal was not considered to be effective.

Note: As the trial progressed, Datapac phone lines became available. These lines, dedicated to computer data transmission, made access much more economical. TVO paid for most of the telephone costs incurred by the sites during the field trial.

Table 16.    Alternative Technical Configurations

|  | Mean | Not effective | | Very effective |
|---|---|---|---|---|
|  |  | 1 & 2 | 3 | 4 & 5 |
|  |  | % | % | % |
| Getting sequences from a large database at central location (e.g., Toronto or Ottawa) | 4.0 | 16 | 16 | 67 |
| Getting sequences from a local database (e.g., your school board or local library) | 4.0 | 12 | 21 | 67 |
| Getting sequences from a database at your school or institution (e.g., on tape or on disc) | 4.0 | 17 | 12 | 71 |
| Getting a more limited number of sequences that are transmitted by a broadcast signal (e.g., teletext) | 2.8 | 45 | 21 | 34 |

B.   Experience of field trial page producers

Participants who were involved in page production completed an additional questionnaire dealing with their experiences in page creation. The four-part questionnaire was intended as an evaluation of their own sequence production process and to provide direction for further Telidon page creation efforts. The results are based on the responses of 46 field trial participants.  TVO staff who produced pages were not included in the sample.

The first part of this questionnaire dealt with difficulties encountered in the process of page creation.  Eleven statements, each describing one aspect of page production, were rated on a seven-point scale ranging from "no difficulty" (1) to "great difficulty" (7).  The table on the next page shows the mean rating on this difficulty scale, and presents the statements in descending order.

As the table shows, the means are below 5, indicating that page creators did not find page production very difficult. The greatest difficulty in page creation involved access to the IPS page provider terminals.  The difficulties of travel to TVOntario and limited access to terminals (due to great demand) were rated highest. (It should be remembered that travel to Toronto is a difficulty that did not have a proportionate impact on all participants – it handicapped some because of their distance from Toronto.)

Table 17.  Difficulty Rating for Page Production

| Statement | Mean | Rank |
|---|---|---|
| Travel to TVOntario to use the IPS | 4.8 | 1 |
| Availability of terminals (booking time on system) | 4.6 | 2 |
| Learning page creation from a manual | 4.2 | 3 * |
| Hardware problems with IPS terminals | 4.2 | 4 * |
| Getting the sequence on the system | 4.1 | 5 |
| Graphic design | 3.9 | 6 |
| Losing pages through hardware error | 3.2 | 7 * |
| Learning IPS commands | 3.2 | 8 * |
| Sequence organization/ branching | 3.1 | 9 |
| Designing an educationally effective sequence | 2.9 | 10 |
| Saving pages on diskette | 2.5 | 11 |
| Choosing a topic | 1.8 | 12 |

\* Mean on a 7-point scale: "no difficulty"    = 1
                          "great difficulty" = 7

Learning how to create an effective sequence from a manual and the graphic
design of a sequence were two skill-related aspects of page creation that
field trial participants found difficult.  IPs unit breakdowns were also
considered somewhat difficult, with a mean rate of 4.2.  Actually having a
completed sequence added to the database ("getting the sequence on the
system") was also considered difficult by respondents.

In the second section of this questionnaire respondents were asked to indicate how effective four types of resources had been in preparing them for the production process. On a scale of "not effective" (1) to "very effective" (7), informal advice from the Telidon (TVO) staff received the highest rating, 5.7. In contrast, the initial formal instruction in how to use an IPS unit, and informal advice on graphic design, were considered less useful, rating 4.6 and 4.4 respectively. The lowest rating for effectiveness was given to the IPS manual that gave instructions on the use of the IPS terminals. It received an average rating of 2.9.

The third section of the questionnaire asked page producers to indicate if they felt any consultation with experts had been lacking during page creation. As the table on the next page shows, the mean ratings on a five-point scale are all very close to the midpoint. There was no strong desire for consultation with graphic or educational designers, or content, curriculum, or school board consultants. However, we see that the greatest need seemed to be for an educational designer. Respondents were least concerned with the absence of consultation with a curriculum planner. This result is somewhat in conflict with the finding reported earlier that many respondents felt that there were not enough sequences applicable to their curricula. Perhaps page producers require such consultation as they do not realize how individually they interpret their curricula when designing sequences.

Table 18.  Consultation with Experts during Page Creation

|  | *<br>MEAN<br>(N=46) |
|---|---|
| Consultation with<br>graphic designer | 3.3 |
| Consultation with<br>educational designer | 3.4 |
| Consultation with a<br>specialist in content | 3.0 |
| Consultation with school<br>board representative | 3.0 |
| Consultation with curriculum<br>planner | 2.9 |

* Mean on a five-point scale: "consultation not lacking" = 1
                                   "consultation lacking"    = 5

Finally, when asked whom they intended their sequences for, most page creators indicated that they had aimed them at users across the province, though a full quarter of the respondents had students in their own institutions as primary targets.

Table 19.  Intended Primary Users of Sequences

|  | Percent<br>(N=46) |
|---|---|
| Your own students | 4 |
| Students at your institution | 22 |
| Students or other users<br>in your region | 20 |
| Students across Ontario | 54 |

C. A survey of teachers without Telidon experience

A separate sample of elementary- and secondary-school teachers who were not involved with Telidon during the field trial was also surveyed. Underlying this effort was the question: Are the priorities of the uninitiated, those naive about Telidon, different from those of people who are already familiar with the new technology?

One hundred and seventeen teachers were assembled in small groups at 20 different schools during the month of May 1982. They were selected by the main participants at each site. An attempt was made to find teachers who had little or no experience with Telidon. Sixty percent of these teachers had never seen Telidon before the research session, while the remainder had, for the most part, only seen a demonstration. Three-quarters of the teachers reported that they had never used a computer. The questionnaire completed by these teachers is available in Telidon and Education: Research Instruments from the TVOntario Formative Evaluation 1981-1982.

1. Criteria for choosing a sequence

The teachers were asked what criteria they felt would be important in their own selection of sequences for use with students. (See table next page.) Personal review of the sequence received a very high rating of 3.7 on the four-point scale. Almost as important to them would be information on how to use the sequence with students. School board and Ministry of Education recommendations were somewhat less important. This pattern is similar to the preferences of the experienced participants.

Table 20.  Importance of Following Criteria for Choosing Sequences

| Criteria | Mean * |
|---|---|
| Personal reviews | 3.7 |
| Information is available on how to use sequence with students | 3.6 |
| A statement of educational objectives for each sequence | 3.4 |
| School board includes a sequence on its list of selected resources | 2.9 |
| MOE suggests the use of the sequence in its curriculum guidelines | 2.7 |
| The author is known to you | 1.9 |

* Mean on a 4-point scale: "not important"  = 1 "very important" = 4

## 2.  Indexes

The teachers reported their preferred system for indexes. The majority, 55 percent of these inexperienced respondents, indicated a preference for an index by subject area. Other preferences were: by school level (27 percent), use of key word (11 percent), and by grade level (7 percent). These findings are similar to those for the field trial participants; subject area and school level were most important, grade level and key word least preferred.

The respondents indicated which type of sequence they needed. Of the 88 who responded to this question, 44 percent wanted instructional sequences, 31 percent wanted sequences that could be used as an electronic blackboard or in-class AV support, and 24 percent wanted informational sequences. This slight preference for instructional sequences parallels that of the field trial participants.

D. Conclusions

Field trial participants, those most directly involved with Telidon in educational institutions, found the most serious weakness of Telidon was the lack of useful sequences in the TVO database.

There were not enough sequences on curricular subjects at each educational level.

They felt that the second most serious problem was the technical breakdown that occurred throughout the field trial period. They also reported that telephone costs were another serious problem.

The respondents believed that Telidon use could be encouraged by efforts such as the distribution of printed support material.

The majority wanted printed indexes with a variety of cross-indexes and a differentiation of sequence types. While the users felt that personal review of a sequence was the best method for selecting sequences to use with students, they also wanted printed documentation on the sequences giving summaries, possible uses, and educational objectives. Findings from a survey of teachers not experienced with Telidon agreed with the preferences of the more experienced users.

Participants rated the field trial's technical configurations, accessing a distant database, as effective. They considered two alternatives -- access to a local computer and accessing sequences from an in-house database -- equally effective.

Respondents who were involved with page production found the availability of IPS terminals the most serious problem. They found the informal and

casual training they received effective, but seemed to be inviting more formal training in the initial stages of page production. A good manual on IPS use was lacking. The page providers found that IPS terminal malfunctions combined with lack of experience and manuals caused a great deal of inefficiency.

The users felt that the strength of Telidon lay in its potential for interactive access to a large current database.

There was a consensus that Telidon's other strengths were its interactive capabilities and the way it provides graphics and color on a standard television screen.

CHAPTER 7


SUMMARY AND CONCLUSIONS

A tremendous amount of information about Telidon in education was
accumulated during the final year of field trial. And so this summary is
necessarily somewhat selective. Also, since the field trial was changing
and improving up to and including its final days, these findings are not
intended to be conclusive, but rather indicative of Telidon applications to
education.

1. Use of Telidon terminals at participating institutions

1.1  Patterns of use at all sites

- The most frequent use of the Telidon terminal was for demonstrations
  of the system.

- The second most frequent use was for casual exploration of the system.

- Terminals were often used for demonstrations of the site's
  sequence(s).

- Some users, often younger ones, would play game sequences, at times
  accessing game sequences from other databases.

- Goal-oriented use of the terminal included information searches and
  curriculum-based applications, and research and development.

1.2  Use of Telidon at elementary and secondary schools

At both elementary and secondary schools:

- Demonstrations of the "new technology" were given to classes at all
  levels.

- At some sites demonstrations were given to users from across the
  school board.

- There was some curriculum-based use, usually by teachers using a
  sequence they had created or which had been produced by a teacher at
  their school.

- Some teachers searched for Telidon sequences relevant to their teaching needs. Teachers reported being unable to find appropriate sequences.

- Searches were hampered by incomplete indexes. At some sites teachers would alert each other as to available sequences, often by printing a printed list of useful sequences.

At elementary schools:

- Elementary-school teachers usually mediated between Telidon and the students by operating the key pad and reading to the students from the screen.

- There was little independent student use.

At secondary schools:

- Overall, secondary schools accounted for the greatest use of Telidon. More secondary schools participated in the trial than other types of institutions; more sequences were created by secondary-school teachers than by participants from other institutions.

- At the secondary-school level there was extensive casual exploration of the system by an interested subpopulation of students. They often sought out game sequences from other databases.

## 1.3 Use of Telidon at colleges of applied arts and technology

- Demonstrations to students and staff of the technology and of sequences created by college participants were common.

- There was some casual use by students when the terminal was made available.

- Users at college libraries undertook few searches for informational sequences. The small number of available databases (two) limited this use.

- There was limited curriculum-oriented use. However, one college used its sequence instead of lectures in an introductory course.

## 1.4 Use of Telidon at universities

- Computer science departments at two universities conducted extensive research and development in Telidon technology.

- University libraries undertook limited (and often unsuccessful) searches for informational sequences.

- One university library attempted a cooperative project with a local public library.

- Difficulties in updating local information led one university to develop local host computer database and page production.

- Two university libraries produced sequences that served as introductions to library services.

## 1.5 Use of Telidon at public libraries

- Demonstrations were given to library patrons.

- Some attempts were made to access informational sequences. These efforts dwindled when information was not found in the first few attempts. Technical problems and a lack of useful information were considered causes of this decrease in use.

## 1.6 Use of Telidon at special institutions

- Patterns of use paralleled those at schools and colleges, with the added emphasis on their own special needs.

## 2. Some factors affecting Telidon use

### 2.1 Demonstrations and workshops

- Demonstrations conducted during the field trial succeeded in interesting many potential users in Telidon.

- There was a demand at some sites, particularly at elementary and secondary schools, for further in-depth demonstrations or workshops dealing with technical operation of the system, troubleshooting, and methods of applying Telidon to educational problems.

### 2.2 Telidon contact people

- Individuals who took responsibility for the terminal and served as the liaison with TVOntario's Telidon project team affected the patterns of use at their sites.

- These contact people's administrative position and level of enthusiasm for Telidon helped or hindered their promotion of Telidon in their institution.

## 2.3 Placement of terminal in institution

- Placement of the terminal could affect its use critically. Terminals located in one classroom often received little exploratory use and limited use by teachers other than the contact person.

- Ideal location for the terminal was in an institution's library or resource centre, with ability to move into a private room.

## 2.4 TVOntario database indexes

- The Table of Contents index, listing sequences alphabetically by title, was the most commonly used by field trial participants. Other indexes, such as those listing sequences by grade or subject, were rarely available for system users.

- Users were limited by the available indexes. Teachers requested indexes by grade and subject. Some participants requested that indexes identify sequences according to type or format of presentation (such as "game," "information," "planned lesson").[1]

- Users expressed a need for cross-referenced indexes to reduce the time required to search for information or sequences.

- There was some demand for printed cross-reference indexes as support materials. (See section 2.5, below.)

## 2.5 Printed documentation[2]

- Many users, especially teachers, wanted a short, clear set of instructions on how to log on and access pages.

- A simply worded but complete user's manual was also needed to describe how to use Telidon and how to troubleshoot when technical problems arise.

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1. The reported need for such identifying terms corroborates the findings presented in the DOC's report Telidon Behavioural Research 2: The Design of Videotex Tree Indexes (Ottawa, 1981). Its study indicated that descriptors decreased errors and increased user preferences of indexes. They also found evidence supporting the efficacy of testing indexes on a sample of users. See Chapter 4, pp.65-104.

2. The demand for printed support materials may seem a step backward for those intimately involved with computer communications. However, this demand for print should not be seen as a misunderstanding or rejection of the technology. These needs were voiced by educators interested in Telidon and its promotion; printed materials are suggested as a way of stimulating interest and reducing demands on the user.

- Some users expressed an interest in having a technical manual explaining Telidon's organization and operation.

- Few of the sites used the Telidon and Education booklet distributed by the TVO Telidon team in the first years of the field trial. At some sites the contact person(s) produced their own short instruction sheet.
- Many teachers requested a catalogue of sequences. They wanted information on intended audiences, educational objectives, and suggestions for use of each sequence.

- Several teachers emphasized the need for multiple copies of any printed material at each Telidon site.


3. Technical aspects of Telidon in education


3.1 Branching-tree structure

- Pages or sequences of pages were accessed by entering a "page number" on a small key pad. These long strings of numbers (from three to six digits) could be tedious to use and caused some errors in use.

- For a user to access any page, there is one simple but crucial prerequisite: he or she must know the page number (except when the page of interest immediately precedes or follows the page being viewed).

   a. Difficulties arise when, within a sequence, the user attempts to review a page. He/she must either have noted the page number of interest, exit the sequence and begin again, or search for it hit and miss; these alternatives were time consuming and confusing.

   b. Because of the difficulty in using indexes to find the page numbers of sequences (see above 2.4), many institutions bypassed the branching system and produced printed lists of useful sequences and their page numbers.

- The use of printed lists of selected sequences at some sites coincides with the findings of many librarians and other participants familiar with computers: they found the Telidon system cumbersome and inefficient in handling large amounts of information. They felt that too many pages had to be screened to find the page of interest.

- Users who were not familiar with computers did not readily understand the concept of a hierarchical branching structure. This had its practical manifestations when teachers, in the course of using a sequence with students, did not know if or how they could "go back" a few pages or to a different sequence.

- Telidon CAI sequences were considered to be limited, compared with CAI courses on other computer systems. The branching structure requires the user to enter the page number of each page desired. Therefore, Telidon CAI sequences were all organized in a multiple-choice format; for instance, the user is asked a question and provided three possible answers, with page numbers corresponding to each. Some participants felt that a complete CAI system must allow the users to generate their own responses.

## 3.2 Telidon key pad [1]

- Use of the key pad was a relatively minor issue in most users' adaptation to Telidon. However, observation of new users indicated that for many of them, especially adults:

  a. The correspondence between a key and its number or symbol was often ambiguous. Users suggested that the number be placed on the keys themselves.

  b. Some users found the numbers in the wrong order - the size and shape of the key pad led users to expect a matrix like that of the common calculator.

  c. The "go" or "send" key wasn't clearly enough marked, given its frequent use.

## 3.3 The Telidon terminal screen [2]

- The natural pattern of use seems to involve groups of approximately six or less. This pattern permitted easy viewing by all users and a sense of sociability in the process.

- Classroom use was often hampered by the size of classes and the illumination in the room. Viewers at the back of a room were often unable to see the sequence clearly from a distance. Window blinds often had to be drawn and lights dimmed for users to see the screen clearly.

## 3.4 Speed of the system

- The waiting period between pages, though generally acceptable, could be slow and frustrating when the number of terminals accessing the host computer was large.

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1. Most of the field trial terminals were supplied with Norpak Mark 3 key pads.

2. Most terminals in the field trial used a modified Electrohome color TV set as a screen.

- Complex graphics were often so long in appearing that their impact was undermined. This was especially true if a graphic was repeated more than once in a sequence, or if the sequence was accessed again after initial use.

- Since transmission rates were not constant, pages that used "overlays" (in which a graphic is built up on a page over a period of time) were often ineffective. The time in which the graphic appeared was different from the time the page producer had designed.

## 3.5 Accessing the host computer

- Participants were very encouraging about their ability to access databases on distant computers.

- Users reported difficulty in accessing or "getting on" the host computer. Usually the source of the problem was the limited number of ports, or points of access to the computer. Next most often, poor transmission over phone lines disrupted access.

- Inexperienced users found the logging-on procedure complicated because of unclear instructions and the number of digits required.

- Teachers, including those experienced in Telidon use, found logging on somewhat disruptive of their lessons.

## 3.6 Telephone access of computers

- Though phone transmission was perceived as expensive by some participants, TVO's subsidization of transmission costs makes it difficult to assess exactly how phone costs would affect the use of Telidon in education.

- Some participants suggested that local storage of Telidon sequences would help overcome the cost and unreliability of phone line transmission.

- Those sites that had experience with Datapac phone lines were pleased with its dependability - it was also recognized as a cheaper alternative to regular phone lines.

## 3.7 Breakdowns

- The system's general technical unreliability was the one most crippling factor in the field trial. Frequent breakdowns were reported and they tended to produce a negative attitude among users, especially among first-time and hesitant users.

- Participants understood that these breakdowns were part of a field trial of a new technology, but many expressed the view that these difficulties would be unacceptable if they continued.

### 3.8  Other technical configurations

- The field trial's technical configuration - a small number of databases on a central host computer accessed by distant terminals - was considered effective.  However, users also considered other configurations as potentially effective. These other configurations were: accessing sequences from local computers or from in-house storage devices.

- Some users, especially library and university sites, wanted to be able to access more than one or two databases with their terminals.

- Some users expressed an interest in being able to store sequences locally.  Several teachers suggested downloading CAI sequences; others considered local storage on disc or tape desirable.

- Some sites that were involved in exploring micros in education were interested in seeing microcomputers with Telidon capacities.

- Many users suggested that a full keyboard was essential for educational use - the numeric keyboard was simply too limited.

4. Telidon databases and their contents

- Library and university sites seemed to use Telidon as an information source. High schools employed the CAI possibilities of Telidon, while elementary schools tended to use all types of sequences to assist teachers' in-class presentation.

- Many users, especially teachers, expressed a need for information on how to use sequences.

4.1  Size of the field trial databases

- Participants, while enthusiastic about the technology, expressed a need for a greater range of software - educational sequence, information, etc.[1]

- It is difficult to assess the amount of information or sequences required. However, it should be noted that the field trial participants were a diverse group - their needs could not be served by incremental increases in the database.  Librarians demanded access to as many sources of information as possible. Teachers required educational sequences for students at many educational levels in dozens of different subjects.  To provide adequate service to these potential Telidon users would require a tremendous growth of the database (or of the number of available databases).

- Many participants felt the available databases were too small to provide enough useful sequences and information.

    a. The TVO educational database was not extensive enough to supply sequences in the many subjects and educational levels required.

    b. The other databases (DOC and Vista) were often found to be too small and with out-of-date information.

4.2  TVOntario educational database

- In elementary and secondary schools the TVO database was criticized for not containing sequences relevant to existing curricula.

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1. Participants in the field trial could access one of two databases: (1) the TVOntario educational database with approximately 60 sequences, and (2) the DOC database with a variety of information and game sequences. Later in the field trial, participants were able to access a second host computer containing a modified version of the TVO database and the Vista database supplying general information and advertiser-supplied information, games, etc.

## 4.3  Telidon in computer-assisted instruction

- Telidon was used to provide computer-assisted instruction to students, primarily at the highschool level. Most often CAI sequences were used by the teachers who had produced them.

- One limiting factor in the use of Telidon CAI sequences was teachers' difficulty in integrating Telidon into their teaching style. Teachers were unaware of what materials were covered in the available sequences, and at what level. Also, in schools where the terminal was not in operation until well into the term it was sometimes difficult to arrange to use Telidon for computer-assisted instruction because teachers had already planned their teaching strategies.

- Teachers familiar with other CAI software found Telidon limited compared with CAI courses on other computer systems.  They found the interaction between student and software was restricted because multiple-choice questions/answers were used instead of student-generated answers.  Also, there was no record of student interaction.


## 4.4  Information uses of Telidon

- Field trial participants searched for information in the TVO database and the DOC and Vista databases.

- The TVO database had few sequences that were strictly informational.

- Many of the sequences on the database that had a game format provided information. However, users found that sequences with a game structure prohibited selective searching for information within the sequence. For instance, game sequences like Globetour or Tag the the Flag provided information on countries of the world but their structure made it extremely difficult to find information on a specific country of interest.

- Since sequences were not identified in the TVO Table of Contents Index according to their type - e.g., educational game, or information - users could not know where to find information or educational games. (See section 2.4 above for information on indexes.)


## 4.5  Graphic uses of Telidon

- Telidon was used successfully at the highschool and elementary-school levels to provide graphics for in-class use - as an "electronic blackboard" of sorts.

- This graphic use was incorporated into various in-class applications of Telidon: games, drill exercises, teachers' notes and diagrams.

- Some difficulties were encountered in viewing the screen in a brightly lighted classroom

## 4.6  Game sequences

- Games were most often used in demonstrations of the technology and free use by students. (The games on the TVO and other database were not directly connected to any curriculum.)

- Most of the game sequences provided the user with a question first, and the informational or educational elements followed – when the users answered. Often only the correct answer initiated the presentation of the informational/educational content. This order of presentation allowed users to play the game without absorbing its informational/educational content.

- Despite great interest in game sequences, field trial participants rated games as a low priority compared with information or instructional sequences. (This may reflect an attitude among teachers that games are generally not educational, or it may reflect the small number of curriculum-based game sequences that existed on the database.)

## 4.7  Role of graphics

- Telidon's graphics were highly appealing and attractive.

- Users warned that graphics in sequences should provide information relevant to the sequence's topic and not serve purely as embellishment, though it was recognized that attractive graphics did serve to promote interest in the screen.

- Graphics that were very complex took very long to appear on the screen and users found this frustrating at times.  Several suggestions were offered:

  a. Use complex graphics early in a sequence but do not repeat them. Repetition grows tedious.

  b. Have text appear on the screen before graphics so that the user is occupied while the graphic is constructed.

- Many page producers and other Telidon users acknowledged the difficulty of designing graphics and text that function effectively together.

## 4.8  Language level of sequences

- Teachers at elementary and highschool levels said they wanted Telidon sequences to be designed with a language level appropriate for intended users.

## 4.9 Errors in content

- Errors were found in some sequences. Both content and language errors were considered unacceptable by some librarians and teachers, especially in curriculum-based sequences.

- Some participants, including some page producers, requested more editorial review of sequences before inclusion on the database.

- Page producers had difficulty making corrections to sequences already on the database. (See below, 5.)

## 5. Producing pages and sequences

- The majority of sequences on the TVO database were produced by individuals from the institutions participating in the field trial.

- The travel and time of the page producers were supplied free of charge. This represents hidden costs in the implementation of Telidon, costs borne unequally by the participating institutions.

- The process of page production was considered to be time consuming.

- Though generally rewarding, page production was sometimes frustrating because of: (1) the difficulties in booking the IPS page production units, which were in great demand, (2) the technical difficulties the IPS units presented on occasion, and (3) the time it took to have a sequence included on the database (i.e., sending the sequence to the host computer and having it loaded there).

- Page producers expressed some desire for more formal training in page production.

- Page producers felt that the IPS manuals were not effective. There was also some interest in assistance in educational design of sequences.

- Page producers who completed more than one sequence gained considerably in experience, and were often critical of their first sequences.

## 6. Appeal of Telidon

- Users of all ages found Telidon highly appealing. Younger students seemed particularly attracted, showing little hesitation in using the system.[1]

--------------------------------------------------------------------

1. A cautionary note should be added. It is difficult to assess the appeal of a new technology such as Telidon. The novelty of using such equipment may exaggerate the interest it generates. The finding of generalized appeal observed in the field trial should be considered with caution, as something that may change with time.

- A subpopulation of all ages used Telidon not for its explicit content, but to explore its structure. These users "played" with the system and the games available in its databases.

- As the field trial progressed, it became clear that there was a body of committed Telidon users: some attempted broad-ranging explorations, others concentrated on using the sequence(s) they had produced. There were also many individuals at each site who showed some interest in Telidon - e.g., they attended a demonstration - but tended not to become involved with Telidon any further.

7. Future role of Telidon in education

- There was diversity of opinion regarding the future of Telidon, reflecting the range of institutional backgrounds and demands of the participants.

- Generally, the configuration used in the trial was considered suitable for providing access to large amounts of worthwhile information and materials.

- Two basic tendencies revealed in the field trial seemed to indicate directions for Telidon development: Elementary and secondary schools and some community colleges tended to use Telidon for teacher support and computer-assisted instruction, while libraries, including college libraries, and universities attempted to use the system for information searches and research and development.

GLOSSARY OF TECHNICAL TERMS


BRANCHING SYSTEM  The branching system is the method of storage and
        retrieval of Telidon PAGES and SEQUENCES used in this field trial (and
        in most Telidon applications). The branching system employs INDEXES,
        lists of possible choices with corresponding page numbers. By choosing
        one item from the index and entering its page number, the user is
        directed down one "branch" of the "tree." The page chosen may be the
        page of interest but it is often a sub-index, presenting a list of
        further choices. The user works his/her way through the indexes until
        the page of interest is found. See TREE STRUCTURE.


CRASH  The failure of the computer system during use. Sometimes caused by
        problems with the HOST COMPUTER, faulty transmission line, or
        technical problems with the TERMINAL. Also referred to as SYSTEM
        FAILURE.


DATABASE  In this field trial, "database" referred to a collection of
        SEQUENCES or discrete PAGES organized under one INDEX. The field trial
        included an "educational database" and other general-information
        databases. In more common computer parlance it refers to a collection
        of many types of information, which is accessible by all types of
        terminals and computers. Telidon databases, on the other hand, are
        only accessible to specially outfitted Telidon TERMINALS.


DATAPAC  The name of a data transmission service. Some Telidon TERMINALS
        used this service instead of standard long-distance phone lines during
        the latter months of the field trial.


DECODER  See TERMINAL.


HEMPTON UNIT  Is a type of DECODER  that allows a television to display
        Telidon PAGES stored on an audiocassette recorder.  The Hempton unit
        stores the text and graphic information of Telidon pages but does not
        retain their hierarchical structure. With a Hempton unit Telidon pages
        must be viewed one after another, like slides in a tray. See BRANCHING
        SYSTEM.


HOST COMPUTER  A large computer - sometimes called a mainframe computer -
        which contains or stores the Telidon PAGES and/or SEQUENCES. Two host
        computers were used during the field trial, one in Ottawa at the
        Department of Communications, and one in Toronto at the Vista Telidon
        trial.

GLOSSARY (Continued)

INDEX  A Telidon PAGE that gives the user a number of choices and provides
     their page numbers.  Also called a "menu page."  See BRANCHING
     STRUCTURE.


IPS UNIT  Information Provider Systems - minicomputers dedicated to the
     design and creation of Telidon PAGES. With these units, page creation
     requires no prior computer programming experience or training. The IPS
     units used in this field trial were Norpak Page Creation Terminals.


KEY PAD  See TERMINAL.


PAGE  One discrete videoscreen of graphics and text that is stored in a
     host computer and displayed on a TERMINAL upon request. Pages are
     usually organized into larger units - see SEQUENCE.


SEQUENCE  A series of Telidon pages usually with a common theme or topic.
     Sequences vary in their organization and format - they can be straight
     listing of information or more complex organizations such as games.
     Sequences use the Telidon BRANCHING STRUCTURE - each page gives the
     user instructions on how to proceed.  Giving the user a number of
     possible "moves" on each page, sequences can be fairly complex in
     format, incorporating looping and reviewing of some pages.  Sequences
     are contained in a DATABASE.


SIGN-ON  The procedure of accessing the host computer; this includes
     phoning the computer and entering several code numbers identifying the
     user and permitting access to the HOST COMPUTER's DATABASE(S). Once
     signed on, the user may access SEQUENCE and PAGES from the database
     and have them displayed on his or her TERMINAL.


SYSTEM FAILURE  See CRASH.


TELETEXT  A variant of VIDEOTEX, teletext allow text and graphics stored on
     computers to be transmitted in a television broadcast signal. In
     teletext, a set of 100 to 200 PAGES are broadcast in a continuous
     cycle. TERMINALS equipped with the proper DECODER "grab" one page at
     a time, and store it in the decoder for display on the TV screen.  The
     USER chooses another page by entering a new number on the KEY PAD and
     waiting for it to be retrieved from the cycle.

GLOSSARY (Continued)

TERMINAL  The equipment installed at each Telidon site.  Consisting of: (1)
a DECODER that allows the reception of Telidon PAGES through phone
lines or broadcast transmission, and (2) a MONITOR, a modified TV set
on which the Telidon pages are displayed, and (3) a KEY PAD attached
to the decoder, the size and shape of a pocket calculator, that allows
the user to enter page numbers when accessing pages and sequences.

TREE STRUCTURE  One way of organizin' a DATABASE, and the one used in this
field trial. Its basic structur is hierarchical, like the branches of
a tree; the base of the tree is connected to a number of branches,
each branch to a number of smaller branches, and so on. Each page
contains instructions on how to proceed along the tree's structure.
See BRANCHING STRUCTURE.

USER  A generic term referring to any individual or group that uses a
computer system.  In this field trial USER referred to individuals who
used the Telidon system - SIGNING ON from a TERMINAL and accessing
pages from one of the DATABASES.

VIDEOTEX  A generic term for the technical system that stores text and
graphic information in a computer and displays it on a television-like
monitor. This term usually refers to systems that employ telephone
lines or data transmission lines for communication between the
computer and the receiving TERMINAL. The early development of videotex
took place in Britain and France; scientists at the Communications
Research Centre in Ottawa later demonstrated what they felt was a
superior videotex system, naming it Telidon.

APPENDIX A: PARTICIPATING INSTITUTIONS

| Name of Institution | Location | Included in the Research Study |
|---|---|---|
| Public Schools | | |
| Broadview Avenue Elementary School | Ottawa | X |
| Sacred Heart Separate School | Windsor | X |
| Woodland Elementary School | St. Catharines | X |
| Upper Canada College Preparatory School | Toronto | X |
| Maynard Elementary School | Prescott | |
| Grafton Elementary School | Grafton | X |
| Junior High Schools | | |
| Don Mills Junior High School | Don Mills | X |
| St. Paul Junior High School | Mississauga | X |
| High Schools | | |
| Bloor Collegiate Institute | Toronto | X |
| Innisdale Secondary School | Barrie | ✘ |
| Chinguacousy Secondary School | Brampton | ✘ |
| Regiopolis-Notre Dame Separate School | Kingston | ✘ |
| M.M. Robinson High School | Burlington | ✘ |
| R.S. Mclaughlin Collegiate and Vocational Institute | Oshawa | ✘ |

| Name of Institution | Location | Included in the Research Study |
|---|---|---|

High Schools (Continued)

| Name of Institution | Location | Included in the Research Study |
|---|---|---|
| École secondaire Garneau | Orleans | X |
| École secondaire Louis Riel | Blackburn Hamlet | X |
| East Northumberland Secondary School | Brighton | X |
| Galt Collegiate and Vocational Institute | Cambridge | X |
| Lake Superior High School | Terrace Bay | X |

Colleges of Applied Arts and Technology

| Name | Location | Included |
|---|---|---|
| Algonquin | Nepean | X |
| Centennial | Scarborough | |
| George Brown | Toronto | |
| Georgian | Barrie | X |
| Mohawk | Hamilton | X |
| Niagara | Welland | X |
| Seneca | Toronto | |
| Sheridan | Toronto | |

| Name of Institution | Location | Included in the Research Study |
|---|---|---|
| **Universities** | | |
| Carleton University | Ottawa | |
| McMaster University | Hamilton | |
| University of Guelph (Library) | Guelph | X |
| University of Toronto (Faculty of Library Science) | Toronto | X |
| University of Waterloo (Department of Computer Science) | Waterloo | X |
| University of Western Ontario (Department of Library Science) | London | X |
| York University (Department of Computer Science) | Toronto | X |
| **Public Libraries** | | |
| Albert Campbell Public Library | Scarborough | X |
| Barrie Public Library | Barrie | |
| Burlington Public Library System | Burlington | X |
| Hamilton Public Library | Hamilton | |
| Lake Erie Regional Library System | London | X |

| Name of Institution | Location | Included in the Research Study |
|---|---|---|
| Special Institutions | | |
| Ernest C. Drury School for the Deaf | Milton | X |
| Toronto Institute of Medical Technology | Toronto | X |
| Metro School for the Deaf | Toronto | X |
| Blissymbolics Communication Institute | Toronto | |
| Ontario Federation for the Cerebral Palsied | Toronto | X |
| Museum of Man | Ottawa | X |

APPENDIX B: COMMENTS ON TELIDON'S STRENGTHS AND WEAKNESSES AS
AN EDUCATIONAL MEDIUM

What do you think is Telidon's greatest strength as an educational
medium?

- - Can provide an additional means of information more up to date
  than texts.
  - Provides another means of small-group or individual
  instruction.

- strong visuals and ability to use it with individuals or small
  groups while teacher works with others

- - availability of information
  - it can be made to teach concepts and skills

- Good for hearing-impaired students if language level appropriate.

- Picture is worth 1000 words.

- possibility for mass access through home use

- If databases are adequate:
  1. providing data to LR centres quickly
  2. freeing teachers for individual work if instructional units
     are of high quality

- Appeals to those who prefer to manipulate/be involved in/their
  educational process.

- graphics, limited interactive response

- Graphics. Speed. Size of database.
  Could be current.

- color and its fascination for children, i.e., its toy/game-like
  connotation rather than work aspect

- color graphics and random access for modular programs

- The interactive mode makes the system dynamic.
  The proper marriage of graphics/colors with text encourages
  usage.

- instant pulling together of information

- ability to quickly input and modify material for classroom
  use by individual teachers

- appeal of graphics (color, novelty)

- Its unlimited scope!
  The database can be continually expanded and updated.

- – providing information/replacing some textbook material/ed. games
  – challenging to learners: meeting their objectives

- – availability
  – interactive uses
  – graphic detail

- graphics and color for interest heighteners, and its potential
  for interactivity

- The kids like to interact.
  The potential for rapid updating of Statistics Canada or
  other gov't. information banks.

- visual impact using graphics

- – two-way – interactive

- – illustrations
  – its newness

- as an additional resource for the classroom teacher

- graphic ability to show spatial concepts

- graphics and color

- depth of info. potentially available

- student involvement

- its potential to give my students access to stored information
  that otherwise they couldn't get

- Can be used by individuals or in a group.

- It can be used over and over to get a lesson across. Bright,
  cheerful, fun to use.

- The range of the graphics allows you to do a great deal in the
  area of demonstration. In this age of electronics and high
  technology it sure helps to hold the student's interest.

- its potential for assisting teachers to individualize programs

- – individualized yet stimulating learning experience
  – directly related to course of study.

- – great availability and amount of information
  – ease of operation

- interest it draws from students and their addiction to video materials -- they will use it

- As an interactive medium it offers more than other visual presentations. Its potential in distance education is of interest to us.

- It appeals to our students.

- its appeal to our students

- as a leveled (primary, junior, etc.) provider of information, i.e., a unit on space for primary children, for junior -- etc. through to .. physics

- information retriever

- access to current information and/or instructional materials

- combination of graphics/text/movement in a medium students are familiar with

- step-by-step logic; potentiality for graphics to "grab" poor readers; ease of review of material by learner

- an instruction and graphic medium using a database

- novelty

- - for individual students or small groups out of step with class
  - those needing remedial work or advanced enrichment material

- - instant visual rapport
  - children are tuned on
  - deaf children can be very excited by colorful graphics

- - presentations in graphic form
  - maps, charts, breakaway diagrams

- - the ability to converse with the student
  - variety of materials
  - motivational factor of student participation

- If such facility was available, with an immensely expanded database its "fingertip" sequence availability is of infinite value to a teacher.

- wide availability if it becomes common in the home especially in the provision of information (e.g., electronic reference sources and also as a community information resource to agencies etc. which can provide information)

- its beautiful graphics
  - the ability to program specifically for one or more children
  - the interaction between the screen and the user
  - a highly visual medium suited to meet the needs of our children

- its graphics

- ability of individual to control speed, frequency of learning sequence, and ability of machine to show record to teacher

- graphics - excellent!
  - interactive capacity - involves the learner
  - flexibility for distance learning (i.e., 24-hr. access - time, geographic location not a restriction)

- extension of the classrooms to a loaded range of subjects
  - interest value in a new form of education

- The student now has graphics and text with the future inclusion of sound.

- the ability to sequence the presentations of graphics and text to stimulate cognitive responses

- The students can work individually and progress at own speed -- ideally.

- Attractive and unique presentations!

- modular concept, variety of topics

- Programs become nonmeaningful for students.

- Students can proceed at their own pace.

- It is difficult for me to say, especially as I have been somewhat disappointed by Telidon. The only clear advantages which it seems to possess over books on the one hand and films on the other are currency and interaction. The interaction seems rather restricted, however.

- novelty

- Its graphics - students find them interesting.

- an information database
  - interactive television
  - excellent graphics

- the future possibility of "now" updating ability

- a data bank of up-to-date information

- ability to access information residing in some remote database

- the visuals

- ability to transmit high-quality, up-to-date informational sequences using highly visible text and good graphics

- availability of large database

- - graphics coupled with CAI
  - distance education
  - low-cost consumer technology - if realized

- Information is available on demand rather than scheduled broadcast.

- enrichment - student involvement

- attraction, format, graphics, how-to's or how it's done

- as a resource for the teacher to use to aid small groups of children for review and drill

<u>What is Telidon's greatest weakness as an educational medium (besides
any technical difficulties such as system crashes)?</u>

- lack of content related closely to curriculum of various grade
  levels

- getting on line at the necessary time when periods of class time
  are short

- At present, except for current events, and because of necessity to
  search indexes for information, a book is still often a faster way
  of finding needed information.

- language level

- CRT – tube size for class viewing

- tossup between tree structure and lack of info in database

- Universal access is necessary (must be democratic or egalitarian).
  The absence of a coherent educational strategy or purpose. Discrete
  facts and units do not produce education. Interaction among users
  is necessary.

- – tedious tree structure index
  – lack of comprehensive content
  – lack of portability

- cost (phone)
  quality of materials (sequences)

- – Must be updated more often.
  – Interaction via a number is limited.
  – Branching must be under program control.

- eye strain; smallness of screen

- Display – classes generally run 25-35 people and one display
  terminal 25" is not enough, thus making it difficult to
  view in larger groups.

- – the lack of proper design of some of the sequences
  – updating can be tedious, but should be essential
  – the tree structure limits potential usage

- technical difficulties and lack of information

- terminal design, COST of inputting

- – small amount of info on screen at one time
  – clumsy tree structure

- cost

- (slow) It(we) have not really discovered the best use for this system yet.

- – design and input of programs that would be better suited to a computer
  – the slowness of retrieval can be frustrating compared to a computer

- no sound – not yet animated enough

- too many selections and branches to get to a piece of information

- too little information on a single page, i.e., one newspaper page would take 100 Telidon pages!

- – high language level
  – not enough programs

- – up-to-date information
  – nebulous instructions with regard to pursuing information

- lack of sound

- lack of applicable material to curriculum

- Student cannot interact directly with the system, i.e., he cannot enter his responses and get feedback from terminal as in micro-computer.

- Poorly designed programs can substitute for thinking and learning by simply entertaining or by making thought irrelevant to the activity. Also, programs must be based on sound scholarship. "Fun with Commas," e.g., is not.

  Pages appear too slowly.

- teacher resistance

- – limited number of useful sequences available
  – lack of true interactivity

- – lack of materials to date
  – cost?

- The teacher needs lots of time to make sure it is on the air.

- The shortage of programmers needed to program the sequences which could be devised for educational use. In our area the cost of long-distance phone calls might be regarded as a weakness.

- "on line" costs -- beyond field trials, our school would find these charges limiting

- capital expenditure for input terminals relevant to use

- not easily applied for large groups of students

- difficult to discern levels and content of sequences without viewing them

- Limited quantity of information can be presented on page and in sequence. 1984 isn't far off.

- Its output is slow.

- access slow

- - small database
  - technology should be available to adapt to a printer
    (black & white would be adequate)

- too slow moving

- lack of detailed descriptions of sequences

- limitations of tree structure, page size, lack of key word access

- expense; availability of terminals; limit of relevant sequences

- - loading the sequences into a database
  - coordinated development

- It can't respond to individual interests, i.e., digressions.

- inefficient medium - very little information actually provided in any sequence - many hours of work required to produce it, expensive, elaborate equipment

- tendency to be more static rather than interactive

- screen size limitation -- especially a problem when you need text accompanying graphics

- cost factor -- teacher programmers needed so that integration with curriculum is assured

- presently only the limited database

- Faculty are still intimidated by technology and are not sure how to best use it (i.e., the old ways are comfortable and familiar) though there will be some adventurers. I'm not sure that Telidon has any more to offer than microcomputers or CAI terminals.

- There are, as yet, not enough sequences on Telidon for us to use.

- not a great variety of sequences

- - a 40-character line
  - costs in networking
  - cost and time of IPS creation

- - repetitious sequences slow the programs
  - difficulty randomly accessing pages for review
  - poorly designed educational programs

- a lack of programs

- unavailability of good graphically displayed pages

- lack of good content

- no sound

- colors difficult to read - depending on lights

- lack of two-way interaction, sequences often superficial,
  i.e., passive in nature, lack of a dialogue

- lack of programs in areas such as business

- lack of human interaction

- Its effectiveness seems restricted to topics which do not rely on
  text.  It is difficult to read easily from a screen, and where
  groups are involved, individuals cannot read at their own speeds.

- its very limited true interactivity

- - too lockstep - not flexible enough
  - must offer far more paths through a program

- Not enough money and care spent on ensuring uniformly high
  quality of sequences.  This will discourage initial users.

- hardware accessibility

- optimum number of users is three at one time - inefficient

- limited programs

- - cost
  - oriented primarily to individual or small-group learning
    situations
  - problems with the technology
  - development of appropriate instructional sequences

- not enough database as yet and not an easy acccess
  immediately - if you don't know number

- working when you need it

- - index weaknesses
  - slow response time
  - dearth of valid sequences for educational applications
  - readability problems

- insufficient information

- one too many amateurish sequences

- - access routes
  - slowdowns

- lack of sound in programs

APPENDIX C

HOW TELIDON WORKED IN THIS FIELD TRIAL

A Simple Explanation [1]

Telidon allows discrete "pages" of graphic and textual information to be stored in a computer and viewed on television screens. The Telidon system used in the TVOntario field trial was designed to allow many users at different locations to retrieve Telidon pages simultaneously from one central computer. To deliver this service, Telidon's designers chose a computer system called a tree structure or branching system. [2]

In the TVOntario field trial, when users established contact between their terminals and the central computer they were presented with an "index" displaying a series of choices. For instance:

    Telidon Main Index

    1 Education

    2 News and Weather

    3 Government Services

---

1. This Appendix was written with the assistance of David Sutherland, TVOntario Telidon Project Team.

2. More accurately, "tree structure" refers to the hierarchical structure of the database, and "branching structure" is the means of navigating through the "tree." For simplicity, the two terms will be used synonymously.

This main index is at the base of the tree structure. All pages in the computer can be found along the "branches" of this tree, like leaves spreading out below an upside-down tree. (See diagram, next page.) By choosing one alternative, for example, "1 Education," the user moves along one branch of the tree. The user is then presented with another choice:

Education Index 1.0

1 Elementary School

2 High School

3 College/University

Again, the user chooses the category of interest, enters the corresponding number, and advances along the branch selected. (In our example the user chooses "2 High School.") At this juncture the user is presented with another index ("12.0" in the diagram) and must make a decision, and so on, until the page of interest is found.

The user need not use the succession of indexes to find a page. Each page has a page number - an address of sorts - by which it is identified in the computer. (For instance, "12111.0", on the diagram.) If a user already knows the number of a page he/she is interested in, then by entering the number the user moves directly to that page, bypassing the indexes.

At the bottom of the tree, pages are stored in "sequences" - series of Telidon pages organized around a theme or topic. Participants in the TVOntario field trial contributed sequences to the educational "branch" of the tree. This branch was called the TVOntario Database. However, all the terminals in the field trial could be used to access any branch of the tree
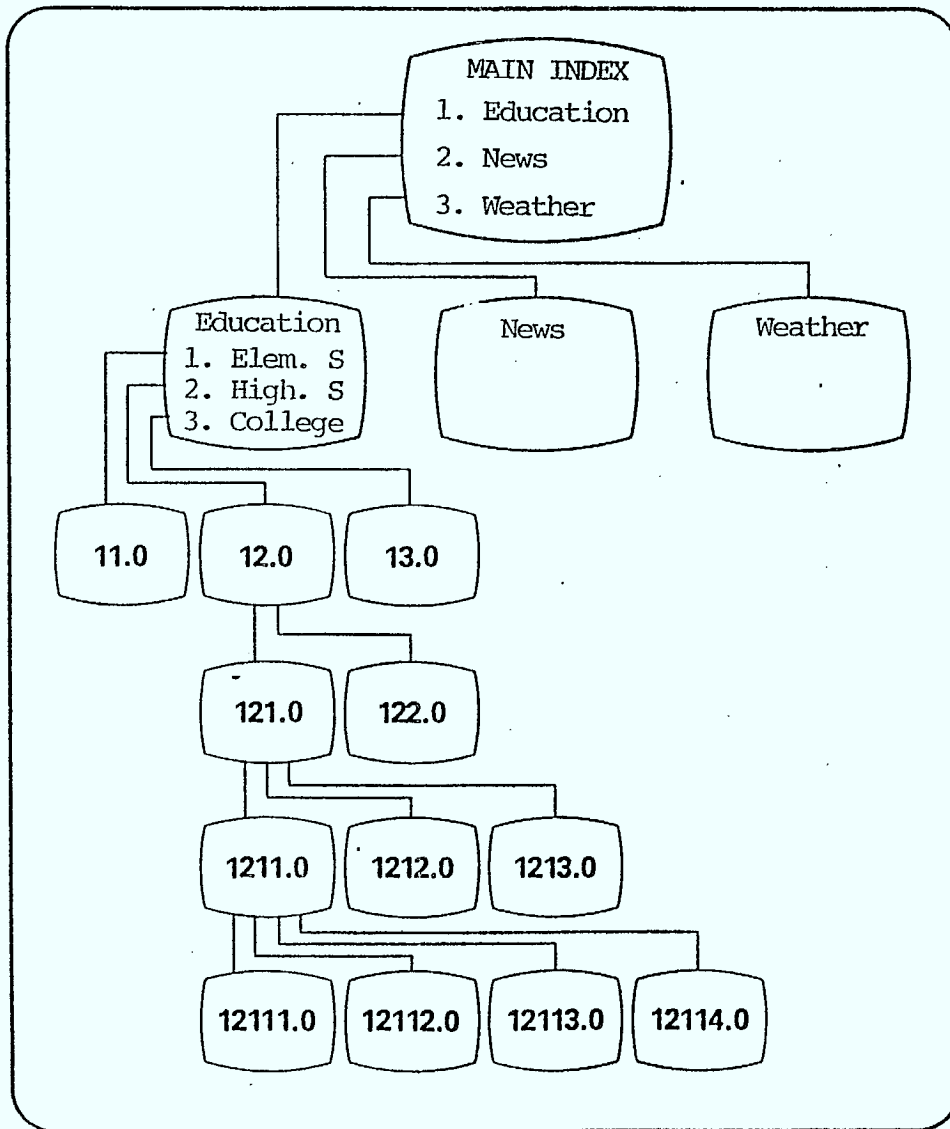
This diagram is adapted from the Norpak Telidon User Guide, 1982.

- those explicitly produced for educational uses or those designed for a general population of users, such as "News and Weather."

The tree system is only one of a number of possible systems available on modern computers and it differs from other systems in a number of important ways. For instance, in the Telidon branching system the user must actively search for and find the pages he or she wants. In other systems, such as those used by libraries in compiling bibliographies, the user search is replaced by the computer search. In the latter, the topics of interest are entered into the computer - for instance, "high school" and "biology." The computer then examines its own contents and provides the user with a list of pages or sequences that fit under both these categories, along with their page numbers.

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