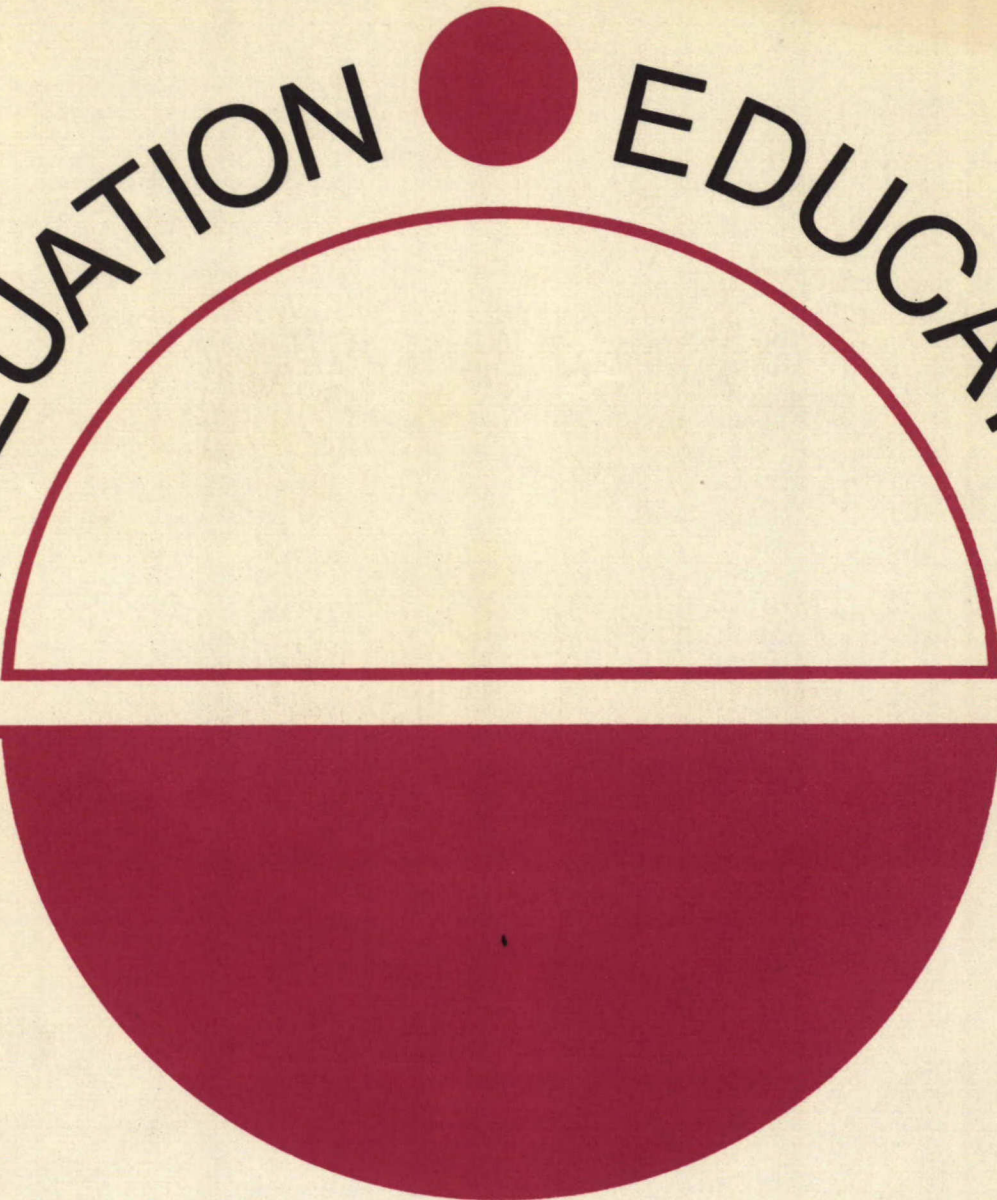


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EVALUATION ● EDUCATION



The use of satellite delivery systems in
education in Canada:
The costing of two networks and a
preliminary needs survey

Volume 2

A preliminary needs survey

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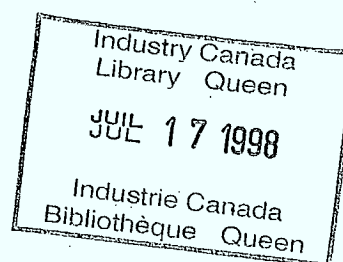
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THE IMPLICATIONS OF THE EDUCATIONAL EXPERIMENTS
CONDUCTED ON THE COMMUNICATIONS TECHNOLOGY SATELLITE

John S. Daniel - Principal researcher

①
THE USE OF SATELLITE DELIVERY SYSTEMS IN EDUCATION IN CANADA;
THE COSTING OF TWO NETWORKS AND A PRELIMINARY NEEDS SURVEY

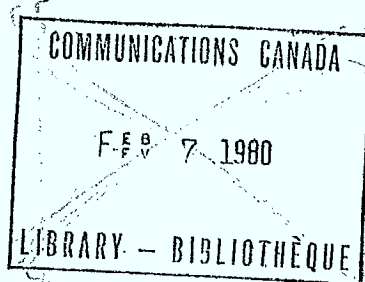
VOLUME 2

A PRELIMINARY NEEDS SURVEY



Department of Communications, Canada
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PURPOSE AND METHODOLOGY OF THIS SURVEY

Volume 1 of this study costs two possible satellite networks which could be of use in education in Canada. In order to determine whether these networks are plausible or useful in the opinion of Canadian educators, the following letter and summary of our intentions was sent, before the cost study was completed, to all Canadian Universities and provincial Departments of Education as well as to other bodies likely to be interested.

The replies received at the time this report went to press are presented in the original language at the end of the french version of this document (p.10). In accordance with our promise to respondents, we have blanked out references likely to reveal an institution's identity.

Now that the results of the cost study and of this survey are available, we invite respondents and others to pursue their reflection on satellites in Canadian education and to let us have further comments in the light of this new information.

Dear Sir,

Satellites in Canadian Education

As befits a country that depends vitally on communications, Canada was the first nation to have a domestic satellite system and is among the leaders in communications satellite technology. Satellites can abolish distance as no previous technology has done and it is in the field of education that the public could reap some of the benefits from the investment of its taxes in the national space effort.

We are presently evaluating the educational experiments being conducted in Canada on the Communications Technology Satellite (Hermès) and the aim of this work is to produce models for the use of satellites in education in the country. The evidence already indicates that satellites can extend educational opportunities but in order to construct a sensible model for future applications we need more information about the real needs.

Instead of conducting a classical needs survey, we decided it would be simpler and more effective to make hypotheses about possible satellite networks and to ask institutions and organizations across Canada to react to these. The enclosed working paper describes two networks which we are in the process of costing. We invite you to circulate this paper for discussion within your institution and to ask those of your colleagues with interests in this area to let us have their comments.

We are particularly interested in obtaining answers to the following questions:

- Is either of these networks plausible?
- What other networks could be useful?

Naturally these questions are not restrictive and we will be pleased to receive reactions to any of the issues raised. All replies will be treated in confidence and presented in an aggregate manner only. We are not asking for formal statements of your institution's position on satellite communications.

We hope to receive replies by mid-March 1977 so that a summary of comments received can be included in the report on the cost study. Since the CRTC is to hold hearings into the proposed merger between Telesat and the Trans Canada Telephone System in the fall this is an appropriate time for educators to reflect on the form they would like satellite communications services to take.

Yours truly,

John S. Daniel

THE USE OF SATELLITE DELIVERY SYSTEMS IN EDUCATION IN CANADA: COSTING OF TWO NETWORKS

I. INTRODUCTION

Canada is a leader in the development and use of communications satellites. At present many educational institutions across the country are conducting experiments on the latest Communications Technology Satellite (Hermes) and a team led by John Daniel (Télé-université, Québec) and Murray Richmond (Athabasca University, Alberta) is evaluating these experiments in order to determine their implications for the future use of satellites in Canadian education.

In order to construct a realistic model for satellite applications in education it is clearly necessary to have information on the present and future needs of various institutions and organizations and to cost systems for meeting these needs.

Given the methodological difficulties of conducting a meaningful needs survey in this new and fast developing domain, the evaluation team has decided to make hypotheses about the satellite delivery systems likely to be of interest to Canadian education and to cost these systems.

We intend that this description of the study to be conducted should serve as a working paper to which institutions, organizations and individuals can react. Are the systems proposed plausible and potentially useful? If not is it because there are no needs that satellites could satisfy or because we have imagined the wrong systems? If a significant number of replies are received to these questions we will have the beginnings of a needs survey.

The proposal to merge Telesat Canada into the Trans Canada Telephone System which, if approved, will influence the use of satellites in the country for many years to come, makes this an appropriate time for Canadian institutions to give thought to their interest in satellites. The Canadian Radio-Television and Telecommunications Commission is to hold hearings into this merger in the fall of 1977 and we hope that the present study and the reactions we receive to it will help to inform the Commission of the potential of communications satellites for improving educational and social services.

2. DESCRIPTION OF THE TWO HYPOTHETICAL NETWORKS

Two networks are being investigated and costed. The first is a network linking major Canadian universities and includes a video capability. We shall call this CUSS (Canadian Universities Satellite System) or SUCES (Système universitaire canadien pour échanges par satellite).

The second network is basically an educational telephone network serving a region (province or group of provinces). We shall call this PETS (Provincial Educational Telephone System) or RER (Réseau éducatif régional).

2.1 The CUSS network

We imagine a network linking some thirty Canadian universities. Some, but not necessarily all of these would be able to emit a video (TV) signal to be received by all others and all would be able to receive and emit audio signals. There would also be a facsimile transmitting capability built in to the network. Such a system would allow Canadian universities - or any other organization which borrowed the network - to do the following things:

a) Course exchanges

Much as Carleton University is presently exchanging graduate courses in engineering with Stanford University in California, such a network would enable universities across Canada to offer a wider range of specialized courses to graduate students. A course given at University X could be followed by students at any or all other network universities. These universities would have a TV image of the lecturer (or of his blackboard/transparencies) and would hear both the lecturer and any questions he was asked. Although the lecturer would not see the students at other sites he and his class would hear all questions and discussion from these sites. The facsimile transmission system would enable lecture notes, diagrams etc. to be transmitted to all sites a few minutes before the start of the lecture.

b) Research seminars and colloquia

Few Canadian university departments have enough graduate students to justify holding research colloquia with world renowned speakers. By providing an audience in many universities simultaneously the CUSS system could encourage such colloquia. These could be either formal, (e.g. a Nobel prize-winning chemist talking about his research to chemists across the country and answering questions), or informal (e.g. a handful of specialists discussing their own research). A successful example of the latter applications was seen in the University of Quebec CTS project when bacteriologists in several cities discussed bacteria and viruses of which live images were transmitted from an electron microscope in Montreal.

c) Other applications

It seems probable that if a system such as CUSS were operational and reliable it would be used for a variety of teleconferences, committee meetings etc. by people both inside and outside the university.

2.2 The PETS network

Highly successful networks of the type envisaged have been in use for some years in Wisconsin and Illinois, to name but two US examples. The idea is to provide an audio link between a large number of sites ($N \sim 200$) within a province or region. Such a system allows any site to be heard by all other sites and in the system we are costing a second channel could be used for facsimile transmission or for a graphic capability of the electrowriter type. Such a network could be used in the following ways.

a) Adult education courses

In Wisconsin some 30,000 people take courses over the University of Wisconsin Extension Educational Telephone Network each year. Such a system could be used for courses at all levels (school, college, university) and would reach into nearly all communities in the region it served.

b) Coordination

Such a province wide network would be useful to many departments of a provincial government in improving coordination with its local agents or employees. To cite the Wisconsin example once again, the ETN is used for regular meetings between the Department of Agriculture and its local agents to provide advice rapidly to farmers about markets, pest control, etc.

c) Meetings

A reliable, easy-to-use network would probably be used intensively by many governmental and educational groups for meetings of various kinds. Obviously these meetings do not have to involve all 200 sites.

3. DETAILS OF THE PRESENT COST STUDY

The study has been broken down into three components.

- Space costs (terminals and satellite) for both CUSS and PETS
- Ground and infrastructure costs for CUSS
- Ground and infrastructure costs for PETS

3.1 Space costs

This part of the investigation as well as the tying together of the whole study, will be carried out by Miller Communications Systems Ltd.

For both systems the following will be provided:

1. Estimates of capital cost per earth station to video and audio baseband interfaces assuming the use of
 - 4/6 GHz Anik I-IV type satellite transponder(s)
 - 12/13 GHz Anik IV type satellite transponder(s)
 vs signal quality, number of channels provided per station, and number of earth stations in the network. Both FM and digital transmission techniques will be examined, and near term cost trends considered. The possible future use of a broadcasting type satellite and its impact on earth station cost will be discussed briefly.
2. Technical (satellite delay, area of coverage, siting, prime power, RF equipment, maintenance) and non technical (time frame, institutional) constraints associated with each of the 4 (2x2) network configurations considered.
3. Possible full-time and occasional use transponder lease arrangements and associated lease costs in an operational system.
4. Annual cost of satellite delivery system, including earth station capital and operating costs plus space segment charge under one or more assumed lease arrangements.

3.2 Ground and infrastructure costs

These will be estimated for CUSS by Dr Don George (Carleton University) and for PETS by Dr John Daniel (Télé-université).

The following parameters will be considered.

1. Equipment costs (TV cameras and monitors and audio feedback system, telephone conference sets, facsimile equipment, graphic facilities such as electrowriters, network control equipment).
2. Maintenance costs.
3. Infrastructure and personnel (equipment operators, security, administration).
4. Instructional development (costs incurred in training instructors and adapting courses to the networks).

4. COMMENTS INVITED

The report of this study will be available in April 1977. Before that date we invite comments and reactions from individuals, institutions and organizations across the country on the plausibility and relevance of the hypothetical systems outlined.

J.S. Daniel
Télé-université
3108, Chemin Ste-Foy
Ste-Foy, Québec
G1X 1P8

Tél.: (418) 657-2496