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VIDEOTEX/TELIDON IN CANADIAN ADULT EDUCATION:
A DELPHI SURVEY

by

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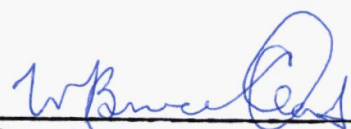
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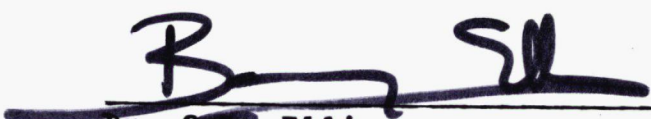
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FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled, "VIDEOTEX/TELIDON IN CANADIAN ADULT EDUCATION: A DELPHI SURVEY", submitted by Robert B. Campbell in partial fulfillment of the requirements for the degree of Master of Arts.


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ABSTRACT

This study investigated the opinions of "experts" in an attempt to find consensus of opinion and build further consensus if possible in regard to the present and future potentialities of Telidon, the Canadian version of videotex, and videotex systems in general as applied in educational areas, with particular emphasis in adult education.

A two round Delphi survey procedure was employed in the study. Of 68 individuals who were recognized as having extensive knowledge or experience in videotex applications at the adult education level, 35 responded in round one and 31 responded in round two of the survey. The survey instrument consisted of 49 items concerning the present and probable future advantages and disadvantages of videotex applications. Space was made available in the survey instrument for participants to "write in" their comments and opinions.

Several issues that were discussed in the review of the literature and brought forth in participants' comments were affirmed in the findings of the study. These include the limitations of the existing "tree structure" data base, and the present disadvantages posed by the lack of funding for courseware, the poor marketing of videotex in educational areas, and the high initial costs of hardware.

Despite the limitations at present, the types of educational services videotex systems can potentially provide were highly regarded as being important and well utilized in the probable future. In particular, those educational services that involve the inputting, retrieval and manipulation of information were regarded as being very important in the probable future by a consensus of the participants. The selection of these types of capabilities conforms to the types of educational applications that were suggested in the literature as being the most "appropriate" applications of Telidon at the adult education level.

Three general trends of thought were apparent in the "written" comments made by participants. The first is that videotex is not being effectively developed in instructor-centred educational institutions. Secondly, is the view that micro-computer technology will either partially, or completely supersede videotex technology. Thirdly, is the view that improvements to Telidon videotex will make it a more effective educational medium in the future.

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Chapter I

INTRODUCTION TO THE PROBLEM AREA

Discussion of the Problem

Telidon, Canada's videotex system was unveiled to the public in August of 1978. In December of that year a document entitled A General Description of Telidon - A Canadian Proposal For Videotex Systems (Bown, O'Brien, Sawchuk & Storey, 1978) was released by the Canadian Department of Communications (DOC). The authors of that document stated that "the initial use of Telidon terminals . . . will be to access data contained in large information banks" (p. 14). They suggested the following areas where further development might occur:

- direct access to large blocks of data containing many pages of information for off-line perusal.
- downline loaded computer programs for entertainment or other purposes.
- subscriber generation of pictures and,
- subscriber-to-subscriber communications with textual messages and graphic images. (p. 14)

The DOC proposal emphasized technical and hardware description. The technology was introduced and its capability briefly outlined. Possible educational applications were not mentioned, much less specified. However, in the past six years research has been conducted by the DOC, by government agencies at the provincial level and by educational institutions, testing, in field trials and other studies, the

capabilities and potential of Telidon's "on-line" or interactive mode as an educational information system.

The results of field trials and the implications of Telidon as applied to education have been discussed in numerous publications. That literature, much of it still in circulation presents a broad spectrum of analysis as each writer discusses his or her observations founded upon a particular aspect of concern, interest or area of specific research which they consider most important. Discussion in the literature, which is presented and discussed in Chapter II of this report, raises various issues concerning the "on-line" interactive mode of Telidon and its educational applications.

One issue that has emerged that comprises a more general question concerns the quality of Telidon's attributes as a educational medium, and more specifically, what types of attributes Telidon possesses that make it appropriate, or inappropriate as an educational medium? Does the Telidon tree structure allow for easy access of pages? Is the speed of display on a Telidon screen fast enough for efficient learning to occur? Can Telidon provide active motion on its screen displays? Is the screen size on most available educational television monitors large enough to display a suitable amount of information, and is the screen size large enough to be effectively viewed by more than a very few persons? Also, is the provision of a colour display necessary for learning to

occur? These and other concerns are recognized as important in the development of Telidon as an educational medium. Also of importance is the future role of Telidon as an educational medium. If an attribute of Telidon is not currently acceptable as one that provides good instruction or does not allow for effective learning to occur, are improvements possible, and if so, are they currently being undertaken, or is there the possibility that they will be undertaken in the future?

Another issue that has emerged in Telidon development is the question of hardware. How adaptable or compatible is Telidon with other media types? Does it function effectively when combined with audio transmission? Can information be efficiently "downloaded" from a data base to a terminal with memory? Is the hardware currently available easy to use? Can a user easily store, access and update information? Again the question arises - if Telidon does not possess these capabilities at present, will it in the future?

Discussion in the literature has raised what appear to be two key issues upon which the future success of Telidon may be dependent. One is the question of financing. Development costs are high. Who pays for the development of Telidon systems? Another financial concern is the question of courseware. The creation of quality courseware is labour intensive. How much quality courseware is currently

available, and if more new courseware is required who will pay for it?

The second key issue is the feasibility and effectiveness of interactivity on the Telidon type of videotex system. The broadcast mode of Telidon is most feasible at present, but for full range of interactive services the on-line transmission mode must be utilized. How feasible is the latter?

Underlying all of the concerns and issues raised regarding Telidon applications is the question of Telidon's uniqueness as an educational medium. Can other media types be substituted for Telidon, and if so, can they function as effectively as a Telidon system, and as efficiently as a Telidon system? If other media types are able to function as effectively and efficiently as a Telidon system can they do so at a cost that is comparable or even less than that of a Telidon system?

The issues and concerns in question pertain generally to applications of Telidon/videotex at all educational levels. The study presented here explores these issues and concerns as they pertain to one level of education only - that being adult education. The findings of this study, although specific to adult education may pertain to other aspects or levels of education not within the domain of adult education.

Statement of the Problem

Issues such as those mentioned above represent the types of concerns addressed by experts involved with educational applications, especially those involving the teaching/learning processes which may make use of the Telidon/videotx system. Experts, however, address these concerns from dissimilar perspectives and are often not in a position to communicate their concerns. Furthermore, experts are not often required to state their opinions or concerns. No doubt opinions among experts exist. If found, the opinions of a group of experts concerning a specific subject would be expected to converge where their opinions were in agreement, and diverge where their opinions were in disagreement. Insofar as this writer can ascertain the existence of a consensus of group opinion of experts involved in Telidon applications in adult education has not been determined, nor has the development of such a consensus been sought.

This study investigated the opinions of experts in an attempt to find any existing consensus among their opinions and to build further consensus if possible, pertaining to the present value and future potentialities of Telidon regarding its quality and effectiveness as an "on-line" interactive educational medium, as implemented in the area of adult education. The method of study was a Delphi procedure, which is an anonymous survey system of sequential questionnaires.

The method was modified slightly to suit the needs of this study. The methods of the study and modifications made to the Delphi procedure are detailed in Chapter III of this report. The study was consequently entitled Videotex/Telidon in Canadian Adult Education: A Delphi Survey.

Several restrictions were place upon the study. Only the videotex function of Telidon, ie. the "on-line" interactive mode, by itself or in combination with other media, was subject to analysis. Furthermore, only that function as applied to adult education was subject to analysis. The opinions elicited in the study were those of individuals who are currently, or who have been involved with Telidon videotex applications at the adult education level, or individuals who have produced documents which pertain to the developments and implications of Telidon videotex as applied to adult education.

A PREMISE FOR THE STUDY

A construct recognized in the fields of Educational Technology and Information Science referred to as the "Right Information or 'Appropriate' Information" construct was used as a postulate in this study to assess the applications of Telidon videotex in education. It served as a fundamental position from which questions and comments were generated in the first round of the Delphi procedure. A preliminary panel of respondents was requested to respond to Telidon/videotex

applications vis-a-vis the "Right Information" construct as it shall be referred to in this study. The members of the preliminary panel were asked to state their opinions concerning Telidon videotex applications in adult education, and to indicate whether or not they believed these applications complied with the criteria outlined in the "Right Information" construct.

The "Right Information" construct, according to Goodman and Standera (1983), should be the over-arching professional objective of all information specialists/purveyors, including educators (p. 310). The construct is as follows:

The provision of "all of the 'right' (appropriate) information and only the 'right' information, to all of the 'right' persons, at the 'right' time and place and only at the 'right' time and place, in the 'right' medium/media format(s) and only them, and at a cost that is affordable to the recipients, to the information system, and to the community in which the recipients reside. (p. 310)

DEFINITION OF TERMS

For clarification, a number of terms require definition:

Adult Education: The area of education of adults including post-secondary education, formal and non-formal, and continuing education.

Computer Based Learning (CBL): The application of computers to the instruction/ learning process. For purposes of this study computer assisted learning (CAL), computer assisted

instruction (CAI) and computer managed learning (CML) are regarded as synonymous.

Distance Education: The term applied to teaching and learning processes occurring at distances via correspondence or other delivery methods such as teleconferencing.

Expert: For purposes of this study an "expert" was defined as an individual with extensive knowledge in the application of videotex technology to adult education.

Interactive (Interactivity): In computer based systems, one that is reciprocal, providing two-way communication between user and data base or user and user.

Videotex: A generic term that refers to an information service that disseminates information from a data base to a user via standard telephone lines, coaxial cable, microwave link, satellite, optical fibre or laser.

Teletext: A term that refers to the broadcast mode of videotex, which is not two-way and therefore not an interactive system.

LIMITATIONS OF THE STUDY

Several limiting factors are inherent in the Delphi procedure. It was expected that these would influence the course of the study. The limitations resulted from the following:

- The Delphi procedure involves multiple rounds of questioning and is time consuming for participants. Several candidates selected for the study did not wish to participate because of time constraints.
- The Delphi procedure does not produce neat and precise results. The response scales therefore are at times difficult to interpret.
- As a Delphi procedure requires several months to complete, new developments in technology and hardware occurring prior to, or during the course of the study might have influenced participants' responses. Such external variables could not be predicted at the outset of the study period, or controlled during the study period.

SIGNIFICANCE OF THE STUDY

Across Canada commitments have been made by the federal and provincial governments, educational consortia and educational institutions to develop the Telidon videotex system as an educational medium. Many Telidon field trials have been completed, many are ongoing, and many are proposed for the future in educational areas. This study surveyed the opinions of experts who are, or were, directly, or indirectly involved with the development and application of Telidon videotex at the adult education level. The survey served two purposes. The first was to find any existing consensus among expert opinion. The second was to hopefully help build further consensus of opinion upon that which already existed.

It is hoped that the findings of this study would serve as an assessment of the current applications of this technology in adult education, and possibly other aspects of education as

well. Furthermore, it is hoped that the findings would also serve as a projection for guiding future developments of this technology in educational areas.

Chapter II

REVIEW OF THE LITERATURE

Two areas of literature are reviewed in this chapter. The first is a review of literature pertaining to the developments and implications of the Telidon videotex system in education in Canada, with specific emphasis on the developments and implications of this technology as applied to adult education in Canada. The questions and issues raised in the literature are discussed as they relate to the findings of Telidon field trials and studies. The second area is a review of literature concerning the utilization of the Delphi technique as a research instrument for assessing and forecasting media applications in education.

Adult Education and Interactive Videotex in Canada

Sources and Availabilty of Relevant Literature

There is ample literature in circulation pertaining to Telidon technology and its general applications. A portion of that literature deals specifically with Telidon's educational applications of both videotex and teletext modes. Restrictions placed upon the study presented here limit the scope of the study to only the videotex mode of Telidon, and only this mode as applied to one level of education - that being adult education. Relevant literature concerning

the videotex mode as applied to adult education is not profuse. However, contributions have been made by writers in the fields of adult education, educational technology, and information science. These contributions are presented here as they pertain to the content of this study.

Videotex and Computer Based Learning (CBL) in Adult Education

Syrett (1981) presents a futuristic scenario that seeks to depict the implications a videotex system functioning in a CBL role might have in education. In this scenario, an interactive videotex system is applied to teaching and learning processes. The student, an adult employee in a working environment utilizes a videotex terminal and keypad, at home and at work, to search a data base for information. Testing is conducted and test results are obtained over the system, as is remedial information. Syrett also discusses the use of a videotex system for the "downloading" of information from databases. Moreover, Syrett points out the advantages of "networking" on a videotex system, whereby users can send and receive "live" or recorded information to and from one another. Syrett's depiction of an adult employee in a self-directed learning situation is of importance in the area of adult education. Hlynka and Hurley (1982) report that "self-directed learning comprises an estimated 70 percent of all adult learning activities" (p. 8). In its role as an

educational medium at the adult education level, Telidon videotex could be expected to provide computer based self-directed learning, and provide the latter, if necessary, over distances as depicted in Syrett's scenario.

Telidon Field Trials and Studies

Whether a Telidon videotex system can provide the type of service depicted in Syrett's scenario remains to be seen. Nevertheless, much of Telidon's promotional literature implies that it can, among other capabilities, provide computer based learning. Feeley (1982) indicates when referring to Telidon for teaching and learning processes, that the potential of Telidon is considerable. He refers to its functions, actual and potential, as a system that can serve as:

. . . an international standard on which to base inexpensive, interactive video communication systems which permit information retrieval, computer assisted learning . . . using existing phone systems or enhanced cable systems. (Feeley, 1982, p. 2)

Feeley reports on educational developments and applications of Telidon that explore its videotex function for the provision of CAL, CML, graphic page creation, electronic journalism and program creation. Among those educational applications are the following field trials and studies which apply Telidon videotex at the adult education level.

- Project NATAL at the University of Victoria, which is testing CAI using standard computer languages on a Telidon system.
- The University of Calgary's teleconferencing system which is utilizing Telidon graphics to enhance an audio-teleconferencing system.
- The Mechanics 12 course offered by the Alberta Correspondence School which utilizes Telidon for CML purposes.
- A course at Sheridan College in Oakville, Ontario, which utilizes Telidon to teach graphic arts.
- Tele-universite at the University of Quebec is designing Telidon videotex courseware to teach 20 adult education courses.
- TVOntario has tested the Telidon videotex system for interactive learning processes.

The results of all of the aforementioned field trials have yet to be determined as not all have been completed and not all have had evaluations conducted or evaluative reports published. However, three of the field trials have undergone extensive evaluation and the findings of those studies are discussed here as they pertain to the content of this study..

The Mechanics 12 course offered by the Alberta Correspondence School was designed to utilize Telidon videotex in a CML role to deliver tests and exercises augmenting traditional printed materials. The field trial study underwent extensive evaluation by Alberta Education. The findings indicate that Telidon as a medium providing

CML has serious limitations. Montgomerie expresses the following:

The use of a Telidon Videotex System in computer based learning was due to the design of the system around the assumption that it would be used for information retrieval only. While information retrieval is an important part of computer based learning, it is not the only part. (p. 79)

It was judged that the Mechanics 12 course provided "only a primitive form of computer managed learning . . . with only cursory feedback to the student" (Montgomerie, 1982, p. 71). Although the application of Telidon in that field trial was minimally interactive the results of the Alberta Education report indicate that modifications to both Telidon hardware and software are required for the system to provide good computer based instruction. The problems with the data-base software have led to modifications and alternatives being sought. Project NATAL at the University of Victoria, for example, seeks to develop a system with software that is more conducive to computer based instruction.

The University of Calgary's Telidon/teleconferencing system experienced similar problems with the suitability of existing Telidon software. Ellis and Winn (1982) state that a "considerable number of changes need to be made to the computer software to make it easier to use when putting in pages and when using them to teach" (p. 5). A major purpose of the Telidon/Teleconferencing study, however, was to test the

effectiveness of a combined system. According to Ellis and Winn, the project provided evidence that the system works and that the study was worth doing. However, they concede "that a lot more work needs to be done in all aspects of the system" (p. 5).

In further regard to the University of Calgary's Telidon/teleconferencing project, comparative research was not undertaken to prove whether or not this combined system was more effective than traditional delivery methods, but several cogent observations were made in an evaluative study concerning the nature and quality of Telidon's attributes as an educational medium. They are:

There is no evidence that altering a delivery system alters cognitive processes. Telidon may facilitate learning, but it will not necessarily improve it.

The amount of information carried on a Telidon page is limited. Possible courses requiring complex visual materials or greatly detailed visual information, could not be successfully delivered via this medium.

Telidon pages are excellent motivators
Telidon/teleconferencing may function very efficiently as a delivery system for professional or seminar oriented courses. On the other hand it may be less effective for courses requiring individual concentration and contemplation. (Potter, 1983, p.12)

TVOntario has tested Telidon in the following areas:

- to compliment educational television
- to disseminate administrative educational information
- to allow for information retrieval
- to provide for interactive learning processes

The results of these tests have been reported in a TVOntario publication from the series entitled

New Technologies in Education, Paper 11, Educational Applications of Videotex/Telidon in Canada.

Testing of Telidon videotex by TVOntario included the use of instructional sequences designed specifically for elementary schools, secondary schools, post secondary institutions and special institutions. It is suggested in the TVOntario publication that future development of Telidon videotex might follow two basic tendencies that were indicated in the field trials. They are:

Elementary and secondary schools and some community colleges tend to use Telidon for teacher support and computer assisted instruction, while universities and libraries use it for information searches and research and development.
(TVOntario, Paper 11, 1984, p. 34)

TVOntario reports several problems in the design of the system. Such problems as limits on time and access "were serious hindrances in introducing the technology to the sites" (p. 25). The placement of the terminals was considered problematic as well. According to TVOntario, terminals were most ideally placed in an institution's library or resource centre (p. 33). Other problems that occurred were similar in nature to those experienced by the Alberta Correspondence School in the Mechanics 12 field trial. TVOntario reports that teachers found Telidon's software capabilities restrictive in terms of CAL, and the lack of programming for tracking a student's progress was considered a drawback (TVOntario, Paper 11, p. 26).

Despite drawbacks and shortcomings in the field trial studies, TVOntario has continued to develop Telidon as an

educational medium. As stated by Feeley (1982) "TVOntario has been quite satisfied with the results, so much so that the provincial government has recently contributed over \$300,000 to the installation of an operational system" (p. 6).

CAL/CML and Interactive Capabilities

The present inadequacies of the interactive capabilities of Telidon videotex have influenced several of the educational field trials in CAL and CML. Montgomerie (1982), in reference to the Alberta Education Mechanics 12 field trial, states that the Telidon videotex system "does not currently have the capability to deliver good computer assisted learning" (p. 72). This view is supported by Gordon (1984) who found evidence in a study of videotext in education to suggest that the CAL capability of videotex systems are presently not acceptable (p. 83). Another issue presented in the literature concerns the practicalities of providing CAL/CML utilizing Telidon videotex. TVOntario questions the practical use of Telidon videotex for CAL/CML purposes. In the TVOntario document the following is stated:

The question is whether a technology designed to transmit graphics economically over great distances should be used for CAL processes and by their very nature tie up equipment, including data lines, for long periods of time. We surmised that the answer to that question is that it should not be so used. We were led to favor, therefore, downloading materials for the creation of local networks for distributed databases in order to relieve the central Telidon system of costly overload.

(TVOntario, Paper 11, 1984, p. 38)

It is hoped that the findings of the study presented here will elicit and assess other existing opinions of present and possible future capabilities of Telidon videotex providing CAL and CML services. It is also hoped that the findings will provide further information concerning the development of other software systems currently being designed for videotex that are more conducive to CAL and CML.

A more general question concerning Telidon developments and applications that has arisen in the literature is its present and potential capability as an interactive system. It would appear that Telidon as originally designed offers limited interactive capabilities. This may be due to the fact that the system as initially designed was for information retrieval only. Interactivity requires that the system provide the user with the ability to input information as well as providing for information retrieval.

Phillips (1981) contends that the success of Telidon's marketing is hinged on its development as a system with fully interactive capabilities that would allow users to not only access the data, but allow users to communicate with one-another individually, or communicate in group to group situations. Telidon as originally designed does not possess such capabilities. The Department of Communications (DOC) is pursuing the improvement of software and database "tree structures", and these improvements may result in improved interactive services (Feeley, 1982).

Adult Learning Characteristics and Videotex

Szabo (1982), in a discussion of CBL and adult learning needs, cites requirements that he feels are important to adults in learning situations. These include vocational training, learner control including self-pacing, feedback or interactivity, flexible study time, questions and practise items, instructional objectives and graphics. Although not exclusive to adult education, Szabo contends that these requirements are individual characteristics of adults which, in a learning/training environment, have a demonstrated and significant effect upon what is learned" (p. 1). Szabo goes on to state that computer based learning "has been demonstrated to meet each of these adult learning requirements in applied learning situations" (p. 7). Telidon videotex, apart from its present and possible future interactive capabilities, as an interactive system providing CAL/CML, has the capabilities at present to meet many adult learning requirements functioning only as a system providing information retrieval. This was one function that was suggested by TVOntario as a general tendency of Telidon development at the post secondary level. Further to this and not mentioned by Szabo is the often additional requirement in adult education of providing instruction over distances. Telidon videotex without major modifications to software or alternative software is capable at present of delivering intruactional information and graphics

in distance education situations, as evidenced in the University of Calgary's field trial study (Ellis & Winn, 1983).

A Summary

Several writers in the literature describe the educational applications of Telidon videotex and videotex systems in general in very optimistic terms. The optimistic view promotes Telidon as a system that is capable of, or has the potential to, function effectively as a computer based educational system providing CAL, CML, graphic page creation, and information retrieval and doing so in distance education situations, providing an individual with the opportunity to learn at home, or at work using a videotex system. Such is the view of Telidon presented in its promotional literature. Telidon's future potentialities have yet to be proven, but in terms of its present capabilities as a computer based educational system the results of several of the educational fields trials have demonstrated that limiting factors affect the functioning of Telidon as an educational computer based system. Among these factors are the limitations of the data base software "tree structure" which does not allow for effective CAL, CML, and interactive functioning. Further to this is the question posed in the TVOntario report

concerning the use, or misuse of a system designed for one purpose - information retrieval, but utilized for other purposes such as CAL and CML processes. Improvements are being undertaken to remedy Telidon's shortcomings and limitations in CAL and CML areas. The use of terminals with a built-in memory, and micro-processors will allow for the "downloading" of information from data bases, and the use of computer languages that are more conducive to CAL processes could substantially improve the CAL capabilities and the interactive capabilities of Telidon videotex. Again, it is hoped that the findings of the study presented here will result in further examining the improvements being made to Telidon videotex.

The learning effectiveness of several of Telidon's attributes may be questioned as well. Certainly problems such as user time and access may be attributable to the logistics of the field trial studies rather than inherent features of the videotex system utilized, although the fact that not enough terminals were made available may indicate a cost factor limiting their purchase and consequent use. Nevertheless, features of the Telidon system such as screen size and the resulting amount of visual information displayed at one time may place limitations on the educational use of Telidon that have not been mentioned in the promotional literature.

Despite the drawbacks, limitations and shortcomings of Telidon videotex mentioned in the literature, the Telidon field trials that involved only information retrieval, or the transmission of graphic information over distances have proved successful in terms of providing the "right" information at the "right" time and place. Whether or not this was done, or can be done efficiently and affordably remains to be seen. It is hoped that the study presented here will more fully explore these issues.

The Delphi Technique and Educational Media

The Delphi technique was originally developed by the Rand Corporation in the early 1950's to forecast futuristic trends in scientific breakthroughs, population control, automation, space progress, war prevention and weapon systems. In the last twenty years the technique has been used as a forecasting and assessment instrument in a variety of areas, from technological forecasting and assessment to the forecasting and assessment of socio-economic concerns.

Lanford (1972) describes the Delphi technique as one that "is directed to the systematic solicitation of expert opinion" (p. 20). He also lists the advantages of the Delphi technique over face-to-face panel meetings. They are:

1. The consensus reflects reasoned, self-aware opinions expressed in the light of the opinions of associate experts. Thus these predictions should provide a sounder basis for long-range decision making than do unarticulated intuitive judgments.

2. Research suggests that face-to-face discussion tends to make the group estimates less accurate, whereas the controlled-feedback procedure makes group estimates more accurate.
3. The procedures create a well defined process that can be described quantitatively.
4. A meaningful estimate of the accuracy of a group response to a given question can be obtained by combining individual self-ratings of competence on that question into a group rating.

A further advantage of the Delphi procedure is that it not only measures existing consensus of opinion, but can help to build further consensus of opinion around an issue. It does this by presumably mobilizing and directing expert thinking.

The reliability of the Delphi technique was examined by Uhl (1975), who tested the reliability of the consensus achieved in a Delphi study by giving the same questionnaire to the same panel of participants a year later and found that the results a year later were significantly more like the earlier Delphi's initial round than the final round.

Several limiting factors that are inherent features of the Delphi technique were discussed in the previous chapter concerning the influence they might have on the course of the study. Other factors, however, may cause the procedure to be ineffective or unreliable. Several of them are pointed out by Linstone & Turoff (1975). They are as follows:

- Imposing monitor views and preconceptions of a problem upon the respondent group by over-specifying the structure of the Delphi and not allowing for the contribution of other perspectives related to the problem.
- Assuming that the Delphi can be a surrogate for all other human communications in a given situation.
- Poor techniques of summarizing and presenting the group response and ensuring common interpretations of the evaluation scales used in the exercise.
- Ignoring and not exploring disagreements . . .
(Linstone & Turoff, 1975)

Pelton's study The Future of Telecommunications (1981) is a Delphi study in the traditional sense. It follows a time scale response procedure. Several of the questions in Pelton's study addressed the anticipated general use of videotex in the future. Three limiting factors are noted in Pelton's findings in regard to the general use of videotex services. The first is that videotex requires much more sophistication on the part of the user than does teletext. Second is the question of financing. People are accustomed to paying for entertainment but not for using a library. Third is the question of consumer marketing. What electronic information do consumers feel they need or want (Pelton, 1981)?

Research in applying the Delphi procedure to educational media has been undertaken in the past decade. Dean R. Spitzer is a proponent of the Delphi procedure for research in educational media. In the course of his research, Spitzer has developed and refined the procedure so that it conforms

to the requirements of media assessment and forecasting in education.

Spitzer's study, Educational Media in the Year 2000: A Program for Research, sought trends and issues for areas of further research. Spitzer modified the data analysis of the procedure utilizing variances derived from a Likert response scale instead of the traditional inter-quartile ranges derived from a time-line scale.

Spitzer's four round study utilized round one as a question generating round from which 68 distinct trends in educational media were elicited from a panel of 100 experts selected from the Association for Educational Communication Technology (AECT) membership directory. Such issues as computerized media distribution, improved graphic computer terminals, and increased computerized information retrieval were recognized as issues in educational media that would be important in the year 2000.

In further discussion of that study, Spitzer points out the need in the field of educational media for forecasting methods, particularly in light of the fact that in "education with our continually shrinking resources, planning for the future is a necessity" (Spitzer, 1976, p. 9).

Dayton (1981) utilized a Delphi procedure to assess the future production of instructional media in the year 2001. A population of 56 educators with media production experience responded to questions using a nine-point Likert scale that

assessed future issues in media types, hardware production techniques and marketability.

Dayton, like Spitzer, utilized round one as a question generating round. The subjects were categorized into work environments. Educators with a public education background comprised 25 percent of the survey population. Educators employed in higher education roles formed 71 percent of the survey population.

Although Dayton's study predates extensive trials or actual use of videotex systems in education it is of interest to note that in this study participants strongly agreed that a future tendency in education will be an increased reliance on electronic communications for distribution of instructional media (p. 237).

A much more recent Delphi study by Gordon (1984), concerned the future viability of all aspects of videotex technology and specifically attempted to analyze the impact videotex technology has and will have on education.

Gordon's findings support the view that videotex is still a technology looking for a market (p. 59). Gordon points out that initial investments of large sums of money to appeal to the general consumer market does not meet with financial success (p. 79).

Gordon's study included all phases and developments of videotex technology including the broadcast mode - teletext. The hypotheses that pertained to education in Gordon's study

were not delimited to specific grade levels in schools or areas of post-secondary education. Gordon's study included all videotex developments with emphasis on those in North America.

The study Videotex/Telidon in Canadian Adult Education: A Delphi Survey, undertaken by this writer overlaps in some areas with Gordon's study. This may be due to the fact that both studies were conducted during the same time period. Overlap is evident in the areas of marketability and cost factors. Such factors are important to any analysis or assessment of a technology, for financing and a market area must exist before any application may occur.

The study undertaken by this writer involves limitations not found in Gordon's study. Only the interactive on-line transmission mode of videotex by itself or in combination with other media was subject to analysis. Only this mode of videotex as applied to one level of education, that being adult education was subject to analysis. Furthermore this study is solely concerned with videotex developments in Canada. Trials and applications assessed are only those occurring in Canada with the Canadian version of videotex. The population for the study is comprised of Canadian educators who are employed at the adult education level, or individuals who have presented literature that is pertinent to this technology as applied to adult education in Canada.

Chapter III

DESIGN OF THE STUDY

A description of the procedure followed in the study, a profile of the subject population, a description of the instrument used, the response system used, and a description of the statistical analysis of the data are undertaken in this chapter.

Candidate Selection

From across Canada, 21 individuals recognized as having extensive knowledge and expertise in videotex applications at the adult education level were sent letters of invitation which outlined the nature and purpose of the study. These individuals were selected on the basis of their contributions to the literature and/or on the nature of the position of their employment, either or both of which indicated extensive knowledge or expertise of the subject matter in question. They were also requested to recommend other individuals whom they believed would qualify as participants. This "snowballing technique" produced a total of 68 potential candidates for participation.

Profile Analysis of the Candidates

To describe the population, candidates were requested to complete a "self-assessment profile" during round one.

As the nature of the study required the inclusion of subjects with diverse perspectives and backgrounds, it was decided that their particular areas of specialization be determined. A list was compiled containing specialized fields from which it was deemed the subject population would be composed. Participants were requested to place a check mark on the list indicating their area or areas of expertise. As these are not mutually exclusive categories, participants could indicate their respective areas of expertise in more than one category. The results of the "profile analysis" are presented in Chapter IV of this report.

The Opinionnaire

A preliminary panel of 5 candidates with diverse areas of specialization in adult education and videotex applications were selected from the 68 potential candidates. These five individuals were matched to the five categories listed in the profile analysis of candidates. Each individual represented one of the five categories listed in the profile analysis. These five individuals were requested to state their opinions regarding videotex applications at the adult education level in terms of the criteria outlined in the "Right Information" construct. From these statements, 19 issues regarding videotex applications at the adult education level were identified.

The 19 issues were categorized under the following 6 sub-headings as they relate to education:

- Presumed advantages of videotex by itself.
- Presumed advantages of videotex in combination with other media.
- Presumed disadvantages of videotex by itself.
- Presumed disadvantages of videotex in combination with other media.
- Presumed advantageous cost factors of videotex.
- Presumed non-advantageous cost factors of videotex.

Likert response ratings were utilized to establish the strength of participants opinions regarding the 19 stated issues, henceforth referred to herein as survey statements. Response categories included the assumed present educational importance or educational implication, the probable future educational importance or educational implication, the probable future utilization and the future prospect for improvement. Response categories varied depending on the nature of the issue in question. This produced an instrument with a total of 49 items. The term "future" was designated to be "within the next 10 years". Apart from the item responses, additional space was available for participants to "write in" their comments and opinions. A sample of the opinionnaire is included in Appendix A of this report.

When responding participants were requested to select a response modifier that would indicate the degree to which they felt their opinion of the statement was best expressed. For statistical purposes the response modifiers were converted to positive integers. The response modifiers and positive integer equivalents are shown in Table 1.

Table 1

Response Modifiers and Positive Integer Equivalents

Survey Instrument Value	Verbal Equivalent	Positive Integer Equivalent
0	"none at all"	1
+	"slight"	2
+ +	"moderate"	3
+ + +	"high"	4
+ + + +	"extremely high"	5

Round One

A covering letter, the opinionnaire, a self-assessment profile, and a stamped return envelope were mailed to each of the 68 candidates. Sample copies of these documents are found in Appendix A of this report. The five members of the preliminary panel were included in this mailing. It was decided that their participation and contributions were necessary due to the limited number of individuals with expertise videotex applications at the adult education level. The results of the round one (N_R) mailing are included in Chapter IV of this report.

Round Two

The data were compiled from the N_R group in round one. Likert responses were represented by histograms of percentage results. Written responses and comments from round one were compiled and copies of these and the histograms were mailed to the N_R group with another copy of the opinionnaire and a stamped return envelope. Sample copies of the histograms for rounds one and two are found in Appendix B of this report. The second round of the survey allowed participants the opportunity to alter their round one responses in light of the expressed opinions of all round one participants. The mailing results of rounds one and two are included in Chapter IV of this report.

Final Round

Upon completion of the study, copies of the statistical data and the written comments will be mailed to the N_{R2} participants. The conclusions of the study will also be forwarded the this group.

Analysis of Data

The analysis of the participants' written responses and comments was descriptive.

Statistical analysis of mean scores, standard deviations and percentage responses of the Likert response modifiers were calculated on the Multics System SPSS Sub-program "Frequencies".

Chapter IV

RESEARCH FINDINGS

Results of the Delphi Procedure

The response from round one of the Delphi procedure yielded a return rate of 51 percent of the total number of potential candidates. The round two response rate was 47 percent of the total potential candidates. The mailing results for round one and round two of the survey are shown in Table 2.

Table 2

Round One and Round Two Mailing Results

	<u>Round 1</u>	<u>Round 2</u>
Total number mailed	68	35
Completed and returned	35	31
Returned but not completed with reason	7	1
Not returned	26	3

Profile Analysis of Participants

During round one, candidates were requested to complete a profile analysis of themselves. They were asked to place a check mark beside areas that were deemed to be those from which the total population would be composed. Participants could indicate their area of expertise, and if necessary indicate their area of expertise in more than one category. The results from round one (N_{R1}) are shown in Table 3.

Table 3

Profile Analysis of Candidates (N_{R1})

Computer Information Science	8
Graphic Design	7
Information Systems Management	10
Instructional Design of Courseware	14
Instruction of Adult Learners	20

According to Table 3 the majority of participants cited "Instruction of Adult Learners" as their area of expertise. On the average each participant acknowledged expertise in approximately 2 areas.

Methods of Presentation and Analysis of the Data

The following is a description of the methods by which the statistical data and written comments are presented, and analyzed in later sections of this chapter.

The effects of the Delphi procedure on the statistical data in rounds one and two are presented in the section entitled Effects of the Delphi Procedure. Written comments and opinions obtained from rounds one and two of the Delphi survey that pertain more generally to the content of the study are presented and discussed in the section entitled General Comments. Comments and opinions that pertain to specific items on the opinionnaire are included in the section entitled Analysis of Survey Statements. Specific items that are presented in the latter section are discussed in the order in which they appeared in the opinionnaire. The statistical results in the form of histograms are presented in Appendix B of this report.

Effects of the Delphi Procedure

Mean scores and standard deviations for each item in rounds one and two were computed and are presented in Table 4 of this report. Included in Table 4 is the direction of change of the standard deviations between rounds one and two.

The effects of the Delphi procedure should, according to theory, cause convergence to occur, as the variance should decrease as the rounds progress. As apparent in Table 4, the standard deviations have decreased in 36 (73%) of the items and increased in 12 (24%) of the items. The standard deviation has remained constant for 1 item.

A positive change in standard deviations was found to occur in items where either of one of two conditions was in effect. The first condition was found in those items where consensus had formed in round one but not in round two and scores during round two were more widely dispersed in the categories of response modifiers. The second condition occurred in those items where consensus formed in round one in a particular category of response modifier, and formed in round two but in a different category of response modifier of either higher or lower value. The resulting shift in response for the latter condition resulted in a wider dispersion of scores in round two. A further description of the variables that may have caused the standard deviations to increase in twelve of the items [represented in Table 4 by a positive (+) sign] and remain the same in one item are presented in later sections of this chapter where analysis and discussion is undertaken for each individual item.

Table 4

A Comparison of Means and Standard Deviation Measures for Rounds One and Two of the Survey

Statement Number/Letter	<u>Round 1</u>		<u>Round 2</u>		Direction of Change of Standard Deviation
	Mean	S.D.	Mean	S.D.	
1A	2.80	1.08	2.39	0.99	-
1B	3.89	1.35	3.90	0.94	-
1C	3.80	1.32	3.52	1.06	-
2A	3.34	1.55	3.36	1.58	+
2B	4.14	1.35	4.10	0.98	-
2C	3.89	0.87	3.84	1.07	+
3A	3.06	1.47	2.87	0.67	-
3B	4.14	1.22	4.32	0.70	-
3C	3.86	1.31	4.10	1.40	+
4A	3.17	1.47	2.90	1.17	-
4B	4.09	1.38	3.94	1.03	-
4C	3.77	0.97	3.81	0.98	+
5A	2.49	1.04	2.48	0.96	-
5B	3.40	1.42	3.58	0.99	-
5C	3.34	0.97	3.32	0.97	no change
6A	3.34	1.00	3.58	0.96	-
6B	4.11	1.21	4.10	0.79	-
6C	4.03	1.25	4.10	0.91	-
7A	3.37	2.06	2.81	1.60	-
7B	4.06	1.83	3.90	1.25	-
7C	3.86	1.65	3.87	1.31	-
8A	3.71	2.22	3.52	1.90	-
8B	4.14	2.10	4.10	1.70	-
8C	4.31	2.18	4.26	1.86	-

Cont: Table 4

Statement Number/Letter	<u>Round 1</u>		<u>Round 2</u>		Direction of Change of Standard Deviation
	Mean	S.D.	Mean	S.D.	
9A	3.34	2.04	2.94	1.59	-
9B	4.46	1.72	4.10	0.95	-
9C	4.25	1.60	4.16	0.86	-
10A	3.87	1.66	3.39	1.43	-
10B	4.00	1.46	4.16	1.44	-
11A	2.06	1.49	2.90	1.32	-
11B	3.86	1.73	3.87	1.78	+
12A	3.26	1.48	3.19	1.45	-
12B	3.83	1.76	3.74	1.46	-
13A	3.31	1.51	2.81	0.91	-
13B	3.97	1.76	3.84	1.57	-
14A	3.37	1.80	3.07	1.03	-
14B	3.60	1.44	3.45	1.18	-
15A	2.80	1.57	3.39	1.87	+
15B	3.63	1.66	4.39	2.03	+
15C	3.31	0.96	4.39	1.96	+
16A	3.17	1.47	3.36	1.38	-
16B	4.14	1.56	4.16	1.61	+
16C	3.69	1.05	4.10	1.39	+
17A	3.86	1.83	3.36	1.23	-
17B	3.74	1.50	3.90	1.13	-
18A	3.94	1.35	3.97	1.33	-
18B	3.31	1.41	3.29	1.55	+
19A	3.54	1.50	3.68	1.25	-
19B	3.43	0.95	3.23	1.09	+

General Comments Compiled from Round One

Although participants were encouraged to express comments and opinions in the "write in" section of the instrument for both rounds one and two, more written comments and opinions were obtained from round one responses than from the round two responses. It is likely that some participants felt that once their opinions had been expressed it was unnecessary to restate them on the second round instrument, especially if their opinions remained unchanged. The comments presented in this section are those that were obtained from the round one instrument. These comments were presented to participants at the start of round two.

One participant who cited "Instructional Design of Courseware" and "Instruction of Adult Learners" as areas of expertise, questioned the reliability of forecasting studies. This participant stated the following:

I'm not certain how to respond to those statements looking 10 years into the future. There are so many factors involved: economic, instructional. Ten years ago we were not predictors of the current situation.

Several participants commented on the self-directed learning capabilities of videotex and the possible implications such capabilities might have on institutionalized education. One participant whose areas of expertise included "Computer Information Science", "Instruction of Adult

Learners" and "Information Systems Management" stated the following:

I cannot stress too strongly that the use of CAL, CML, Videotex, database access etc., is a client centered process. If we insist on approaching it with a broadcasting (instructor-oriented) mentality we will miss the point completely. Videotex is not a megaphone - it is a resource to the user.

Another participant whose areas of expertise included "Instruction of Adult Learners" and "Information Systems Management" stated that:

Most institutions of education are followers rather than leaders, consequently the technology will be shaped outside the halls of education more by the imagination of self-learners than by instructors who want to "control" the content of that which we want to learn Educational institutions are in for a rude awakening once the technology can be used by everyone.

One participant involved with "Instruction of Adult Learners" and "Communication and Media Theory" expressed the following:

I am extremely sceptical about the present educational system at every level, being able to deal with this aspect of the informatics revolution. The private sector will take over the educational software market with customized materials, quickly, effectively, and seductively. The private sector will establish private schools, more capable than established systems of responding to the demands of the market place.

Two participants expressed opinions concerning the possibility of micro-computers superseding videotex technology. One stated that:

It is likely that technological advances in microcomputer hardware and software (eg. memory size, cost of equipment, compatibility of software, etc.) will most assuredly bring into question the efficacy and efficiency of large data bases for storage and retrieval of information for educational purposes, especially guided independent study at home or at work. Even with today's technology, micro computers and/or slow scan or freeze frame television can be utilized with audio teleconferencing without the need for a large a data base for most educational applications. Even the superior graphics quality which is inherent in the Telidon version of videotex will give way to the improving software and printing capabilities of the microcomputer.

The second participant expressed the following regarding micro-computers:

The capability of the microcomputer is now close or surpassing the Telidon decoder. Look at the SM 70 micro that runs videodisc machines, manipulates videotape and creates 144 colour graphics with 256K for under \$3000. Think of the educational implications of that.

One participant, commenting upon the selection of the response modifier stated that "the present situation is only a few small pilot projects. So the present importance of everything is = 0". This participant went on to state that:

The only technological improvements needed are the replacement of telephone wires with broadband cables, and the introduction of High definition NAPLPS [North American Presentation Level Protocol Syntax] standard displays and printers. The main limitation is the lack of provision for interlearner and learner teacher synchronous and asynchronous direct communications, which is technically possible now but the DOC [Department of Communications] just didn't understand its importance and so did nothing to implement it.

Additional general comments by participants in round one concerned the uniqueness and importance of Telidon videotex services. One participant stated that "the results [of the study presented here] will have to report that the presumed advantages of Videotex by itself are not unique advantages of videotex, and the results should be interpreted accordingly". Another participant suggested that "Videotex services are an interim technology. Temporarily important, but not important in the long run".

General Comments Compiled From Round Two

There were not as many "written" responses obtained from the round two opinionnaire. Several participants did restate their opinions as expressed in round one. However, in round two several comments, not mentioned in round one, were expressed concerning the financing and marketing of videotex in educational areas. They are:

- Formic has a software decoder to run in an "Apple IIe" for about \$250, and an Information Provider packaging system can be obtained for about \$2500 - \$3500, so that the main remaining problems are those of high telephone costs and low government expenditures in education.
- Videotex is still a technology searching for its market potential. Just look at Telidon and all of the sunk costs in field trials - no one in Canada has seen a significant return on their investment. Videotex will also not be utilized in education until business, industry and government are successfully using this technology. Educators will be the last group to implement videotex. Also the videotex that you and I recognized today will not be the videotex of tomorrow, it will be integrated with new technologies and will be indistinguishable as being "videotex".

Analysis of Survey Statements

Formation of Consensus

It was decided that to assist in the discussion of the statistical data the term "consensus", which is the degree of agreement among participants, would be further defined. A strong consensus was designated as occurring when 50 percent or more of the participants selected the same response modifier for a particular item. A medium consensus was designated as occurring when 40 percent or more of the participants but less than 50 percent selected the same response modifier for a particular item. A weak consensus was designated as occurring when more than 30 percent or more of the participants but less than 40 percent selected the same response modifier for a particular item.

According to the research findings for all of the survey statements discussed and presented in this section, regarding the formation of consensus, that is, where 30 percent or more of the participants selected the same response modifier for a particular item, the following is noted:

- In 2 survey statement items the results indicate the formation of consensus only in round two.
- In 6 survey statement items the results indicate the formation of consensus only in round one.
- In 9 survey statement items the results indicate the formation of consensus in both rounds one and two, however the degree of consensus decreased in round two.
- In 25 survey statement items the results indicate the formation of consensus in round one and an increase of consensus in round two.

Survey Statement One

Learner Interactive

(A presumed advantage of videotex by itself.)

Videotex allows learners to access with a data base interactively and be differentially routed through instructional and remedial information.

Participants' comments from round one that refer specifically to Survey Statement One concern the computer based software "tree structure" of Telidon and its limited capabilities regarding interactivity. The specific comments are:

- Only to a limited extent via "tree structures".
- Videotex systems do this very badly.
- Tree indexing is poor.

Table 5

Responses in Percentage and Mean Scores ($\bar{X}$)
for Survey Statement One

	1	2	3	4	5	"nr"	$\bar{X}$
1A							
Rnd1	5.7	42.9	25.7	17.1	8.6	0.0	2.80
Rnd2	16.1	45.2	25.8	9.7	3.2	0.0	2.39
1B							
Rnd1	2.9	8.6	22.9	40.0	22.9	2.9	3.89
Rnd2	0.0	9.7	19.4	41.9	29.0	0.0	3.90
1C							
Rnd1	0.0	11.4	34.3	28.6	22.9	2.9	3.80
Rnd2	0.0	22.6	22.6	35.5	19.4	0.0	3.90

As apparent in Table 5, referring to item 1A, which pertains to the presumed advantage of videotex providing learner interactivity at present, a medium consensus is indicated as 45.2 percent of the round two participants selected the "slight" (2) modifier rating. The round one mean score of 2.80 approaches the "moderate" (3) rating, but a shift toward the "slight" (2) rating occurred during round two resulting in a mean score of 2.39, which approaches the "slight" area of consensus. It would appear that the specific comments concerning the limitations of the "tree structure" database software influenced the formation of consensus of opinion in round two and caused further consensus to build in the "slight" (2) category and increase in the "none at all" (1) category. A moderate consensus of the population, as indicated by the results in Table 5, believes that learner interactivity provided by videotex systems is only of "slight" educational importance.

Item 1B concerns the probable future educational importance of the presumed advantage of videotex providing learner interactivity. The results of round two indicate that a medium consensus occurred as 41.9 percent of the respondents selected the "high" (4) response modifier during round two. There was not an appreciable shift in mean scores between rounds one and two for this item. Mean scores in both rounds approach the "high" (4) rating, indicating a group opinion that the presumed advantage of

videotex providing learner interactivity, will in the probable future be of educational importance.

Item 1C concerns the probable future utilization of learner interactive videotex. A shift in percentage responses occurred between rounds one and two. A weak consensus was indicated as 34.3 percent of the participants selected the "moderate" (3) response modifier during round one. However, during round two the consensus shifted to the "high" (4) response modifier with a percentage response rate of 35.5. A mean score for round two of 3.90 indicates a "moderate" to "high" group rating, with a consensus of agreement that in the probable future videotex will be utilized for learner interactivity.

Survey Statement Two

Easy Access of Pages

(A presumed advantage of videotex by itself.)

Users may access required pages of information without going through entire programs or structured sequences of pages.

Participants' comments from round one that pertain specifically to Survey Statement Two again concern the limitations of the "tree structure" data base software.

The specific comments are:

- Current problem is menu driven "tree structure". Users go through dumb sequences of pages.
- This is not true for videotex systems as presently designed.

Table 6

Responses in Percentage and Mean Scores ($\bar{X}$)
for Survey Statement Two

	1	2	3	4	5	"nr"	$\bar{X}$
2A							
Rnd1	11.4	14.3	31.4	25.7	14.3	2.9	3.34
Rnd2	9.7	19.4	25.8	29.0	12.9	3.2	3.35
2B							
Rnd1	2.9	11.4	2.9	45.7	34.3	2.9	4.14
Rnd2	3.2	3.2	12.9	41.9	38.7	0.0	4.10
2C							
Rnd1	0.0	5.7	25.7	42.9	25.7	0.0	3.89
Rnd2	3.2	9.7	16.1	41.9	29.0	0.0	3.83

As apparent in Table 6, referring to item 2A which concerns the present importance of the presumed advantage of easy page accessing on videotex, a weak consensus of 31.4 percent formed in round one in the "moderate" (3) response category. A consensus is not evident for this item in round two, however, there was an increase in responses in the "high" (4) category and in the "slight" (2) category. The fact that consensus did not form in round two for this item is evidenced by the increase apparent in the standard deviation values shown in Table 4. The two specific comments made by participants in round one who were not in agreement with the affirmative nature of the survey statement, may have caused the divergence of

opinion evident in the standard deviation changes. Because consensus in round two is not evident for this item the findings in regard to group opinion of the educational importance of easy page accessing are inconclusive.

Item 2B pertains to the probable future educational importance of the presumed advantage of videotex for easy page accessing. A medium consensus is indicated in Table 6 as 41.9 percent of the participants selected the "high" response modifier during round two. A weak consensus of 38.7 percent is indicated for the "extremely high" (5) response modifier. The round two mean score of 4.10 conforms to the "high" category of medium consensus of opinion which suggests that in the probable future the educational importance of easy page accessing on videotex will be "high".

Item 2C concerns the probable future educational utilization of videotex for the presumed advantage of easy page accessing. A medium consensus is indicated as 41.9 percent of the participants selected the "high" (4) response modifier during round two. A round two mean score of 3.83 indicates a group opinion that in the future this aspect of videotex will be utilized in education. Standard deviation values, as shown in Table 4, also increased for this item. This may be due to the dispersion of percentage scores that occurred in round two. Although the percentage of respondents who selected the "high" (4) category remained relatively stable

in both rounds, the percentage results increased during round two in the "none at all" (0), "slight" (1), and "extremely high" (5) response categories. Despite the wider dispersion of scores in round two a medium consensus is apparent and would indicate that in the probable future the easy page accessing capabilities of videotex will be "highly" utilized in education.

Survey Statement Three

Information Sharing

(A presumed advantage of videotex by itself.)

Information in data bases may be shared or exchanged by different educational areas or institutions.

Specific comments from round one that pertain to survey statement three are as follows:

- Information is linked with courseware which is costly for institutions.
- Videotex system design is likely to impede this [information sharing], although the adoption of the NAPLP [North American Presentation Level Protocol Syntax] standard is potentially very important.

The statistical results of Survey Statement Three are shown in Table 7. Item 3A concerns the present educational importance of the presumed advantage of videotex providing information sharing services as indicated therein. A weak consensus of 37.1 percent formed in the "slight" (2) category. A shift of opinion occurred in round two resulting in a strong consensus of 64.5 percent of the participants selecting the

moderate response modifier. A round two mean of 2.87 indicates a group opinion that information sharing, at present, is of moderate educational importance.

Table 7

Responses in Percentage and Mean Scores ($\bar{X}$)
for Survey Statement Three

	1	2	3	4	5	"nr"	$\bar{X}$
3A							
Rnd1	5.7	37.1	22.9	25.7	5.7	2.9	3.06
Rnd2	0.0	25.8	64.5	6.5	3.2	0.0	2.87
3B							
Rnd1	0.0	8.6	11.4	48.6	28.6	2.9	4.14
Rnd2	0.0	0.0	12.9	41.9	45.2	0.0	4.32
3C							
Rnd1	0.0	8.6	37.1	25.7	25.7	2.9	3.86
Rnd2	0.0	12.9	19.4	25.8	38.7	3.2	4.10

For item 3B, which concerns the future educational importance of the presumed advantage of videotex providing information sharing services, a medium consensus is indicated in both "high" and "extremely high" response modifier categories. A shift toward the "extremely high" response modifier occurred during round two as the percentage of response for "extremely high" increased from 28.6 percent in round one to 45.2 percent in round two. A resulting round two mean score of 4.32 conforms to the medium consensus in both "high" and "extremely high" categories indicating that in

the probable future information sharing via videotex systems will be very important in educational areas.

Item 3C pertains to the probable future utilization of videotex for information sharing. A medium consensus of 37.1 percent formed during round one on the "moderate" (3) response modifier. As in Item 3B a shift toward "higher" values occurred during round two. A medium consensus of 38.7 percent of the participants selected the "extremely high" (5) response modifier in round two. A round two mean score of 4.10 indicates a group opinion that in the probable future videotex will be much used in education for information sharing. The change in the area of consensus for this item between rounds attests to the wide dispersion of scores which is evidenced by the fact that change in standard deviation for item 3C increased during round two as shown in Table 4.

Survey Statement Four

Information Updating

(A presumed advantage of videotex by itself.)

Constantly changing information, such as statistics, can be readily "updated" in data bases.

The specific comments from round one questioned the credibility of the statement that "videotex can be readily updated". The comments are as follows:

- On the contrary the "videotex" philosophy - outside of the U.K. context prevents the rapid "updating" of information.
- Pages are quite hard to update.

Table 8

Responses in Percentage and Mean Scores ($\bar{X}$)
for Survey Statement Four

	1	2	3	4	5	"nr"	$\bar{X}$
4A							
Rnd1	8.6	22.9	31.4	28.6	5.7	2.9	3.17
Rnd2	9.7	32.3	25.8	22.6	9.7	0.0	2.90
4B							
Rnd1	5.7	2.9	17.1	37.1	34.3	2.9	4.09
Rnd2	3.2	3.2	25.8	32.3	35.5	0.0	3.94
4C							
Rnd1	2.9	5.7	25.7	42.9	22.9	0.0	3.77
Rnd2	0.0	6.5	38.7	22.6	32.3	0.0	3.81

In Table 8, regarding item 4A which concerns the present educational importance of information updating, a shift in participants' responses occurred in round two which may be attributable to the two specific comments made by participants during round one that were not in agreement with Survey Statement Four. In round one a weak consensus is indicated as 31.4 percent of the participants selected the "moderate" (3) response modifier. The consensus of group opinion shifted to the "slight" (2) responses modifier during round two. However, the round two mean score of 2.90 did not shift appreciably. The weak consensus of group opinion that formed in the "slight" (2) response modifier category indicates that at present the educational importance of information updating is "slight".

Item 4B pertains to the probable future educational importance of information updating, that is presumed to be an advantage of videotex systems. A weak consensus has formed in both the "high" and "extremely high" response modifiers for both rounds one and two. A round two mean score of 3.94 indicates that in the probable future, according to consensus of group opinion, information updating via videotex will be "highly" important in education.

Item 4C concerns the utilization of videotex for information updating in the probable future. Although mean scores have not altered appreciably between rounds, the participants' responses have. A moderate consensus of 42.9 percent selected the "high" (4) response modifier during round one. Subsequently, during round two the responses shifted in both directions, forming a weak consensus on both the "moderate" (3) and on the "extremely high" (5) response modifiers. This dispersion is also apparent in the changes in the values of standard deviations for this item, which have slightly increased, as shown in Table 4. The resulting round two mean score of 3.81 is between the two areas of consensus. One weak consensus of group opinion indicating that the probable future educational utilization of information updating will be "moderate", the other area of weak consensus indicating that it will be "highly" utilized.

Survey Statement Five

Simulated Motion

(A presumed advantage of videotex by itself.)

Visuals can be animated by simulated motion as pages are displayed on screen.

The comments pertaining specifically to this item from round one are as follows:

- Currently not easy to do.
- The lack of animation is a major short-coming of the NAPLP standard.
- Hard to do now.

Table 9

Responses in Percentage and Mean Scores ($\bar{X}$)
for Survey Statement Five

	1	2	3	4	5	"nr"	$\bar{X}$
5A							
Rnd1	17.1	37.1	28.6	14.3	2.9	0.0	2.49
Rnd2	12.9	41.9	32.3	9.7	3.2	0.0	2.48
5B							
Rnd1	5.7	14.3	40.0	25.7	11.4	2.9	3.40
Rnd2	3.2	9.7	29.0	41.9	16.1	0.0	3.58
5C							
Rnd1	0.0	17.1	48.6	17.1	17.1	0.0	3.34
Rnd2	3.2	16.1	35.5	35.5	9.7	0.0	3.32

Table 9 refers to the presumed advantage of using simulated motion on videotex. In regard to item 5A which indicates the percentages of group response concerning the

present importance of simulated motion on videotex, a weak consensus of 37.1 percent of the population indicated that it felt that simulated motion was only of "slight" (2) importance at present. The percentage of participants who selected the "slight" response modifier increased during round two forming a medium consensus in this response category. The increase of consensus in the "slight" area of response may have been due to several of the specific round one comments that were in disagreement with the survey statement. The mean scores did not vary appreciably between rounds. A round two mean score of 2.48 indicates a group consensus between the "slight" (2) and "moderate" (3) response modifiers which is between the two areas of consensus and indicates that at present the features of simulated motion on videotex are of "slight" to "moderate" importance in education.

Item 5B refers to the probable future educational importance of simulated motion on videotex. A medium consensus formed in both rounds but shifted during round two to the higher response modifier with 41.9 percent of the respondents selecting the "high" (4) response modifier. The mean score increased as well resulting in a round two mean score of 3.58 indicating that participants believed that in the probable future simulated motion on videotex would be of "moderate" to "high" educational importance.

Item 5C refers to the probable future educational utilization of simulated motion on videotex. A medium consensus of 48.6 percent of the respondents in round one indicated that simulated motion would be utilized "moderately" in the probable future. During round two consensus shifted to the higher categories forming two areas of medium consensus. One area of consensus remained on the "moderate" (3) response modifier. The other area of medium consensus formed in the "high" (4) category. The round two mean score dropped slightly but remained in the "moderate" to "high" region with a resulting mean score of 3.32. The dispersion of scores that occurred in round two that resulted in two different areas of consensus forming, caused the standard deviations to remain unchanged as shown in Table 4 on page 36. The two areas of weak consensus that formed in round two would indicate a consensus of group opinion that in the probable future the features of simulated motion would be "moderately" to "highly" utilized.

Survey Statement Six

Colour Display

(A presumed advantage of videotex by itself.)

Pictorial, graphic and textual information can be high-lighted or identified by the use of colour.

Only one participant commented during round one regarding colour display. That participant stated the following:

- Most users don't know how to effectively use these facilities . . . I hope this will change in the next decade.

Table 10 refers to the presumed educational advantage of colour display on videotex systems. Item 6A refers to the present educational importance of colour display on videotex. A weak consensus was formed as 37.1 percent of the participants selected the "high" (4) response modifier during round one. This increased during round two forming a medium consensus of 41.9 percent of the participants selecting the "high" (4) response modifier. The round two mean score increased from 3.34 to 3.58, both indicate a group opinion that at present colour display on videotex is of "moderate" to "high" importance.

Table 10

Responses in Percentage and Mean Scores ($\bar{X}$)
for Survey Statement Six

	1	2	3	4	5	"nr"	$\bar{X}$
6A							
Rnd1	0.0	25.7	25.7	37.1	11.4	0.0	3.34
Rnd2	0.0	16.1	25.8	41.9	16.1	0.0	3.58
6B							
Rnd1	0.0	8.6	11.4	51.4	25.5	2.9	4.11
Rnd2	0.0	6.5	6.5	58.1	29.0	0.0	4.09
6C							
Rnd1	0.0	8.6	20.0	42.9	25.7	2.9	4.03
Rnd2	0.0	9.7	6.5	48.5	35.5	0.0	4.10

In item 6B which concerns the future educational importance of the colour display features of videotex, a strong consensus formed in both rounds one and two in the "high" (4) response modifier category. The strong consensus increased during round two to 58.1 percent. A round two mean score of 4.09 attests to the strong consensus found in the "high" (4) response modifier category, and indicates a group consensus that in the probable future colour display features of videotex will be "highly" important in educational areas.

Item 6C concerns the probable future educational utilization of colour display features on videotex. A medium consensus is indicated as 42.9 percent of the participants selected the "high" (4) response modifier. During round two the medium consensus increased to 48.5 percent. A weak consensus of 35.5 percent also formed in round two in the "extremely high" (5) response modifier category. Mean scores did not vary appreciably between rounds. A round two mean score of 4.09 conforms to the "high" response modifier category where the strongest consensus of group opinion occurred. The findings indicate that in the probable future colour display features of videotex will be "highly" utilized in educational areas.

Survey Statement Seven

Combined With Audio

(A presumed advantage of videotex in combination with other media.)

A visual display can be combined with audio transmission for a full audio-visual presentation with the instructor in control of access.

The specific comments from round one that pertain to videotex combined with audio transmission are as follows:

- Not much value unless learner can access [learner interactivity with the system].
- The technological problems of synchronization are beyond most instructors' budgets and/or time.

Table 11

Responses in Percentage and Mean Score ($\bar{X}$)
for Survey Statement Seven

	1	2	3	4	5	"nr"	$\bar{X}$
7A							
Rnd1	8.6	34.3	17.1	25.7	5.7	8.6	3.37
Rnd2	16.1	32.3	29.0	12.9	6.5	3.2	3.90
7B							
Rnd1	2.9	14.3	14.3	45.7	14.3	8.6	4.06
Rnd2	0.0	6.5	29.0	45.2	16.1	3.2	3.90
7C							
Rnd1	0.0	20.0	22.9	31.4	20.0	5.7	3.86
Rnd2	0.0	12.9	19.4	48.4	16.1	3.2	3.87

Table 11 refers to the presumed advantage of videotex in combination with audio transmission. For item 7A in Table 11 which concerns the present educational importance of videotex combined with audio transmission, a weak consensus formed in both rounds one and two in the "slight" (2) response modifier category. During round two scores shifted noticeably to the lower values. The mean score shifted in this direction as well from a "moderately high" mean score of 3.37 in round one to a more "moderate" value of 2.81 in round two. The round two mean score indicates a group opinion that at present, the presumed advantage of videotex combined with audio transmission is only of "moderate" educational importance.

Item 7B concerns the probable future educational importance of videotex combined with audio transmission. As shown in Table 11, a medium consensus formed in the "high" (4) response modifier category in both rounds one and two. Consensus did not vary greatly between rounds. However, an increase is evident in the round two results in the "moderate" (3) response modifier category which resulted in a percentage response rate of 29.0. Mean scores in both rounds one and two reflect consensus forming in the "high" (4) category which indicates a group consensus of opinion that combined audio transmission will be of "high" educational importance in the probable future.

The probable future educational utilization of combined audio transmission is shown in the results of item 7C.

Consensus, which was weak in round one in the "high" (4) response modifier category increased during round two to form a medium consensus of 48.4 percent. Mean scores did not appreciably change between rounds. The resulting round two mean score of 3.87 approaches the "high" (4) response modifier category and represents an group consensus of opinion that in the probable future, videotex combined with audio transmission will be "highly" utilized in educational areas.

Survey Statement Eight

Instructor Interactive

(A presumed advantage of videotex in combination with other media.)

Instructors may disclose information at a pace they feel is most desirable for learners.

Several participants felt that the survey statement in question was not true, and therefore not an advantage of videotex systems. As evidenced by the relatively high percentage of "blank" (nr) responses as shown in Table 12 for all items of this survey statement, it can be assumed that the participants who did not agree with the survey statement could not select a suitable response modifier to express the degree to which they were in agreement. The extent of disagreement is apparent in the following specific round one comments:

- Absolutely not so! Learners may access information at a pace they feel is most desirable. (The days of instructor as keeper of information are numbered).
- This concept is dangerous in its naivety.
- With Videotex - No - not effective "CML".

Item 8A in Table 12 refers to the present educational importance of videotex providing instructors with the capability of controlling the pace of the information disclosed. Consensus did not form in either rounds one or two for this item. It is evident that scores shifted toward the "moderate" response modifier during round two, however, as consensus did not form in round two the results in terms of group opinion are inconclusive. Thus rendering the question invalid as part of the survey.

Table 12

Responses in Percentage and Mean Scores ($\bar{X}$)
for Survey Statement Eight

	1	2	3	4	5	"nr"	$\bar{X}$
8A							
Rnd1	8.6	22.9	22.9	25.7	8.6	11.4	3.71
Rnd2	9.7	19.4	29.0	19.4	16.1	6.5	3.52
8B							
Rnd1	8.6	8.6	17.1	37.1	17.1	11.4	4.14
Rnd2	0.0	19.4	12.9	32.3	29.0	6.5	4.10
8C							
Rnd1	5.7	8.6	17.1	42.9	11.4	14.3	4.31
Rnd2	0.0	16.1	12.9	38.7	22.6	9.7	4.25

Item 8B refers to the probable future educational importance of "instructor interactivity". A weak consensus of 37.1 percent formed in the "high" (4) response modifier category during round one. A weak consensus of 32.3 percent was maintained during round two. Response shifted toward the "extremely high" (5) response modifier in this round with 29.0 percent of the population selecting the "extremely high" response modifier. A round two mean score of 4.10 conforms to the weak consensus in the "high" response modifier indicating that in the probable future interactivity for instructors would be "highly" important.

Item 8C concerns the probable future utilization of videotex for instructor interactivity. A moderate consensus of 42.9 percent formed during round one in the "high" response modifier category. During round two a weak consensus of 38.7 percent selected the "high" category, with a resulting round two mean score of 4.25. The findings indicate a consensus of group opinion that in the probable future, videotex will be "highly" utilized for instructor interactivity.

Survey Statement Nine

Downloading Information

(A presumed advantage of videotex
in combination with other media.)

Pages of information can be "downloaded" from data bases to microcomputers or display terminals with memory storage capacity.

The use of "downloading" information on Telidon videotex will be increased by its adoption as a North American standard by the North American Presentation Level Protocol Syntax. This was pointed out by one participant who stated, referring to the standardization of the Telidon graphics code, that downloading "is a very important side effect of NAPLPS".

Table 13

Responses in Percentage and Mean Scores ($\bar{X}$)
for Survey Statement Nine

	1	2	3	4	5	"nr"	$\bar{X}$
9A							
Rnd1	11.4	22.9	34.3	17.1	5.7	8.6	3.34
Rnd2	12.9	32.3	25.8	19.4	6.5	3.2	2.94
9B							
Rnd1	2.9	5.7	11.4	37.1	34.3	8.6	4.46
Rnd2	3.2	3.2	9.7	48.4	35.5	0.0	4.10
9C							
Rnd1	2.9	8.6	14.3	31.4	37.1	5.7	4.26
Rnd2	0.0	3.2	19.4	35.5	41.9	0.0	4.16

As apparent in Table 13 regarding item 9A which refers to the present educational importance of "downloading" information on videotex systems, a medium consensus of 34.3 percent formed in the "moderate" (3) response modifier category during round one, and shifted to form a medium consensus of 32.3 percent in the "slight" (2) response modifier category during round two. A shift in mean scores of 3.34 for round one and 2.94 for round two attests to the shift

in response from a "moderate" rating towards a "slight" rating. The resulting formation of consensus in round two indicates that the "downloading" of information is only of "slight" importance in education at present.

Item 9B concerns the probable future educational importance of "downloading" information in videotex systems. A weak consensus formed in both "high" (4) and "extremely high" (5) response modifier categories during round one. During round two consensus increased for both categories, and a medium consensus of 48.4 percent formed in the "high" response modifier category. The resulting round two mean score of 4.10 conforms to the "high" response category where consensus formed, indicating that in the probable future the "downloading" of information on videotex systems will be "highly" important in education.

Item 9C refers to the probable future utilization of "downloading" information on videotex systems. Again, as in item 9B, a weak consensus formed in both "high" (4) and "extremely high" (5) response modifier categories. During round two the consensus increased in both "high" and "extremely high" categories. A weak consensus of 35.5 percent formed in the "high" category, and a strong consensus of 41.9 percent formed in the "extremely high" category. The results indicate a consensus of opinion that in the probable future the "downloading" of information on videotex systems will be "highly" utilized.

Survey Statement Ten

Speed of Display

(A presumed disadvantage of videotex by itself.)

Once accessed and transmitted it takes a relatively long period of time for complete pages to appear on screen.

The only comment by a participant in reference to the speed of display was that "it depends on the method of transmission".

Table 14

Responses in Percentage and Mean Scores ($\bar{X}$)
for Survey Statement Ten

	1	2	3	4	5	"nr"	$\bar{X}$
10A							
Rnd1	2.9	11.4	31.4	25.7	22.9	5.7	3.89
Rnd2	3.2	19.4	41.9	19.4	12.9	3.2	3.39
10B							
Rnd1	5.7	8.6	14.3	34.3	34.3	2.9	4.00
Rnd2	6.5	3.2	12.9	25.5	38.7	3.2	4.16

Item 10A in Table 10 refers to the present implications the relatively slow speed of display on videotex may have in educational areas. A weak consensus of 31.4 percent formed in the "moderate" (3) response modifier category during round one. Almost 50 percent of the population however selected either the "high" (4) or "extremely high" (5) response modifier in round one. Response shifted to more moderate and

lower values during round two, with a medium consensus of 41.9 percent forming in the "moderate" (3) response modifier category. The mean scores shifted as well during round two towards more moderate and lower responses. The resulting round two mean score of 3.39 attests to the consensus of opinion that the disadvantages of the relatively slow speed of display on videotex systems has "moderate" educational implications at present.

The future prospect for improvements in the speed of display is shown in item 10B. A weak consensus formed in the "high" (4) and "extremely high" (5) response modifier categories in round one. During round two consensus formed only in the "extremely high" response modifier category. A tendency evident in round two was toward scores of higher value. The consensus of opinion formed in round two indicates that in the probable future the prospects for improved speed of display are "extremely high".

Survey Statement Eleven

Lack of Active Motion

(A presumed disadvantage of videotex by itself.)

Currently, motion on Videotex is simulated by animation as pages appear. It does not display "real" active motion.

Only one specific comment pertaining to the lack of active motion was made by a participant. That participant stated that the "Formic system in Montreal has this feature".

Table 15

Responses in Percentage and mean Scores ($\bar{X}$)
for Survey Statement Eleven

	1	2	3	4	5	"nr"	$\bar{X}$
11A							
Rnd1	5.7	34.3	34.3	11.4	11.4	2.9	3.06
Rnd2	3.2	23.3	51.6	9.7	0.0	3.2	2.90
11B							
Rnd1	5.7	11.4	28.6	22.9	25.7	5.7	3.81
Rnd2	6.5	9.7	29.0	25.8	22.6	6.5	3.87

The results of item 11A in Table 5 show the participants' responses to the present educational implications of the presumed disadvantage of the lack of active motion on videotex. A weak consensus formed in both the "slight" (2) and "moderate" (3) response modifier categories in round one. Scores shifted towards the "moderate" (2) response modifier category during round two resulting in a strong consensus of 51.6 percent forming in this category. The mean scores of 2.90 for round two is in the "moderate" response area and conforms to strong a group consensus of "moderate" opinion. The results indicate that at present the implications of this presumed disadvantage of lack of active motion on videotex are "moderate" in educational areas.

Item 11B shows the results of participants' responses to the question of the prospect for future improvements in the active motion features of videotex. A consensus did not form

in any response modifier categories in either rounds one or two. The scores were dispersed in all categories, however, the highest percentage of responses occurred in the "moderate" (3) response modifier category during round two. The fact that consensus did not form in either round one or round two, is indicative of the results of the changes in the standard deviations reported for this item in Table 4. An very small increase in the standard deviations occurred in round two, from 1.73 in round one to 1.78 in round two, indicating a wider dispersion of scores in the second round. Because the formation of consensus did not occur, the results of the prospect for future improvements in the active motion features of videotex are inconclusive.

Survey Statement Twelve

Screen Size Display

(A presumed disadvantage of videotex by itself.)

Only a limited amount of information can appear on one videotex page.

The percentage results of Survey Statement Twelve are shown in Table 16. Ambiguities existed in the wording of this survey statement and perhaps the wording of the questioning should not have included, in the same survey statement, the physical size of the screen and the amount of information that could appear at one time on the screen display. The validity of the results for both items A and B of this survey statement are questionable because of the ambiguous wording. It was

decided to regard the results for both items A and B of Survey Statement Twelve as invalid and reject them from the survey.

Table 16

Responses in Percentage and Mean Scores ($\bar{X}$)
for Survey Statement Twelve

	1	2	3	4	5	"nr"	$\bar{X}$
12A							
Rnd1	5.7	25.7	31.4	22.9	11.4	2.9	3.26
Rnd2	0.0	38.7	25.8	25.8	6.5	3.2	3.19
12B							
Rnd1	5.7	14.3	25.7	22.9	25.7	5.7	3.83
Rnd2	3.2	12.9	29.0	29.0	22.6	3.2	3.74

Survey Statement Thirteen

Lack of Hard Copy

(A presumed disadvantage of videotex by itself.)

Learners do not receive "hard copy" of instructional materials for study and reference.

Comments from round one that pertain specifically to this survey statement are as follows:

- Available now
- Price is the only issue
- Exists now just not generally applied

Table 17

Responses in Percentage and Mean Scores ($\bar{X}$)
for Survey Statement Thirteen

	1	2	3	4	5	"nr"	$\bar{X}$
13A							
Rnd1	8.6	20.0	28.6	28.6	11.4	2.9	3.31
Rnd2	6.5	32.3	35.5	25.8	0.0	0.0	2.81
13B							
Rnd1	8.6	8.6	17.1	31.4	28.6	5.7	3.97
Rnd2	6.5	12.9	19.4	25.8	32.3	3.2	3.84

Item 13A in Table 17 shows response ratings for the present educational implications of the presumed disadvantage of videotex, that being the failure to provide "hard copies" of materials to learners. A consensus did not form in found one, but two areas of weak consensus formed in round two. One are in the "slight" (2) response modifier category of 32.3 percent, and the other in the "moderate" response modifier category of 35.5 percent. A round two mean score of 2.81 indicates a "slight" to "moderate" rating and is within the areas of consensus for this item. The consensus of percentage response, and the mean score for round two indicate a group opinion that at present the "lack of hard copy" on videotex systems poses "slight" to "moderate" disadvantages in education.

The results of item 13B pertain to the participants' opinions regarding the prospect for development of a printer or screen display. Although the round two results show a weak consensus forming in the "extremely high" (5) category, the mean score of 3.84 approaches the "high" (4) category. The round two mean score is lower than that for round one, and is attributable to the wide dispersion of scores in all categories. Almost 60 percent of the respondents, however, selected either the "high" (4) or the "extremely high" (5) categories and this would indicate a group opinion that in the probable future printers or screen displays will be available for users. In all probability the statements that confirm this feature as being "available now" induced a tendency on the part of participants to respond with higher values during round two.

Survey Statement Fourteen

Lack of Facilities for Extensive Use

(A presumed disadvantage of videotex in combination with other media.)

Extensive use of a videotex system in an educational institution may "tie up existing telephone lines or delivery facilities.

Only one comment was made during round one concerning this survey statement. The participant stated that videotex could "use existing cable systems".

Table 18

Responses in Percentage and Mean Scores ($\bar{X}$)
for Survey Statement Fourteen

	1	2	3	4	5	"nr"	$\bar{X}$
14A							
Rnd1	11.4	14.3	40.0	17.1	11.4	5.7	3.37
Rnd2	3.2	32.3	25.8	32.3	6.5	0.	3.07
14B							
Rnd1	8.6	5.7	31.4	37.1	14.3	2.9	3.60
Rnd2	3.2	22.6	22.6	29.0	22.6	0.0	3.45

Item 14A in Table 18 concerns the presumed disadvantages of the lack of facilities for extensive use of videotex in educational institutions. A medium consensus of 40.0 percent formed in the "moderate" response modifier category during round one. The percentage of responses decreased during round two in response modifier categories (1), (3) and (5), and increased in the "slight" (2) and "high" (4) categories. A weak consensus of 32.3 percent formed in both the "slight" and "high" categories, indicating that that segment of the population believed that the lack of available facilities posed only "slight" implications in education. Another segment however, comprising 32.3 percent of the population believed that the implications resulting from the lack of available facilities for extensive use were "high".

A weak consensus formed in the "moderate" (3) and "high" (4) categories during round one for item 14B which pertains to the prospect of increasing delivery facilities in educational institutions within the near future. Consensus, however, did not form in round two in any of the response modifier categories. Scores are evenly distributed in categories (2), (3) and (5). The "high" (4) response modifier category was selected by the most participants. Because consensus did not form in round two the results remain inconclusive regarding the probable future prospects for increasing delivery facilities in educational institutions.

Survey Statement Fifteen

Production Costs

(A presumed advantageous cost factor of videotex.)

In comparison to courses with regular printed materials, videotex reduces costs of production and duplication of materials.

The following opinions were expressed in round one in regard to Survey Statement Fifteen.

- Yes it does, but at what cost for development of videotex pages.
- Much more expensive yet convenient.
- I believe printed materials are essential.
- More important is updating.
- These are two separate issues [production and duplication].
- I doubt very much that this is even a true statement.

Survey Statement Fifteen appears to have generated the greatest controversies of all of the survey statements. Positive standard deviation changes are apparent for all items of this survey statement, indicating divergence rather than convergence occurring. Extreme changes in mean scores between rounds one and two are evident as well. As shown in Table 19 a relatively high percentage of reponse is evident in the "blank" (nr) categories of all items in the round two responses. This may indicate that several of the participants did not agree with the statement, as evident in the comment "I doubt very much that this is even a true statement". It is also possible that several respondents found the meaning of the statement somewhat unclear and chose not to select a response modifier category.

Table 19.

Responses in Percentage and Mean Scores ($\bar{X}$)
for Survey Statement Fifteen

	1	2	3	4	5	"nr"	($\bar{X}$)
15A							
Rnd1	20.0	22.9	34.3	14.3	5.7	2.9	2.80
Rnd2	9.7	19.4	38.7	12.9	12.9	6.5	3.39
15B							
Rnd1	8.6	5.7	34.3	40.0	5.7	5.7	3.63
Rnd2	0.0	9.7	29.0	25.8	22.6	12.9	4.39
15C							
Rnd1	5.7	8.6	42.9	34.3	8.6	0.0	3.31
Rnd2	0.0	6.5	25.8	41.9	12.9	12.9	4.39

Item 15A in Table 19 concerns the present educational importance posed by the production costs of videotex information, which according to Survey Statement Fifteen, are less than those of regular printed materials. A weak consensus formed in the "moderate" (3) response modifier category in both rounds one and two. A round two mean score of 3.39 attests to a "moderate" consensus of opinion. While there was a tendency towards a convergence in the "moderate" category during round two indicating a "moderate" educational importance, a group of participants chose to select the "extremely high" response modifier category. Although this was a relatively small group comprising only 12.9 percent of the population, the extreme position of their scores and the fact that the resulting round two response rating of 12.9 percent was more than twice that of the round one response rating, which was 5.7 percent, may in part explain the positive increase in standard deviation values noted for this item in Table 4. Despite the small group of participants selecting the "extremely high" response modifier, consensus of opinion formed in the "moderate" response modifier category and indicates that at present the educational importance of lower production costs of videotex in comparison to those of regular printed materials is of "moderate" educational importance.

Item 15B pertains to the probable future importance of the presumed advantages afforded by lower production costs of videotex. During round one a weak consensus of 34.3 percent formed in the "moderate" (3) response modifier category and a medium consensus of 40.0 percent formed in the "high" (4) response modifier category. During round two a general trend in respondents' selections was toward the "moderate", "high" and "extremely high" categories, however, consensus did not form in any of these categories. This would indicate a divergence, rather than a convergence of response, and is evidenced by the positive change in standard deviations noted for this item in Table 4. As consensus did not form in round two for this item the findings concerning the probable future educational importance of lower production costs remain inconclusive.

Regarding item 15C, several participants suggested that the meaning was unclear. As production costs are not a utility function of videotex, the survey statement regarded in terms of future utilization can be regarded as ambiguous. It was decided not to further pursue the findings for this item and reject it from the survey.

Survey Statement Sixteen

Distance Education

(A presumed advantageous cost factor of videotex.)

Videotex allows for inexpensive transmission of instructional information to distant locations once the system is established and the hardware is in place.

One comment concerning the speed of transmission in distance education systems over regular telephone wires was stated in round one. It is as follows:

- The assumption that a tree-structure and 300 Baud transmission rates are educationally effective does not hold water in the real world.

Table 20

Responses in Percentage and Mean Scores ($\bar{X}$)
for Survey Statement Sixteen

	1	2	3	4	5	"nr"	$\bar{X}$
16A							
Rnd1	8.6	22.9	31.4	28.6	5.7	2.9	3.17
Rnd2	3.2	19.4	35.5	35.5	3.2	3.2	3.36
16B							
Rnd1	2.9	2.9	28.6	31.4	28.6	5.7	4.14
Rnd2	3.2	6.5	16.1	45.2	22.6	6.5	4.16
16C							
Rnd1	2.9	8.6	31.4	31.4	25.7	0.0	3.69
Rnd2	3.2	9.7	9.7	41.9	32.3	3.2	4.10

Item 16A in Table 20 refers to the present educational importance of the presumed advantages afforded by videotex in distance education situations. A weak consensus of 31.4 percent formed in round one in the "moderate" (3) response modifier category. During round two the weak consensus increased in this category to 35.5 percent, and another area of weak consensus of 35.5 percent formed in the "high" (4) response modifier category. A round two mean score of 3.36 is within the range of the "moderate" to "high" consensus of response. The consensus of opinion for this item is that at present, the presumed advantages afforded by videotex in distance education situations are of "moderate" to "high" importance in educational areas.

Item 16B pertains to the probable future educational importance of the advantages afforded by videotex in distance education situations. A weak consensus of 31.4 percent formed in round one in the "high" (4) response modifier category, and this percentage of response increased during round two forming a medium consensus of 45.2 percent in the "high" response category. The resulting round two mean score of 4.16 conforms to a consensus of group opinion that in the future videotex will probably be "highly " important in distance education situations. A small increase in the change of standard deviations is evident in this item in Table 4. Although consensus increased in the "high" (4) response modifier category an increase in the lower scores occurred as well.

Although the increase was small in the "none at all" (1) and the "slight" (2) categories, the increase in standard deviation for this item may be attributable to the increases in these lower valued scores.

The probable future utilization of videotex for distance education purposes is examined in item 16C. A weak consensus of 31.4 percent formed in both "moderate" (3) and "high" (4) response modifier categories in round one with a mean score for this round of 3.69. A shift toward higher response values occurred during round two forming a medium consensus of 41.9 percent in the "high" (4) response category, and a weak consensus of 32.3 percent in the "extremely high" response category. This would indicate a group consensus of opinion that future utilization of videotex for distance education purposes is a likely prospect. Although there was not a large increase in responses in the lower valued categories of "none at all" (1) and "slight" (2), the round two percentage responses did increase slightly in each of these categories. This would suggest that the participants who selected the lower response categories in round one did not follow the general trend evident in round two, which was a tendency to select higher categories of response modifiers. The fact that the lower scores increased slightly while other scores shifted to higher values during the second round may have contributed to the increase in the change in standard deviations for this item reported in Table 4.

Survey Statement Seventeen

Affordable Only by Large Institutions

(A presumed non-advantageous cost factor of videotex.)

Because of high initial costs videotex systems are only affordable by large institutions.

The round one comments pertaining specifically to this item express a variety of differing opinions concerning the affordability of videotex systems. They are as follows:

- Probably the opposite - hardware is declining.
- True, but micros come to the rescue.
- Lower initial costs are available now.
- Simply not so. Can start for under < \$10,000.

Table 21

Responses in Percentage and Mean Scores ($\bar{X}$)
for Survey Statement Seventeen

	1	2	3	4	5	"nr"	$\bar{X}$
17A							
Rnd1	8.6	14.3	20.0	20.0	31.4	5.7	3.86
Rnd2	6.5	22.6	19.4	32.3	19.4	0.0	3.36
17B							
Rnd1	2.9	22.9	11.4	34.3	25.7	2.9	3.74
Rnd2	3.2	9.7	19.4	29.0	38.7	0.0	3.90

Item 17A in Table 21 concerns the present educational implications of the high initial costs of videotex systems. A weak consensus of 31.4 percent formed in round one in the "extremely high" (5) response modifier category, which would

indicate that almost one third of the participants in round one believed that high initial costs restrict development of videotex to only large institutions. Although the distribution of scores did not form consensus in any other categories 40.0 percent of the respondents selected either the "moderate" or the "high" response categories, which resulted in a mean score of 3.86 for this round. The round two results for item 17A show a trend toward less extreme opinions with a consensus of 32.3 forming in the "high" (4) response modifier category. Also evident is an increase in the "slight" (2) category. The increase in the latter category may have been attributable to those comments that pertain specifically to Survey Statement Seventeen that emphasize the declining costs of hardware. Despite evidence that would indicate a trend in the round two responses toward scores of lower value, the consensus did form in the "high" (4) category and indicates that almost one-third of the population believes that the present educational implications of hardware costs are "high". An additional 19.4 percent of the population believes the implications are "extremely high".

Item 17B refers to the probable future prospect for lower initial costs of videotex systems. A weak consensus formed in the "high" (4) response modifier category during round one resulting in a mean score for this round of 3.74. Several of the specific comments pertaining to Survey

Statement Seventeen in round one suggest that initial costs of videotex systems are declining. These stated opinions may have been responsible for the trend evident in round two toward higher response ratings conforming to the opinions expressed that initial costs are decreasing. During round two a weak consensus of 38.7 percent formed in the "extremely high" (5) response modifier category. An additional 29.0 percent of the population selected the "high" (4) response modifier. The results indicate that a weak consensus of group opinion believes that in the probable future the prospects are "extremely high" for the lowering of initial costs of videotex systems.

Survey Statement Eighteen

Lack of Funds for Software

(A presumed non-advantageous cost factor of videotex.)

Funding for videotex projects in education does not usually take into account the costs of high quality software development and production.

The comments from round one that pertain specifically to Survey Statement Eighteen are as follows:

- Is this a true statement?
- A matter of priorities. We can't afford not to invest in courseware.
- Innovators are ten years ahead of operating budgets.

Table 22

Responses in Percentage and Mean Scores ($\bar{X}$)
for Survey Statement Eighteen

	1	2	3	4	5	"nr"	$\bar{X}$
18A							
Rnd1	0.0	11.4	28.6	25.7	31.4	2.9	3.94
Rnd2	0.0	12.9	16.1	45.2	22.6	3.2	3.97
18B							
Rnd1	2.9	25.7	31.4	28.6	8.6	2.9	3.31
Rnd2	6.5	25.8	29.0	22.6	12.9	3.2	3.29

The present educational implications of lack of funds for software are presented in item 18A in Table 22. A weak consensus of 31.4 percent formed in round one in the "extremely high" response modifier category, however both "moderate" and "high" categories were selected by a substantial portion of the population as each of these categories show a percentage response rate of over 25 percent. Consensus increased and shifted during round two to the "high" response modifier forming a medium consensus of 45.2 percent in this response category. A percentage response rate of 67.8 percent of the population selected either the "high" or "extremely high" response modifier which would indicate a consensus of opinion agreeing with the survey statement that at present, the funding for videotex projects does not usually take into account the high costs of quality software production.

Item 18B concerns the probable future prospect for increased funding for software. A weak consensus of 31.4 percent formed in round one in the "moderate" (3) response modifier category. Although consensus did not form, relatively high response ratings are evident for both the "slight" and "high" categories. During round two the percentage of response in the "moderate" (3) category decreased to 29.0 percent, and an increase in response is apparent in the extreme categories of "none at all" and "extremely high". Consensus did not form round in two and a dispersion of scores is evident by the increase in the change of standard deviations between rounds noted for this item in Table 4. The divergence of response in round two may be attributable to the differing opinions expressed in the comments specifically referring to Survey Statement Eighteen. As consensus is not apparent in this item the results of the prospect for future increased funding remain inconclusive.

Survey Statement Nineteen

Marketing Strategies

(A presumed non-advantageous cost factor of videotex.)

Videotex systems in Canada are not being marketed effectively in educational areas.

The round one comments that pertain specifically to Survey Statement Nineteen are as follows:

- Whether being marketed effectively or not, videotex systems are simply not cost-effective especially when compared with illustrated - print medium.
- Not being marketed effectively in any other area either.
- If its not already to late.
- IPATT [Inter-Provincial Agency for Telematics and Telidon] network is on the way.

Table 23

Responses in Percentage and Mean Scores ($\bar{X}$)
for Survey Statement Nineteen

	1	2	3	4	5	"nr"	$\bar{X}$
19A							
Rnd1	5.7	17.1	28.6	25.7	20.0	2.9	3.54
Rnd2	6.5	12.9	19.4	29.0	32.3	0.0	3.68
19B							
Rnd1	0.0	20.0	28.6	40.0	11.4	0.0	3.43
Rnd2	3.2	25.8	29.0	29.0	12.9	0.0	3.23

Item 19A in Table 23 concerns the present educational implications due to the presumed ineffective marketing strategies of videotex in education. Consensus is not evident in round one, however a consensus of 32.3 percent formed in round two in the "extremely high" response modifier category. In addition to this area of consensus, it is also apparent in Table 23 that 29 percent of the respondents selected the "high" (4) response modifier. This would indicate that over 60 percent of the respondents agreed that at present videotex is not being marketed effectively in educational areas.

Item 19B refers to the prospect for improved marketing of videotex in educational areas in the probable future. A medium consensus formed in round one in the "high" (4) response modifier category, indicating an existing consensus group opinion believing that in the probable future the marketing of videotex would improve in educational areas. However, consensus did not form in round two for this item. As in other items where consensus was not found, an increase in standard deviation values is apparent in Table 4 on page 36. The percentage response rate decreased in the "high" (4) category to 29.0 percent, and an increase of 5.8 percent is apparent in the "slight" (2) response modifier category. Several of the general comments concerning the uncertain future of videotex vis-a-vis micro-computer technology, and the comment specific to this survey statement that suggested that the marketing of videotex in educational areas "may already be too late", may have been responsible for the lack of consensus in the second round, as some participants showed a tendency to select a lower valued response modifier during the second round.

Chapter V

DISCUSSION AND CONCLUSIONS

The exploratory study undertaken here attempts to discern, describe and analyze the perceptions of conditions and trends that exist in the developments and applications of videotex technology in education with emphasis in the area of adult education in Canada. The Delphi survey technique which was used in this study seeks to establish a consensus of group opinion and if possible build further consensus of of group opinion in regard to particular issues or concerns. The results of the Delphi survey show that varying degrees of consensus have formed around certain issues and concerns related to videotex applications and developments in educational areas. In most cases the results show an increase in either, or both, the degree of consensus (the percentage results), or the position of consensus (the location of consensus in terms of the rating scales of value). In 25 of the 49 survey statement items the degree of consensus increased during round two. In 2 survey items, consensus, which was not evident in round one, formed during round two.

This chapter contains a summary of the results of the survey statement items showing the areas of the formation of consensus and the degrees of the formation of consensus during round two of the study in regard to the present importance,

present implication, probable future importance, probable future utilization and the prospect for the future improvement of particular issues and concerns. Also described in this chapter are the trends and issues that were apparent in the general and specific comments made by participants in rounds one and two of the survey. Conclusions regarding videotex developments and applications in education in general and adult education in particular are discussed in this chapter as well. The conclusions are drawn from the round two results of the survey statement items and the trends and issues evident in the general and specific comments.

A Summary of Survey Statement Findings

Present Educational Importance

Of those survey statement items that were categorized as presumed advantages of videotex, either by itself, in combination with other media or as advantageous cost factors, only the use of colour display features, and the distance education capabilities of videotex were deemed by a consensus of group opinion in round two to be of educational importance at present. A medium consensus comprizing 41.9 percent of the population agreed that at present the colour display features of videotex were "highly" important in educational areas. A weak consensus comprizing 35.5 percent of the population agreed that the distance education capabilities of videotex are at present "highly" important in educational areas.

Several other features or capabilities of videotex that were categorized as presumed advantages were regarded by a consensus of group opinion as being "moderately" important in education at present. The presumed lower production cost of videotex compared to regular printed materials was acknowledged by a weak consensus of 38.7 percent of the population as "moderately" important in education at present. The simulated motion features as well were regarded as "moderately" important by a weak consensus of 32.3 percent of the population.

Four capabilities that were categorized as presumed advantages of videotex were regarded by a consensus of the population as being of only "slight" educational importance at present. They are: the "downloading" of information, the combination with audio transmission, the learner interactive capabilities and the capabilities of videotex for updating information.

Probable Future Educational Importance

Regarding the future educational importance of those survey statement items that were categorized as presumed advantages of videotex, either by itself, in combination with other media, or as advantageous cost factors, varying degrees of consensus were apparent in either or both, the "high" or "extremely high" response modifier categories in the round two results for all items. The exception is item 15B where consensus did not form.

Those survey statement items that concerned the probable future educational importance of learner interactivity easy access of pages, information sharing, information updating, the "downloading" of information and the colour display features features were selected by a consensus of participants or a large percentage of participants in both the "high" and "extremely high" response modifier categories. By combining these two response modifier categories the percentage rate of response in the aforementioned items approached, or was over 70 percent of the total percentage of response. This indicates that these aspects of videotex were regarded by by group consensus as being very important in education in the probable future.

Probable Future Utilization

Participants selected similar response modifiers for both probable future importance and probable future utilization in regard to those survey statements that were categorized as presumed advantages of videotex. This is evidenced in the the formation of consensus in the round two results for the items. If consensus formed in the areas of probable future importance, a corresponding consensus is usually found in the section of the item concerning probable future utilization. This is not evident in the invalidated item 15C which concerned the probable future importance of lower production costs, as consensus did not form in item 15B for this survey

statement. Although the formation of consensus concerning the probable future utilization of videotex corresponds to the probable future importance of videotex, in most cases the degree of consensus or the position where consensus formed is somewhat lower in the item concerning the probable future utilization. In those survey statements concerning the combination of videotex with audio transmission, and the statement concerning distance education capabilities of videotex, the degree and/or the position of consensus is higher in the probable future utilization item than in the probable future importance item. This is most pronounced in Survey Statement Sixteen which concerns the distance education capabilities of videotex. The percentage of response is almost 10 percent higher in the probable future utilization item than in the probable future importance item for this survey statement. This would indicate a view that the distance education capabilities of videotex would be "highly" important in educational areas in the probable future, moreover these capabilities would be utilized in educational areas as evidenced by the "extremely high" consensus of group opinion.

Present Implications

As ambiguities existed in the wording of Survey Statement Twelve which concerned the limited screen size of videotex, it was rejected from the survey findings. For other items

that concerned the present educational implications of those survey statements that were categorized as presumed disadvantages or presumed non-advantageous cost factors of videotex, consensus formed in the "high" or "extremely high" response modifier categories in only 3 items. This would indicate that these issues were regarded by a consensus of group opinion to be disadvantages in educational areas at present. A weak consensus of 32.3 percent of the population selected the "high" response modifier in item 17A indicating that this portion of the population agrees with the survey statement that at present, because of high initial costs videotex is only affordable by large institutions. A medium consensus of 45.2 percent of the population selected the "high" response modifier in item 18A which concerns the lack of funding for videotex software or courseware, indicating that this is perceived as a disadvantage of videotex systems at present. In item 19A a weak consensus of 32.3 percent of the population selected the "extremely high" response modifier regarding the marketing of videotex in educational areas. An additional 29.0 percent of the population selected the "high" response modifier for this item, indicating a combined total of over 60 percent agreeing that videotex is not being marketed effectively in educational areas.

Of those items concerning the present educational implications of the presumed disadvantages of videotex, 3 were selected by a consensus of the population as having "moderate"

educational implications at present. A medium consensus of 41.9 percent of the population believed that the relatively slow speed of display is a disadvantage of videotex at present. A strong consensus of 51.6 percent of the population believed that the lack of active motion on videotex currently is a disadvantage in education. The failure of videotex systems to provide "hard copy" of information to learners is regarded by a weak consensus of 35.5 percent of the population as a "moderate" implication at present. Another portion of the population comprising 32.3 percent of the population believed that lack of "hard copy" poses only "slight" educational implications at present.

Prospects for Future Improvement

Consensus was apparent in 3 items concerning the prospects for future improvement of those issues that were categorized as presumed disadvantages of videotex or non-advantageous cost factors of videotex. A weak consensus of 38.7 percent of the population selected the "extremely high" response modifier category for the prospects of more rapid speed of display in the probable future on videotex systems. A weak consensus of 32.3 percent of the population selected the "extremely high" response modifier category for the development of a printer of screen displays. A weak consensus of 38.7 percent of the population selected the

"extremely high" response modifier category for the future prospect of lower initial costs of videotex systems.

Consensus was not evident in the research findings concerning the prospects for the future improvements in the lack of active motion, the lack of funds made available for software or courseware and the marketing strategies in educational areas. The latter two issues were considered by a consensus of the population to be at present disadvantages of videotex systems. The lack of consensus found for these items regarding the prospect for future improvement could warrant further research in the areas of funding and marketing of videotex systems.

Consensus Not Evident

For several survey statement items consensus did not form in either rounds one or two. This may indicate that indeed, group opinion was indeterminate in regard to these particular items of the survey. However, in several items consensus formed in round one of the survey but not in round two, or in round two the existing consensus substantially decreased. This may be attributable to the fact that in some cases, several of the participants disagreed with the survey statement in question. This appears to have caused confusion on the part of the other participants resulting in a dispersion of scores and a lowering of the degree of consensus. This appears to have occurred to such an extent

that consensus did not form at all in the second round. form at all in the second round. Also evident in several of the survey statement items where consensus was not apparent in the second round results is the apparently ambiguous nature of the survey statement. This is particularly noticable in item B of Survey Statement Twelve, where ambiguities in the wording of the survey statement apparently caused confusion in the participants' responses. Where such ambiguities occurred the results were invalidated and rejected from the survey.

General Trends

Three general trends of thought concerning videotex developments and applications were apparent in the general comments and opinions compiled from rounds one and two. These trends of thought are supported by specific comments pertaining to particular survey statements.

The first trend evident in the general comments is the view held by several participants that videotex is the "right" media type, and that it can provide client-controlled or self-learning educational processes, but it is not, or cannot be effectively developed to do the latter in instructor-controlled educational institutions. Several participants who support this view claim that videotex will be developed in the private sector rather than in established educational institutions.

The second trend of thought apparent in the general comments and supported in several of the specific comments concerns the recent advances in micro-computer technology. Micro-computers, according to several participants have the potential to partially, or completely supersede videotex technology in providing educational services. This trend is further supported by the information provided by one participant who suggest that micro-computers are less expensive than videotex systems.

The third trend of thought expressed in one general comment and supported by several comments that pertain to specific survey statements is the view that Telidon, the Canadian version of videotex, is not totally acceptable at present, but current or possible future modifications to hardware and software, the adoption of the Telidon graphics code as a NAPLPS (North American Presentation Level Protocol Syntax) standard, and the improved educational services organized by IPATT (Inter-Provincial Agency for Telematics and Telidon), will enable Telidon to effectively provide educational services.

Conclusions

As stated in Chapter I of this report, one disadvantage of the Delphi procedure is that it does not produce neat and precise results and that the tables are at times difficult to interpret. However, in this study statistical data is not the

systems of data base software have yet to be determined and the effectiveness of such alternative software systems remains to be seen.

Other factors which limit the application of Telidon in educational areas are related to costs and marketing. Several participants in this study suggested that the initial costs of establishing a videotex system are declining, and one participant suggested that a videotex systems could cost an institution less than \$10,000. The results of the survey indicate that even though hardware costs may be declining, the initial costs of establishing a videotex system are high and that they are cost prohibitive to anything other than large institutions. Regarding the probable future however, a consensus of the population agreed that initial costs of videotex systems would be lower.

Another cost factor is the issue of providing funding for software or courseware. The findings of this study indicate that funding for videotex projects does not usually take into account the costs of high quality software. The findings do not show whether the prospects for funding for software or courseware will improve in the future.

The marketing of Telidon in educational areas is an issue that was regarded by a large percentage of the participants in this study (more than 60 percent) as not being done effectively. Again the findings of the study do not indicate whether marketing in education areas will

improve in the probable future. However, it was found in Gordon's study that the marketing of videotex in education will not be determined until the general market sectors such as business and industry are successfully evolving (Gordon, p.82).

However limiting or disadvantageous the aforementioned issues regarding videotex systems or the Telidon version of videotex may be, the participants involved in the study presented here, generally speaking, held in high regard the potential capabilities of videotex and the types of educational services videotex can provide, including the utilization of the media attributes that videotex systems possess. The colour display features and the distance education capabilities of videotex were deemed by consensus of the participants to be of importance in education at present, and virtually all of the capabilities and the types of educational services videotex can potentially provide in the future were deemed by participants to be not only of importance in the probable future, but also well utilized in the probable future. In particular were those features and capabilities of videotex that involve the inputting, retrieval, and manipulation of information. These include the use of videotex for information sharing, information updating, the "downloading" of information and the use of the media attributes of videotex such as the colour display features and simulated motion. The utilization of videotex

for these types of educational services corresponds to the types of services presented in the literature that were suggested as being most "appropriate" at the adult education level. As suggested by one writer, Telidon in combination with teleconferencing may function most effectively for seminar related courses, and the TVOntario Report contends that although some community colleges use Telidon for teacher support and CAL, universities use it for information searches and research and development.

It would appear that Telidon videotex cannot at present provide the type and quality of services necessary for self-learning, or client-centred learning situations due mainly to the limitations of the data-base software, also prohibitive perhaps, are the high initial costs of hardware and the lack of funding made available for high quality courseware. However, hardware costs are declining and modifications in the data base software are being undertaken. In addition, the adoption of the Telidon graphics code as a NAPLPS standard has the potential to improve the marketing and selling of Telidon equipment as the products would be less sensitive to obsolescence. Of importance also is IPATT which could ensure the creation and exchange of Telidon materials for education in Canada.

In light of the aforementioned information, the optimistic trend of thought concerning future development and applications of Telidon videotex in education in the probable

future appears to be warranted. However, the advent of micro-computer technology brings into question the "uniqueness" and cost efficiency of videotex systems. Micro-computers can be used for "downloading" information from data bases and Telidon terminals are now capable of information storage. The findings of this study affirm the basic question pointed out in the literature, that a technology designed to transmit graphics over distances may not be effectively used for CAL, CML and interactive teaching/learning processes. When one compares the costs of videotex to the costs of micro-computers, the importance of micro-computer technology in educational areas is further recognized.

In conclusion then, the Telidon version of videotex, and videotex systems in general may be superseded, partially or completely by micro-computer technology. The types of educational services videotex systems have the potential to provide may be provided in the future, but not necessarily by the types or versions of videotex systems we know today. As one participant involved in the study commented, "the videotex of tomorrow . . . will be integrated with new technologies and will be indistinguishable as being 'videotex'".

Recommendations for Further Research

For several survey statement items in this study, consensus, not apparent within the response modifier

categories, is apparent if two adjacent response modifier categories are combined. In combination they may form a degree of consensus not evident if they are regarded separately. Further research may be warranted in examining those survey statement items where degrees of consensus are apparent in the combination of adjacent response modifier results.

The results for several issues examined in this study proved inconclusive. In several cases, such as in Survey Statements Twelve and Fifteen, ambiguities in wording apparently contributed to confusion in some participants' responses. It may be beneficial to re-examine these issues ensuring that the wording of the survey statements in question is not open to misinterpretation.

It is hoped that the issues and concerns explored in this study would be further examined in other studies that pertain to applications of videotex and other related technologies in educational areas. It is also hoped that the findings of this study will be of use to educators involved in decision making processes regarding the application of this technology in educational areas.

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APPENDICES

APPENDIX A .

INTRODUCTORY LETTER AND SURVEY INSTRUMENT

January 2, 1984

Robert Campbell

Department of Curriculum and Instruction, Faculty of Education, University of Calgary,
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Calgary, Alberta T2N 1N4

As a graduate student enrolled in Educational Technology at the University of Calgary, I am conducting a descriptive research study entitled "Canadian Videotex in Adult Education: Implications and Applications". The basic purposes of the study are as follows:

1. To seek information about the present and future implications and applications of Videotex as applied to adult education in Canada.
2. To measure the extent of consensus of expert opinion concerning these implications and applications.
3. To measure the effects of a Delphi study on the consensus of expert opinion.

"Expert", for purposes of this study is defined as an individual who has extensive knowledge, either instructional or technical, in the applications of Videotex to adult education.

The study takes the form of a survey employing a modified Delphi method. This approach will use 2 rounds of questioning. The results of how all other participants responded in the first round will be provided to participants at the start of the second round. Respondents then have the opportunity to revise their responses in the second round with the knowledge of the first round results. The final results of the study will be mailed to all participants after the second round is completed.

I feel that your knowledge in this area of expertise would be a valuable contribution to this study. As you know, there is a limited number of individuals across Canada with knowledge in Videotex applications, so I can assure you that your contribution will be greatly appreciated. To assist me in this endeavor would you please complete the enclosed opinionaire and return it to me as soon as possible. It is imperative when using a Delphi approach that the instrument be cycled with a minimum of delay. Wednesday, January 11, 1984, is the round 1 deadline date. Replies received after this date cannot be included in the study.

It is estimated to take between 10 and 20 minutes to complete the opinionaire. All information is strictly confidential with neither you nor your institution being identified in the study. The identification number on your opinionaire is used only for the purpose of the feedback requirement. For your convenience a stamped addressed return envelope is included.

I thank you for your assistance and contribution.

Yours truly,

Robert Campbell

R.C.
Enc.

CANADIAN VIDEOTEX IN ADULT EDUCATION OPINIONAIRESELF ASSESSMENT PROFILE:

This information will be used for statistical analysis of results.

Please indicate your area(s) of expertise by placing a check mark (✓) in the appropriate blank(s). Please feel free to "write in" any relevant area not listed.

☐ Computer Information Science
☐ Graphic Design
☐ Information Systems Management
☐ Instructional Design of Courseware
☐ Instruction of Adult learners
☐ _____
☐ _____

DEFINITION OF TERMS:

In all cases the term Videotex refers to interactive videotex, as a two-way information delivery system. In its present stage of development, it utilizes telephone wires or two-way coaxial cable to carry demands for information to a computer data base from the user, and to send requested information from a computer data base back to the user.

Unless otherwise indicated, please regard the term probable future as within the next 10 years.

INSTRUCTIONS:

The statements, numbering 1 to 19, represent the expressed opinions of educators who have extensive instructional or technical knowledge in the application of Videotex to adult education.

Please respond to these opinions by selecting the modifier that most closely corresponds to your own opinion and placing a check mark (✓) in the appropriate square.

The rating modifiers are as follows:

0	+	++	++	++
none at all	slight	moderate	high	extremely high

If you find that your opinion cannot be expressed with the response modifier, or you feel you wish to provide additional information about your response, please feel free to "write in" a response or provide additional information about your response on the lined page provided. Refer to each statement by number.

Respondent Identification Number _____

CANADIAN VIDEOTEX IN ADULT EDUCATION OPINIONAIREPRESUMED ADVANTAGES OF VIDEOTEX BY ITSELF:1. Learner Interactive

Videotex allows learners to access with a data base interactively and be differentially routed through instructional and remedial information.

<u>Educational Importance</u>	0	+	++	+++	+++	
at present						A
probable future						B
<u>Educational Utilization</u>						
probable future						C

2. Easy Access of Pages

Users may access required pages of information without going through entire programs or structured sequences of pages.

<u>Educational Importance</u>	0	+	++	+++	+++	
at present						A
probable future						B
<u>Educational Utilization</u>						
probable future						C

3. Information Sharing

Information in data bases may be shared or exchanged by different educational areas or institutions.

<u>Educational Importance</u>	0	+	++	+++	+++	
at present						A
probable future						B
<u>Educational Utilization</u>						
probable future						C

4. Information Updating

Constantly changing information, such as statistics, can be readily "updated" in data bases.

<u>Educational Importance</u>	0	+	++	+++	+++	
at present						A
probable future						B
<u>Educational Utilization</u>						
probable future						C

5. Simulated Motion

Visuals can be animated by simulated motion as pages are displayed on screen.

<u>Educational Importance</u>	0	+	++	+++	+++	
at present						A
probable future						B
<u>Educational Utilization</u>						
probable future						C

6. Colour Display

Pictorial, graphic and textual information can be high-lighted or identified by the use of colour.

<u>Educational Importance</u>	0	+	++	+++	+++	
at present						A
probable future						B
<u>Educational Utilization</u>						
probable future						C

PRESUMED ADVANTAGES OF VIDEOTEX IN COMBINATION WITH OTHER MEDIA:7. Combined With Audio

A visual display can be combined with audio transmission for a full audio-visual presentation with the instructor in control of access.

<u>Educational Importance</u>	0	+	++	++	++	
at present						A
probable future						B
<u>Educational Utilization</u>						
probable future						C

8. Instructor Interactive

Instructors may disclose information at a pace they feel is most desirable for learners.

<u>Educational Importance</u>	0	+	++	+++	++++	
at present						A
probable future						B
<u>Educational Utilization</u>						
probable future						C

9. Downloading Information

Pages of information can be "downloaded" from data bases to microcomputers or display terminals with memory storage capacity.

<u>Educational Importance</u>	0	+	++	+++	+++	
at present						A
probable future						B
<u>Educational Utilization</u>						
probable future						C

PRESUMED DISADVANTAGES OF VIDEOTEX BY ITSELF:10. Speed of Display

Once accessed and transmitted it takes a relatively long period of time for complete pages to appear on screen.

<u>Educational Implication</u>	0	+	++	+++	++	
at present						A
<u>Prospect for more rapid display</u>						
within near future (10 years)						B

11. Lack of Active Motion

Currently, motion on Videotex is simulated by animation as pages appear. It does not display "real" active motion.

<u>Educational Implication</u>	0	+	++	+++	++	
at present						A
<u>Prospect for development of "real" active motion</u>						
within near future (10 years)						B

12. Screen Size Display

Only a limited amount of information can appear on one Videotex page.

<u>Educational Implication</u>	0	+	++	+++	++
at present					
<u>Prospect for development</u>					
<u>of a larger screen display</u>					
within near future					
(10 years)					

13. Lack of Hard Copy

Learners do not receive "hard copy" of instructional materials for study and reference.

<u>Educational Implication</u>	0	+	++	+++	++	
at present						A
<u>Prospect for development</u>						
of a printer of screen display						
within near future						
(10 years)						B

PRESUMED DISADVANTAGES OF VIDEOTEX IN COMBINATION WITH OTHER MEDIA:14. Lack of Facilities for Extensive Use

Extensive use of a Videotex system in an educational institution may "tie up" existing telephone lines or delivery facilities.

<u>Educational Implication</u>	0	+	++	+++	++
at present	☐	☐	☐	☐	☐
<u>Prospect for increasing delivery facilities in educational institutions</u>					
within near future (10 years)	☐	☐	☐	☐	☐

A
B

PRESUMED ADVANTAGEOUS COST FACTORS OF VIDEOTEX:15. Production Costs

In comparison to courses with regular printed materials, Videotex reduces costs of production and duplication of materials.

<u>Educational Importance</u>	0	+	++	+++	++
at present	☐	☐	☐	☐	☐
probable future	☐	☐	☐	☐	☐
<u>Educational Utilization</u>					
probable future	☐	☐	☐	☐	☐

A
B
C

16. Distance Education

Videotex allows for inexpensive transmission of instructional information to distant locations once the system is established and the hardware is in place.

<u>Educational Importance</u>	0	+	++	+++	++
at present	☐	☐	☐	☐	☐
probable future	☐	☐	☐	☐	☐
<u>Educational Utilization</u>					
probable future	☐	☐	☐	☐	☐

A
B
C

PRESUMED NON-ADVANTAGEOUS COST FACTORS OF VIDEOTEX:17. Affordable Only by Large Institutions

Because of high initial costs Videotex systems are only affordable by large institutions.

<u>Educational Implication</u>	0	+	++	+++	++
at present	☐	☐	☐	☐	☐
<u>Prospect for lower initial costs</u>					
within near future (10 years)	☐	☐	☐	☐	☐

A
B

18. Lack of Funds for Software

Funding for Videotex projects in education does not usually take into account the costs of high quality software development and production.

<u>Educational Implication</u>	0	+	++	+++	++
at present	☐	☐	☐	☐	☐
<u>Prospect for increased funding for software</u>					
within near future (10 years)	☐	☐	☐	☐	☐

A
B

19. Marketing Strategies

Videotex systems in Canada are not being marketed effectively in educational areas.

<u>Educational Implication</u>	0	+	++	+++	++
at present	☐	☐	☐	☐	☐
<u>Prospect for improved marketing in educational areas</u>					
within near future (10 years)	☐	☐	☐	☐	☐

A
B

APPENDIX B

ROUNDS ONE AND TWO PERCENTAGE RESPONSES
IN HISTOGRAM FORM

ROUND 1 PERCENTAGE RESULTS

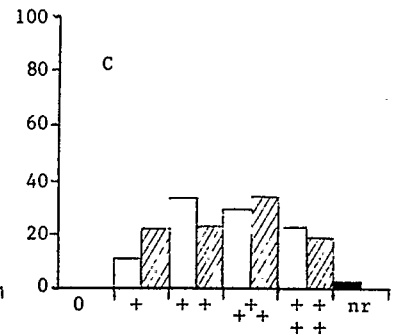
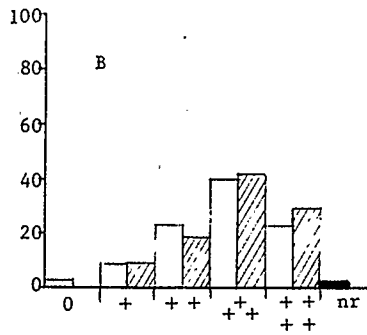
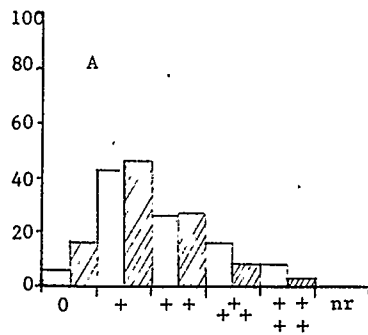
note: "nr" indicates the percentage of "blank" responses for each statement.

round one

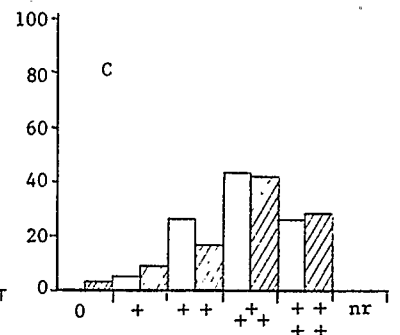
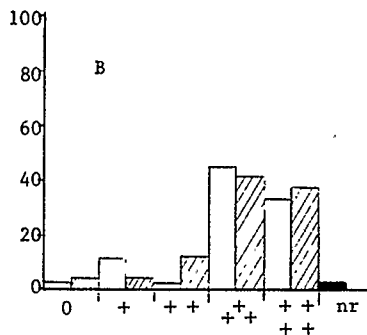
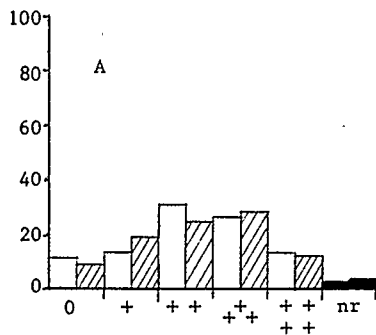
round two

no response

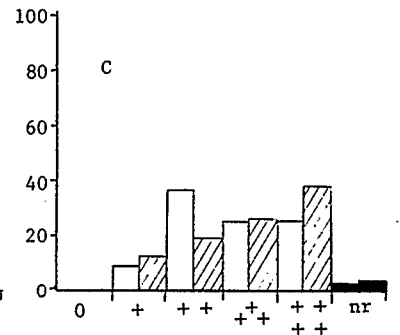
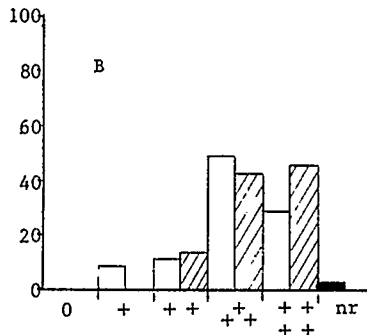
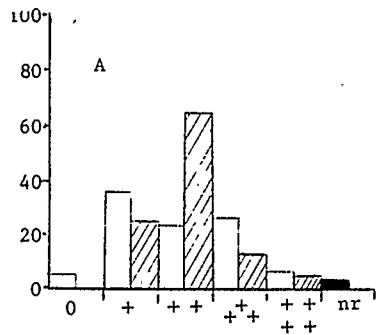
1. Learner Interactive



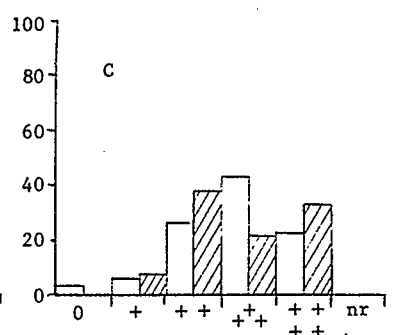
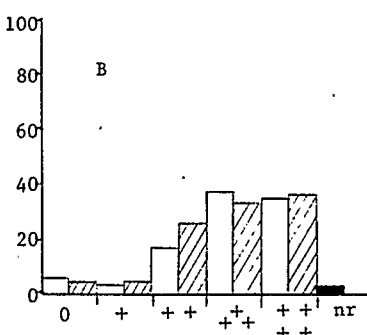
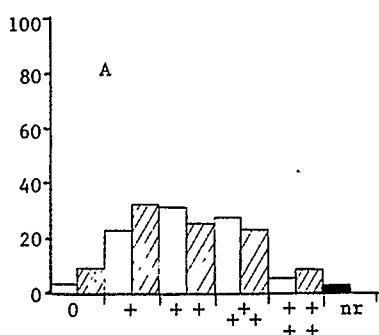
2. Easy Access of Pages



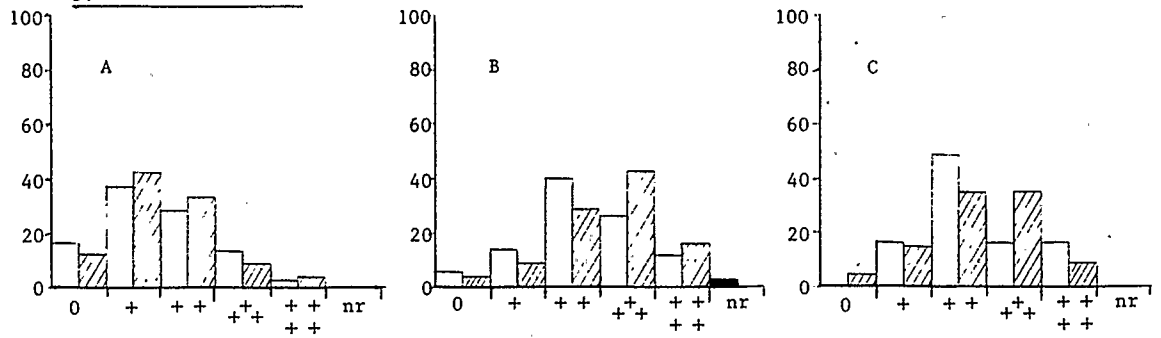
3. Information Sharing



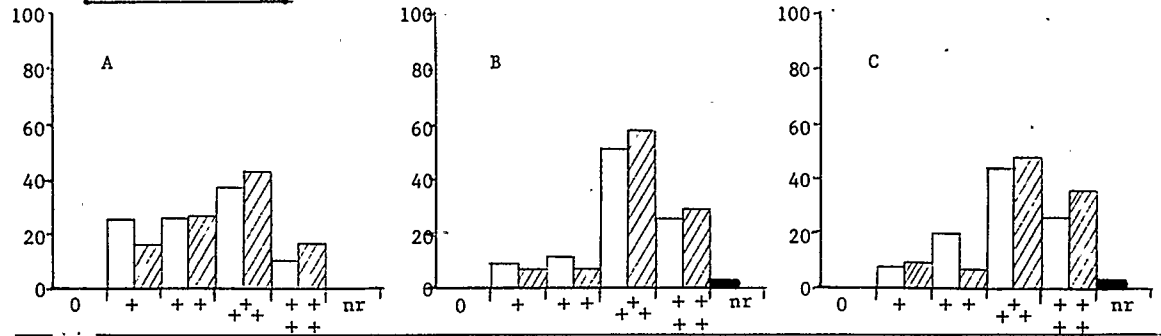
4. Information Updating



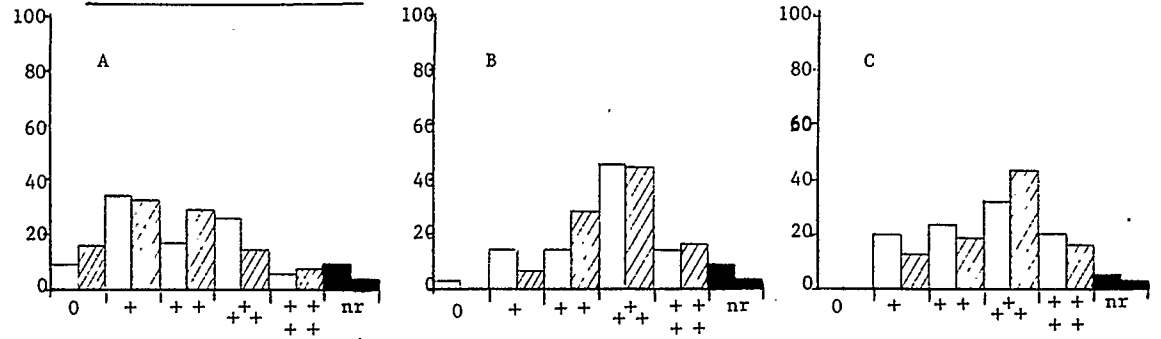
5. Simulated Motion



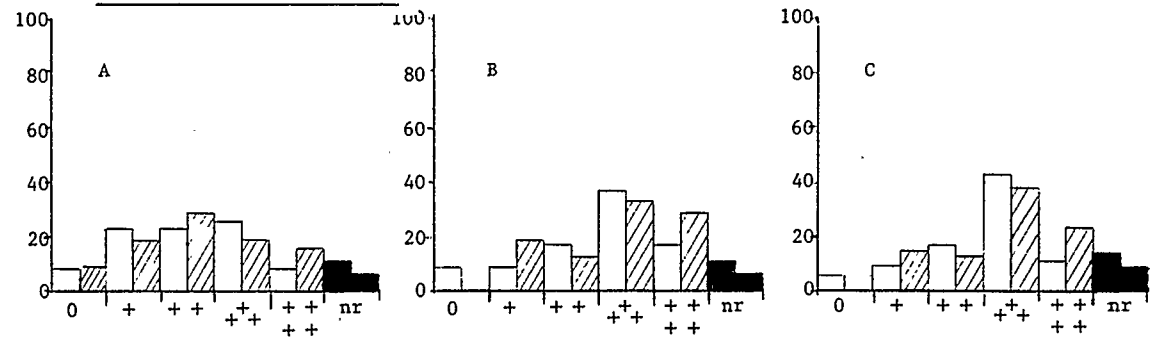
6. Colour Display



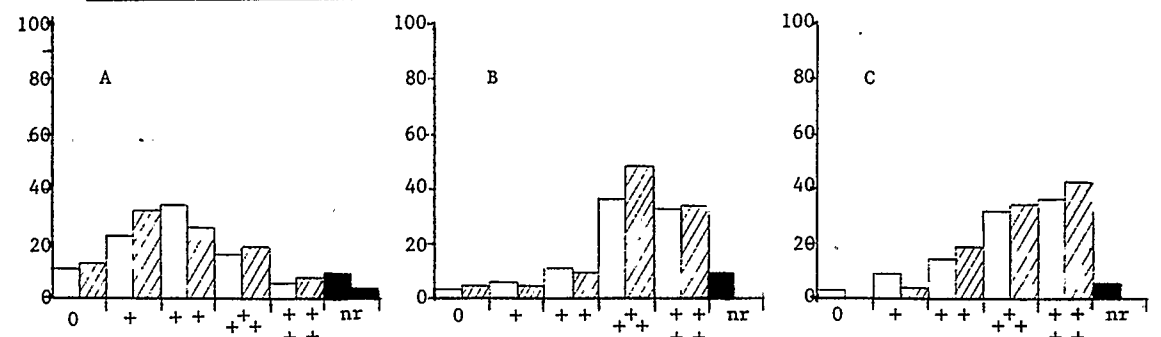
7. Combined With Audio



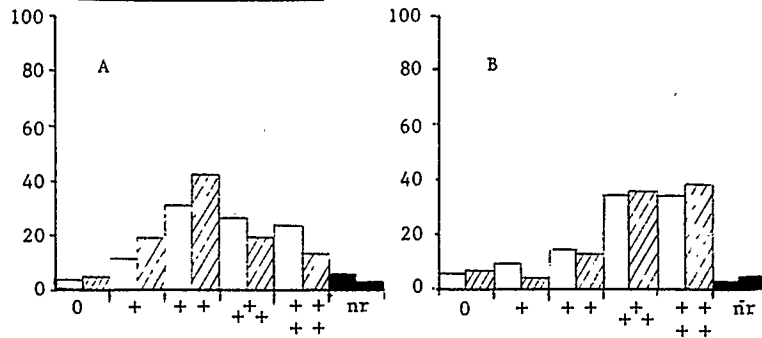
8. Instructor Interactive



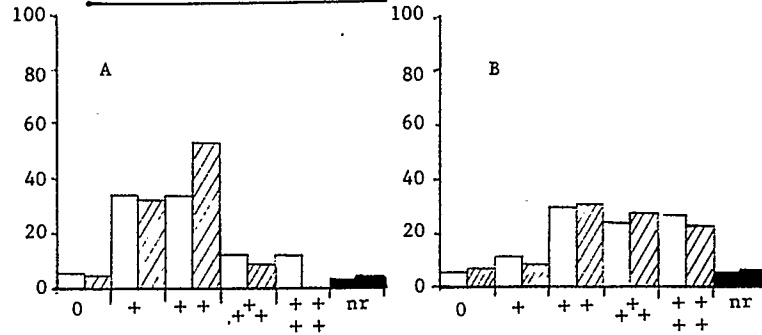
9. Downloading Information



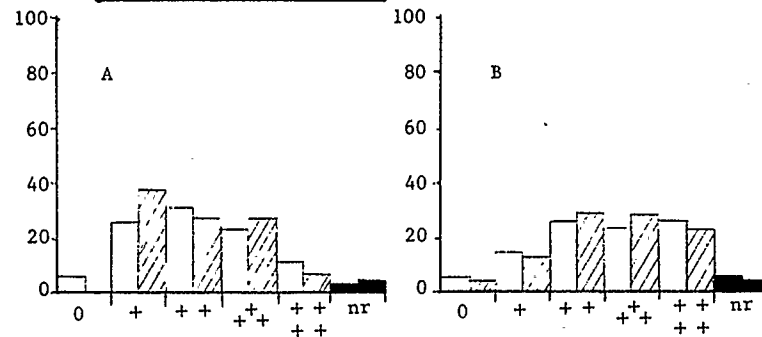
10. Speed of Display (presumed disadvantage)



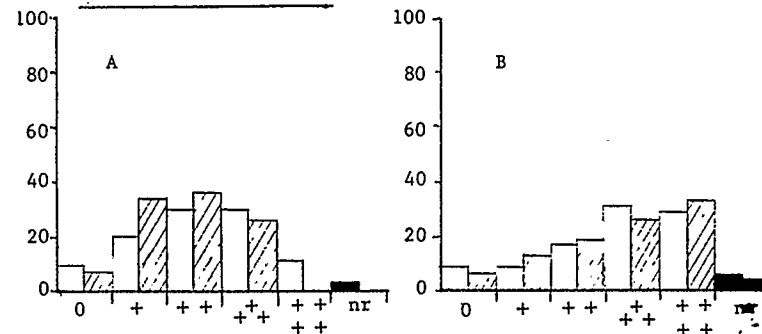
11. Lack of Active Motion (presumed disadvantage)



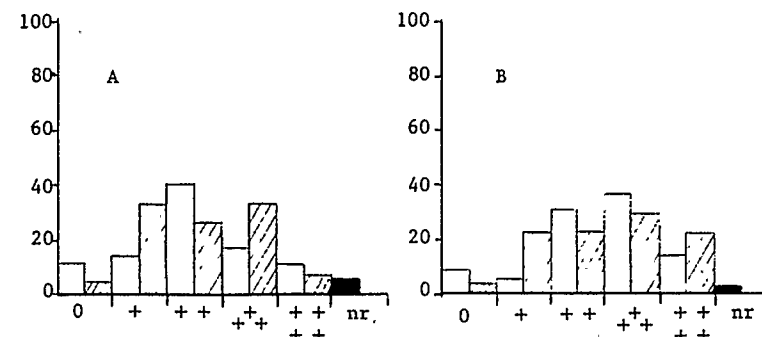
12. Screen Size Display (presumed disadvantage)



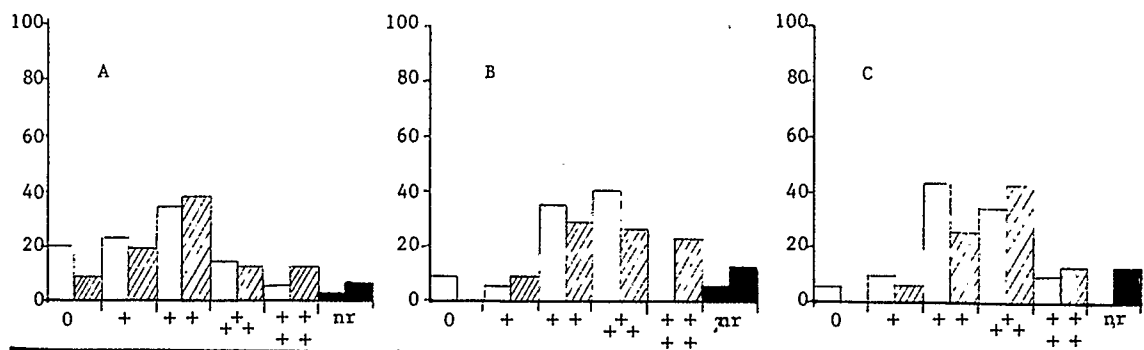
13. Lack of Hard Copy (presumed disadvantage)



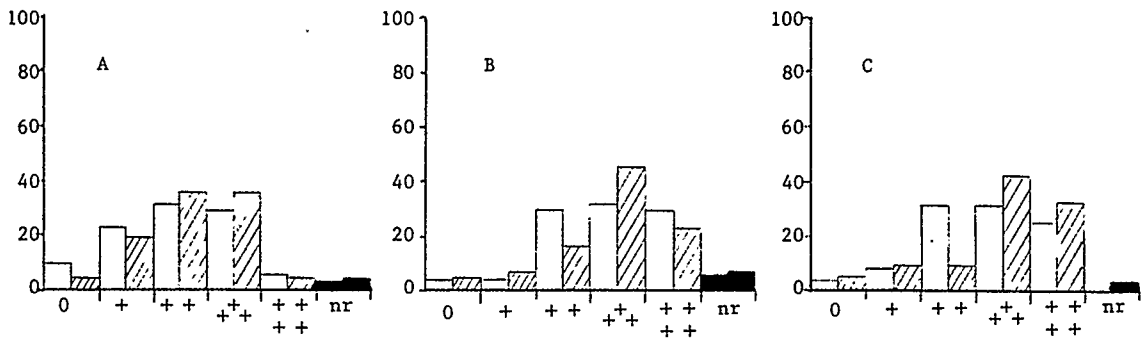
14. Lack of Facilities for Extensive Use (presumed disadvantage)



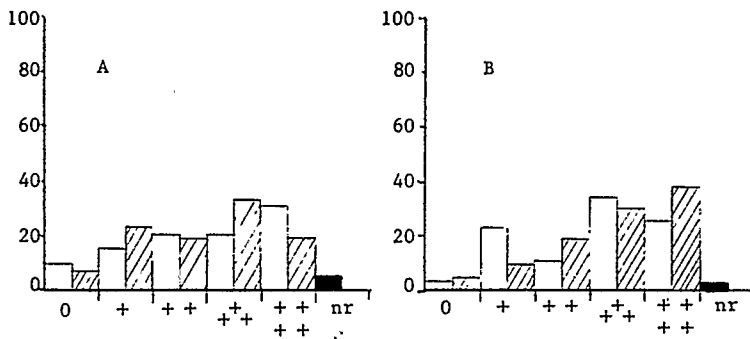
15. Production Costs



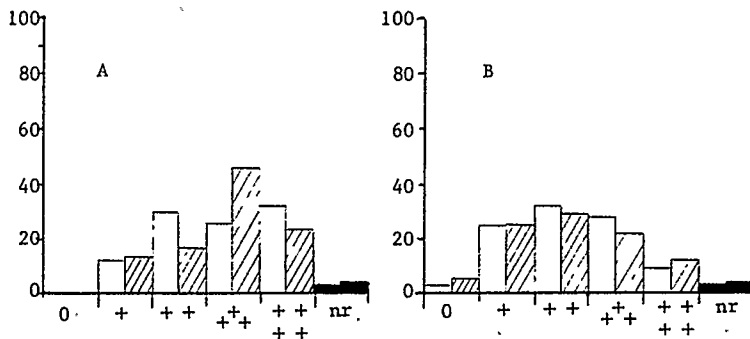
16. Distance Education



17. Affordable Only by Large Institutions



18. Lack of Funds for Software



19. Marketing Strategies

