Conceptual Design
of
A Commonwealth Centre
for Distance Learning

(R-367-02)

Teleconsult ltd.

Consulting Telecommunications Engineers

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of
A Commonwealth Centre
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submitted to

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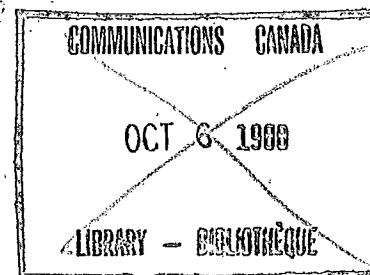
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1.0 SUMMARY

This study has determined that it would be feasible to establish a Commonwealth Centre for Distance Learning which would meet many of the needs identified since 1985, when the Commonwealth Secretary-General was requested to explore the scope for new initiatives in this area.

The present report describes how such a Centre might operate, together with the likely financial and technical implications. However, this is only an initial blueprint for such a Centre; changes would be necessary as operational details were further refined.

We envisage that the Centre would be a modest and flexible organization that would support Commonwealth institutions engaged in Open Learning and Distance Education, and promote cooperation between them. Its key roles would be:

1. To develop and operate an information and brokerage service on behalf of existing institutions and agencies. This service would identify what resources exist in the Commonwealth and how they could be obtained or utilized.

2. To provide the means of training professional educators in the practice of Open Learning and Distance Education, both through hands-on experience, and theoretical background where appropriate.

3. To undertake applied research and development and synthesize existing work with the goal of improving the education and training offered via Open Learning and Distance Education.

4. To work in collaboration with Commonwealth institutions to ensure the widest possible accreditation of learning resources and materials.

The Centre would not be a degree-granting institution and would not enroll any students. It would not duplicate existing activities, and would use existing expertise and resources wherever possible.

In carrying out its mandate, the Centre would use appropriate communication networks and modern technologies to create, capture, store, process and transport information.

We envisage that it would take approximately five years for the Centre to reach full operation, following a three-phase action plan:

1. Implementation Phase
2. Pilot Phase
3. Operational Phase

Once in full operation, the Centre, excluding Programme Task Forces, would require an annual staff operational budget of $4,015,000 with a staff of 38 people, including 26 professionals.

We envisage that the annual operating budget during the first five years (in $'000's) including co-located office space and Programme Task Forces would be as follows:

Year 1	$1,320
Year 2	$1,980
Year 3	$2,705
Year 4	$3,385
Year 5	$4,015

If the Centre were established in Canada, the total facility cost would depend on whether it shared facilities with an existing institution or was constructed as a separate facility. The minimum capital cost of a co-located facility would be $1,500,000. The construction of a separate facility would cost $5,584,430.

2.0 INTRODUCTION

This report describes a conceptual design for a Commonwealth
Centre for Distance Learning (the Centre). It is the result of a
study commissioned by the Federal Department of Communications
(DOC) early in February, 1987.

The first part of the study dealt with communications media used
for Distance Learning. ("Distance Learning" is used in the rest
of the present report as a generic term to cover both "Open
Learning" and "Distance Education". See Appendix VI.) The
resulting report, which was forwarded to the Commonwealth Expert
Group, is included as Appendix V. The second part of the study
covered the work which led to the conceptual design presented in
this report. The key areas addressed are:

* The functions of such a Centre

* A proposed organizational structure

* Financial implications, including establishment and annual
  operating costs

* Technical implications

* An action plan for implementing such a Centre over a five-year
  period

The Statement of Work for the second part of the study is
included in Appendix I.

In preparing this report, the project team reviewed a number of
Distance Learning proposals and studies which had been prepared
within the Commonwealth. Appendix II lists the reports and
documents which were reviewed. Four specific proposals were
considered to be particulary relevant:

* A Pan-Commonwealth Electronic Distance Learning Network

* A Commonwealth Distance Learning Centre

* A Commonwealth Open University Institute

* A Canadian Foundation for International Development through
  Distance Learning

The project team carefully examined the needs which were
identified in the reports listed in Appendix II, and then
assessed the degree to which various existing proposals met those
needs (Appendix III). Based on this analysis, the project team
developed the model which is described in this report.

During the research phase, the project team prepared a short, preliminary report which highlighted the desirable features of a possible model. The report listed the needs which such a model would address, outlined some guiding principles and described its basic functions. This concept was then circulated to a number of leading Canadian experts in Distance Education, as well as representatives of other Canadian organizations, including CIDA and IDRC. The people contacted are listed in Appendix IV.

There was clear consensus of approval for the concept and, as a result, the project team proceeded to develop detailed functions of a Commonwealth Centre for Distance Learning, as well as an appropriate organizational structure, its estimated establishment and operating costs, and technical requirements.

The project team assigned to this study includes N. Mark Lopianowski; Kathleen Forsythe; Roger Hart; Robert J. Martin and Duncan S. Sharp. We gratefully acknowledge the time which representatives of Federal Departments, members of the Commonwealth Secretariat and many distinguished Canadian educators (Appendix IV) have freely provided for discussions and comments on our preliminary work.

3.0 NEEDS IN COMMONWEALTH EDUCATION AND TRAINING

Any proposal should meet the majority of the identified and emerging needs in education and training which have received wide attention within the Commonwealth, namely:

1. Encouraging greater cooperation across the Commonwealth in the sharing of resources and expertise in Distance Learning.

2. Ensuring more widespread recognition of credits for Distance Learning.

3. Providing increased access to all forms of education, and improved opportunities for learning and training.

4. Strengthening the education and training systems of institutions engaged in Distance Learning.

5. Improving the quality of education and training.

6. Providing hands-on training in an extension environment for professionals engaged in Distance Learning.

7. Developing organizational structures that are able to overcome social, economic, and geographic distances without compromising national culture and identity.

8. Exploring new means of financing education and training in Commonwealth countries (this may include developing and delivering Distance Learning materials for private industry, or for non-Commonwealth countries such as the U.S. or Japan).

9. Ensuring that new communications technologies are used as a means for distributing education and training materials.

To ensure that these needs are met, any Commonwealth initiative should work with existing Distance Learning institutions. This requires an organizational structure that permits smooth growth into a Commonwealth-wide network of participating institutions.

4.0 GUIDING PRINCIPLES

In developing the model described in the present report, the study team was guided by a number of principles which are discussed in the studies referred to in Appendix II.

1. Any initiative in the Commonwealth must reflect the autonomy of each individual country and participant.

   Local autonomy can help preserve cultural diversity and maintain social stability, despite the widespread use of communications technology.

2. Any initiative must be capable of adapting to changing needs. It must, therefore, be driven by needs and not technology.

   By ensuring that all networks are driven by real educational needs, educators will be at the forefront of appropriate technological development, thereby contributing to their community's development as well as to industrial and telecommunications infrastructure.

3. Any initiative must help train participants (i.e. the educators, trainers and administrators) in the total system.

   The total system refers to the proposed Commonwealth Centre, the participating institutions, and the network(s) which would serve them. In addition to making the network accessible to the participants, they would be trained to use it to its fullest extent, through the exchange of ideas and interaction between the participants.

4. Any initiative must ensure equity of access throughout the system by providing both a backbone network and a variety of regional and common-interest networks.

   Standard network interfaces should, therefore, be used wherever possible to allow these networks to be interconnected.

In addition, any Commonwealth initiative in Distance Learning must have the potential:

* To improve the educational mobility of students throughout the Commonwealth, by providing a common frame of reference for accreditation and by providing flexible programmes that combine both Distance Learning and campus-based instruction.

* To improve opportunities for learning, through the sharing of resources and expertise by participating institutions.

* To improve basic education for adults, as well as technical and vocational training, undergraduate programmes, and professional and graduate studies.

* To contribute, in the longer term, to improving opportunities for children and young people, through an increased awareness of Distance Learning methodologies, and the increased use of appropriate technologies.

* To use Distance Learning methodologies and new technologies to contribute to improvements in such areas as health care and economic well-being.

* To support the improvement of telecommunications infrastructures throughout the Commonwealth in order to satisfy the needs identified through this initiative.

The Commonwealth initiative in Distance Learning must be viewed as a long-term investment with benefits that will continue to be realized well into the 21st century. For this reason, any functional model must be dynamic and adaptive, building on existing institutions and resources to become an active organization that grows and adjusts as developments dictate.

5.0 CONCEPTUAL DESIGN FOR A COMMONWEALTH DISTANCE LEARNING NETWORK

Figure 5.1 shows a possible structure for a Commonwealth Network in which the proposed Centre would be the keystone. The Charter would be framed in a Commonwealth Distance Learning Agreement and be administered by a Governing Council.

Membership of the Governing Council would be chosen from countries who were signatories to the Commonwealth Distance Learning Agreement. The function of the Council would be to interpret the Agreement and determine policy.

The network would consist of the Commonwealth Centre for Distance Learning, Commonwealth institutions and agencies engaged in Distance Learning, and eventually Regional Branches of the Commonwealth Centre. The network would encourage direct communications between participants through a multitude of linkages.

The Commonwealth Centre for Distance Learning would facilitate activities within this network and between institutions. The Centre would be staffed by a permanent core and would also encourage Commonwealth members to assign staff for specialized projects or assignments.

Initially the Centre could be located at one site, with the potential to expand to other locations once the network was established. The Regional Branches would be task specific, established for a certain term, or to serve a geographic region. The Regional Branches would operate at the local or national level and directly interface with any Commonwealth institution or agency engaged in Distance Learning. In general they would coordinate areas of common interest, both at the national and international levels.

The main nodes of the network would consist of Commonwealth institutions and organizations which are actively engaged in Distance Learning.

COMMONWEALTH
DISTANCE
LEARNING
AGREEMENT

GOVERNING
COMMITTEE

DISTANCE
LEARNING
CENTRE

o   NATIONAL MEMBERS

o   INSTITUTIONAL
    ASSOCIATES

COMMONWEALTH
INSTITUTIONS & ORGANIZATIONS
ACTIVELY ENGAGED IN DISTANCE LEARNING

BRANCHES OF THE DISTANCE LEARNING CENTRE

NODES

DISTANCE LEARNING NETWORK

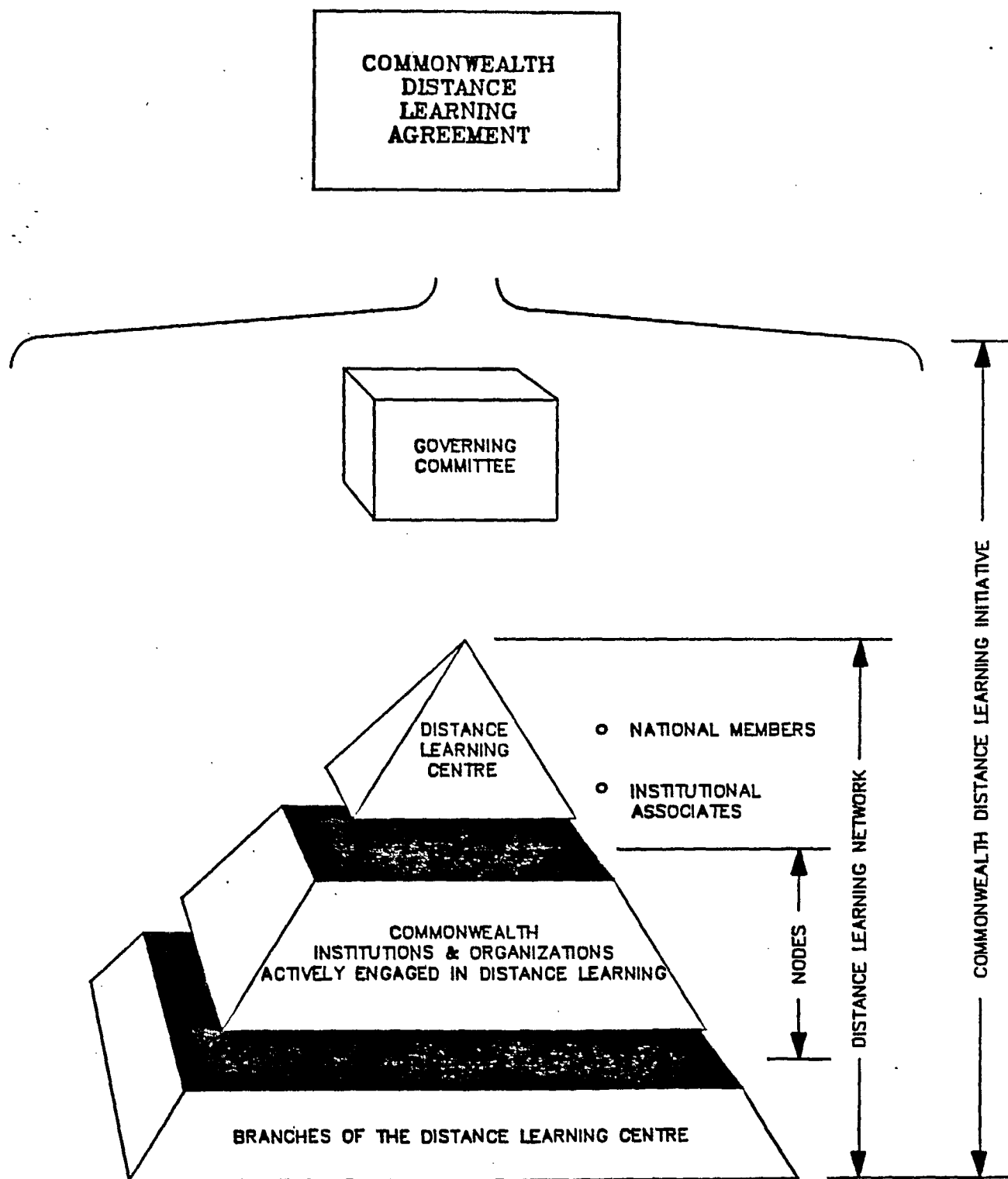COMMONWEALTH DISTANCE LEARNING INITIATIVE

Figure 5.1

6.0 FUNCTIONAL REQUIREMENTS OF THE PROPOSED CENTRE

This section describes the function requirements envisaged for a Commonwealth Centre for Distance Learning.

The purpose of the Centre would be to foster cooperative activities among Commonwealth educators. It would, in effect, manage a global network of professionals and institutions and coordinate those activities, projects and initiatives aimed at improving access to learning through cooperation in Distance Learning.

The Centre would develop the network so that it could address needs that have already been identified, as well as those that are emerging. The proposed Commonwealth Centre for Distance Learning would, therefore, play a key role in helping develop and sustain a network for sharing the educational resources of Commonwealth institutions at all levels, including adult basic education, technical and vocational training, as well as undergraduate programmes. As such, the Centre would need to be able to perform the following functions:

1. Information and brokerage of Distance Learning materials and resources

2. Joint development of learning materials and resources

3. Network design and provisioning

4. Staff training in Distance Learning

5. Applied research and development in Distance Learning

6. Accreditation of learning materials

7. Funding development

These functions are explained below.

1. **Information and Brokerage of Distance Learning Materials and Resources**

    * The Centre would develop and operate an information and brokerage service on behalf of participating institutions and agencies. This service would identify existing materials and resources in the Commonwealth and how they could be obtained or used.

    * The Centre would promote and demonstrate the use of Distance Learning techniques in other areas requiring development, such as health care, rural education, and government training.

* The Centre would monitor developments in Distance Education around the world and facilitate the acquisition of new materials and resource materials as necessary.

* The Centre would maintain awareness of worldwide expertise in Distance Learning and encourage the sharing of this knowledge.

2. **Joint Development of Learning Materials and Resources**

* The Centre would identify areas in which there were common needs for new learning materials and resources.

* The Centre would foster, stimulate and participate in the exploration, development, production, and exchange of learning systems and learning resources by participating institutions and agencies, after having determined the needs.

* The Centre would help determine guidelines and procedures for the development of 'common' learning systems. Where justified, it would commission the development of such materials and resources.

3. **Network Design and Provisioning**

* The Centre would encourage the establishment and operation of appropriate communication networks to support the above activities.

* To facilitate such communication, the Centre would recommend standards and protocols for the use of these networks by participating institutions and agencies.

* The Centre would provide its expertise to participating institutions, and would develop, through practice and demonstration, methods for assisting participants to acquire competence in using new telecommunication systems.

* The Centre would ensure that communication links were established and maintained with non-Commonwealth agencies. This would include access to a variety of educational databases.

* The Centre would assist in the conversion from one standard to another, where necessary.

4.   **Staff Training in Distance Learning**

* The Centre would both provide and arrange training for professional educators and trainers in the practice of Distance Learning, both through hands-on experience working in an extension environment with real students, and with theoretical background where appropriate. It would also provide advice on developing local support services for students.

* The Centre would foster, stimulate, and participate in the development and application of new ideas for learning and training, using both emerging and proven technologies.

* The Centre would encourage the field testing of ideas, techniques, tools and methods that would assist Distance Learning practitioners in improving the quality of learning design and delivery for students.

5.   **Applied Research and Development in Distance Learning**

* The Centre would provide a future scanning and information service on the use of appropriate technologies, as well as applied research into effectively using these technologies for Distance Learning.

* The Centre would encourage and support new forms of organizational arrangements, through pilot and demonstration projects, to allow new technologies to be used more effectively.

* The Centre would research the effectiveness and real costs of various education or training systems, including Distance Learning and campus-based instruction.

* The Centre would help identify generic research areas common to many Commonwealth countries, and develop strategies for the continued exploration of pertinent issues in Distance Learning.

* The Centre would promote the development of new learning systems in order to demonstrate new theories or technologies.

* The Centre would gather and distribute the results of recent research or practical experience relevant to Distance Learning.

6.   **Accrediting of Learning Materials**

   * The Centre would be responsible for ensuring that learning
     materials commissioned by the Centre were accredited by
     Commonwealth institutions.

   * The Centre would collaborate with Commonwealth
     institutions to improve credit transfer and the
     accreditation of existing materials throughout the
     Commonwealth.   This accrediting would cover the full
     range of Distance Learning programmes, from adult basic
     education, technical and vocational training and
     undergraduate programmes, through to professional and
     graduate studies.

7.   **Funding Development**

   * The Centre would explore and develop innovative means for
     funding activities and projects. These might include
     collaboration with the private sector or combined
     purchases of materials.

   * The Centre would assist in the marketing of materials and
     systems developed within the Commonwealth to non-
     Commonwealth countries such as the U.S.

   * The Centre would document, through research and the
     experiences of participating institutions, the economic
     and other advantages of using Distance Learning
     methodologies, especially when these are combined with
     strong local support. Where appropriate, the Centre would
     encourage the development of these local models, to
     demonstrate how they can make new educational and training
     opportunites available to learners, and to show what
     economic advantages can be realised.

7.0 DISTANCE LEARNING CENTRE ORGANIZATION

It is envisaged that a Commonwealth Centre for Distance Learning would have a Governing Council which would ensure that the Centre operated according to the provisions of a Commonwealth Distance Learning Agreement. An organizational structure is proposed (as shown in Figure 7.1) to address the functions of the Centre which were described in Section 5.0. The responsibilities of the various components are described below.

1. Governance

The Governing Council would be responsible for determining the scope, direction, and overall goals of the Commonwealth Centre for Distance Learning. It would convene on a regular basis and would conduct as much of its business as possible using communication technologies and the methodology of Distance Education.

A council of ten members would be a workable size, and the members would be drawn from the countries which were signatories to the Commonwealth Distance Learning Agreement. At least three of the Agreement's major participants would be permanent members, with others appointed for a minimum period of two years. This form of organization would give the governing body the continuity we consider necessary.

2. President's Office

The President would be chosen from the Commonwealth and appointed by the Governing Council for a five-year term. The President would be the chief executive officer of the Commonwealth Centre for Distance Learning and would be directly responsible to the Governing Council for its operation. The President's office would also include an executive secretary and an executive assistant.

The President's responsibilities would include formulation of a master or strategic plan for achieving the objectives set by the Governing Council. The President would also recommend the appointment of the Vice-President and all Directors.

3. Administrative Services

This section would provide all the administrative support services required by the Centre including accounting, purchasing, personnel support, etc.

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                    ┌─────────────────┐
                    │    GOVERNING    │
                    │     COUNCIL     │
                    │           (10)  │
                    └────────┬────────┘
                             │
                    ┌────────┴────────┐
                    │                 │
                    │    PRESIDENT    │
                    │            (3)  │
                    └────────┬────────┘
                             │
                             ├──────────── ADMINISTRATION
                             │                      (5)
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┌──────────────┐  ┌──────────────┐  ┌──────────────┐  ┌──────────────┐
│     VICE     │  │   DIRECTOR   │  │   DIRECTOR   │  │   DIRECTOR   │
│  PRESIDENT   │  │              │  │              │  │              │
│        (12)  │  │         (7)  │  │         (5)  │  │         (6)  │
└──────────────┘  └──────────────┘  └──────────────┘  └──────────────┘
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—Education Information Brokerage and Program Services	— Systems Services	— Training Services	— Research and Evaluation Services
—Program Development			
Task Forces *			
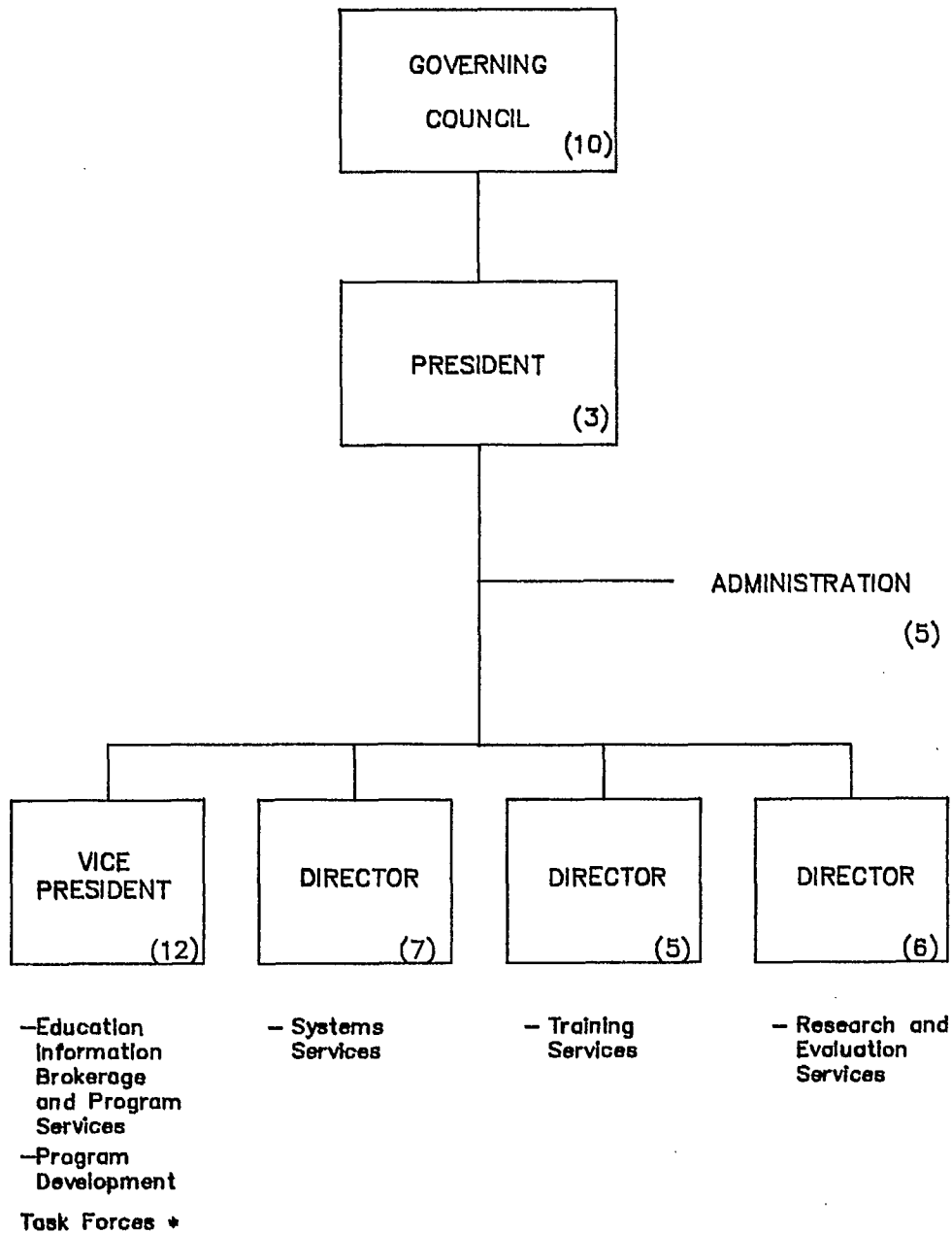
Notes
* Staffed on an as required basis
( ) Figures in brackets indicate staff complement

Figure 7.1

4. **Educational Information, Brokerage and Programme Services**

This section would provide an information and brokerage service, acquire learning materials, and promote or commission the development of learning materials. Additionally, it would coordinate the delivery of materials to institutions and facilitate inter-institutional links.

Because of the significance of this section, it would be under the Vice-President of the Centre. The section would have a core staff of twelve, including five Regional Officers. These Regional Officers, who would coordinate activities in the field, would be drawn from the region in question and would not be appointed until the network was sufficiently established to enable them to function effectively.

Part of the proposed budget is specifically allocated for purchasing services from elsewhere so, for example, it is likely that the Centre would have direct access to the database which has been established in Milton Keynes, rather than attempting to replicate that activity.

5. **System Services**

This section would facilitate the establishment and operation of communication networks, recommend standards and protocols, and assist with conversion of transmission standards. It would also provide advice on the development of local support services.

The Director of this section would have a strong educational background to help ensure that the technology was needs driven. However, a good understanding of modern communications technology would be essential.

The section would have a staff of seven, including a Network Coordinator, two professionals, and a technical officer.

6. Training Services

This section would be responsible for providing the training services for professional educators and trainers. Hands-on training in delivering courses to students would be provided by the Centre itself, and by other Commonwealth institutions. Theoretical studies for the educators would be delivered, wherever possible, by Distance Learning techniques.

The Director would have a strong background in working with Distance Learning materials in an extension environment. The section would have a staff of five, and would also have funds for purchasing training services from other Commonwealth institutions.

7. Research and Evaluation Services

This section would undertake applied research with the goal of improving the education and training offered by Distance Learning. It would encourage the application of new scientific theories of learning, using existing or emerging technologies to meet real educational and training needs throughout the Commonwealth.

Part of this would entail evaluating the effectiveness of existing methods, including campus-based instruction. Such information would be crucial in facilitating the accreditation of learning materials. The staff of six would consist of a Director, an Accreditation Coordinator, two research professionals, and two individuals for clerical support. Funds would also be allocated to purchase services from other Commonwealth institutions.

8. Programme Task Forces

In addition to the above sections, it is envisaged that various Programme Task Forces would be created for the development of learning materials. Each Task Force would be expected to cooperate with all the service units, to ensure that:

1. There is no unnecessary duplication.
2. The materials are usable across the Commonwealth.
3. Appropriate technologies are used to develop and deliver these materials.
4. Local organizational arrangements are suitable for the effective delivery of the materials.
5. Local professional staff are actively involved in the process.
6. Research and evaluation are integral to the process.
7. The materials are fully accredited.

The Programme Task Forces would be staffed with individuals from participating Commonwealth institutions who are qualified to meet the particular task at hand. They would include people with subject matter expertise and experience in course design and course delivery. All Programme Task Forces would include professionals from the various service units of the Centre. The Programme Task Forces would report to the Vice-President.

Although each of the above services would have clearly defined and learner-centred functions, in most cases they would cooperate with each other and the participating institutions to ensure the maximum possible synergy. This would allow each section to be relatively small and action oriented, and would discourage the growth of an internal bureaucracy.

8.0 POTENTIAL DISTANCE LEARNING CENTRE PROJECTS

In addition to providing educators and trainers with professional training in Distance Learning, the Centre would also undertake development of learning materials in cooperation with participating Commonwealth institutions. Previous studies have already identified areas where there is a shortage of good learning materials and sufficient cross-cultural homogeneity to merit consideration of joint development projects, viz:

1. Rural Development
2. Health
3. Agricultural Practice
4. Management and Business Studies
5. English and other International Languages

During the formative years of the Centre, it is envisaged that one or more of these areas would be chosen for development. Such projects would provide the opportunity to define and refine many of the procedures and interfaces required by the Centre. The budget assumes that a small number of Programme Task Forces would be established in the second year of operation, growing to perhaps five by the third year. The Programme Task Forces would be created for specific, action-oriented tasks to encourage the Centre to act as an incubator and a catalyst for the cooperative development of learning materials. It would also foster the type of collaborative effort which is essential for the success of the overall network.

9.0 FINANCIAL IMPLICATIONS

This section outlines the financial implications of setting up and operating the Commonwealth Centre for Distance Learning over the first five years. The study recognizes that there are three possible scenarios for establishing the Centre:

a) Co-locate with an existing institution,
b) Rent suitable space, or
c) Constructing a new facility.

Costs and space allocations are typical of Canadian metropolitan environments. The staffing costs shown include benefits and similar overheads.

1. Operating Budget

This budget assumes that the Centre has reached full operation.

		Staff	Office Space (sqft)	Budget (000's)
a)	Governance			
	Travel, stipends and meeting expenses			$135
b)	President's Office			
	President	1	400	$105
	Executive Assistant	1	150	$50
	Executive Secretary	1	150	$30
	Travel, Office Expenses			$30
	Sub-total	3	700	$215
c)	Administrative Office			
	Administrative Coordinator	1	150	$45
	Accountant	1	150	$35
	Purchasing	1	150	$35
	Clerical plus Central Filing	2	300	$45
	Travel, Office Expenses			$20
	Sub-total	5	750	$180

Budget (cont'd)

	Staff	Office Space (sqft)	Budget (000's)
d) Information, Brokerage and Programme Services			
Vice-President and Director	1	300	$90
Information Coordinator	1	180	$60
Professionals	2	300	$100
Regional Officers	5		$250
Secretarial/Clerical	3	300	$65
Travel, Office Expenses			$60
Funds for Purchasing Services			$200
Telecommunications, etc.			$50
Program Task Forces (variable -- see item h)			
Sub-total	12	1,080	$875
e) Systems Services			
Director	1	200	$75
Network Coordinator	1	180	$60
Professionals	2	300	$100
Technical Officer	1	120	$40
Secretarial/Clerical	2	200	$45
Travel, Office Expenses			$50
Telecommunications, etc.			$300
Sub-total	7	1,000	$670
f) Training Services			
Director	1	200	$75
Professionals	2	300	$100
Secretarial/Clerical	2	200	$45
Travel, Office Expenses			$50
Fund for Purchasing Services			$300
Sub-total	5	700	$570

Budget (cont'd)
Office

		Staff	Space (sqft)	Budget (000's)
g)	Research and Evaluation Services			
	Director	1	200	$75
	Accreditation Coordinator	1	180	$60
	Professionals	2	300	$100
	Secretarial/Clerical	2	100	$45
	Travel, Office Expenses			$50
	Funds for Purchasing Services			$200
	Sub-total	6	780	$530
	Total	38	5,010	$3,175
	(Professional Staff)	26		
h)	Program Development			
	Program Task Forces Three @ $280,000 (Assumed three professionals plus support staff per Task Force)	12	1,650	$840
	Conference Rooms plus Office Space for Visiting Professionals		1,100	
	Total Office Space:		7,760	
	Total Operating Budget:			$4,015

2. Growth in Operating Budgets over a Five-Year Period

	Year 1	Year 2	($'000) Year 3	Year 4	Year 5
a) Governance	135	135	135	135	135
b) President's Office	200	215	215	215	215
c) Administrative Office	80	135	180	180	180
d) Information, Brokerage and Programme Services	225	425	525	625	875
e) Systems Services	205	370	470	570	670
f) Training Services	270	370	470	570	570
g) Research and Evaluation Services	205	330	430	530	530
h) Programme Development	-	-	280	560	840
Total	1,320	1,980	2,705	3,385	4,015

Notes:

In year one, the work of the Interim Planning Committee would add to the cost of Governance. However, since it is not likely that the Governing Council would be fully operational at this time, it is assumed that the resulting budget would be very similar to that for year two onwards. It is also assumed that the President's Office would be fully operational during year one, (although travel would be less than in subsequent years) and that key staff would be appointed in the various service units.

In year two, staffing would be brought up to full strength in all of the service units, and Training Services would begin to purchase training services from institutions actively engaged in Distance Learning.

In year three, the administrative office would be brought up to full strength; Information, Brokerage, and Programme Services and Research Services would begin to purchase services; and Systems Services would begin to make extensive use of telecommunications. The first Programme Task Force would be established.

Expenditures in telecommunications and in purchasing services from other institutions are expected to continue to grow during years four and five, with five Regional Officers being appointed in year five. It is expected that these people would be located in Africa, Asia, Australia, Europe, and Latin America.

The budget allocation for Programme Task Forces is extremely modest, but it is hoped that once the Centre is operational, this activity would continue to grow in the regions, rather than in the Centre.

3. Establishment Budget

The facilities which are marked with an asterisk (*) are only preliminary figures.

Space Type	General (sqft)	Technical (sqft)	Total (sqft)
Office	7,760		
Meeting Rooms* (Including Council)	2,500		
Reception/Public*	1,000		
Information Processing*		1,000	
Programme Support*		300	
Technical Support*		2,500	
	11,260	3,800	15,060
Net/Gross Markups General (1:1.6) Technical (1:1.45)	18,016	5,510	23,526
Subtotal Gross Space Future Expansion(10%)	1,802	550	2,352
TOTAL BUILDING AREA (sqft)	19,818	6,060	25,878

a) Co-locate with Existing Institution

Annual cost $8 per sq ft $207,024

Technical and Communication System $1,500,000
  Allowance
  Note: This option assumes that the
institution has the necessary space
available. For efficiency, the Centre
would be a self-contained unit within the
institution, with the exception of some
meeting rooms, etc. which might be
shared. In practice such space might be
difficult to locate.

b) Rent Space

Annual cost $25 per sq ft $646,950

Technical and Communication System $1,500,000
  Allowance

c) Construct New Facility

Building Costs (general) $1,783,620
  ($90 per square foot - including
   structural, mechanical, etc.)

Building Costs (technical) $606,000
  ($100 per square foot - including
   structural, mechanical, etc.)

Sub-total $2,389,620

Site Services, Improvements, Landscaping,
Furnishings, Testing, Permits, Consultants,
Designers, Surveyors, Contingency (1:1.5) $1,194,810

TOTAL FOR BUILDING AND SITE WORK: $3,584,430

Technical and Communications System* $1,500,000
  (Allowance)

Site Acquisition* (0.5 Acres) $500,000

TOTAL ESTABLISHMENT COST: $5,584,430

Annual maintenance costs $207,500

4. Analysis of the Alternatives

Co-locating with an existing institution engaged in Distance
Learning is clearly the most cost effective solution, but it
seems most unlikely that a dynamic institution of this sort
would have sufficient unused office space available.
Similarly, although general office space is readily
available in most areas, it is not generally contiguous with
the public facilities, meeting rooms, and technical
facilities that the Centre would require. Therefore, the
Centre would probably have to rent space for all these
functions, regardless of the level of usage, and provide all
of the technical infrastructure from scratch. The same is
true for building comprehensive facilities from scratch.

The most appropriate solution would therefore seem to be a
combination of co-location and building additional
facilities on the same site, which could be either rented or
owned by the Centre. This would allow some facilities to be
shared, but would give the Centre a useful degree of
independence. Perhaps an ideal solution would be to design
the Centre parallel to development of a new facility at an
existing Distance Learning institution. Regardless of
whether the space was rented or owned, it would allow
economies in site services, improvements, and technical and
communication systems, as well as the shared use of some
facilities. Indeed, if such a partnership were possible, it
would not only allow the space to be specifically designed
for the Centre's needs, but it would be much more cost
effective than renting space in a downtown location.

10.0 TECHNICAL IMPLICATIONS

In carrying out its mandate, the Centre would create, capture, store, manipulate, and transport information. This section addresses the information systems and services needed to support these activities. The following discussion focusses on the functions, systems, and service requirements.

1. **Functional Requirements**

    In many respects, the technology needs of the Centre would be similar to those of any advanced business user. The following points characterize the expected requirements.

    a) office / business support functions

        * letter and report preparation and production
        * telex/electronic messaging
        * telephone and facsimile
        * filing, library, and database services

    b) teleconferencing functions

        * audio teleconference
        * computer teleconference
        * integrated audio and computer teleconferencing

    c) research, training, and evaluation functions

        * audio and video media playback capability
        * interactive video and data media capability
        * modest production facilities
        * electronic publishing facilities

    d) future functions

        * audio programme broadcasting
        * video (television) broadcasting
        * video teleconferencing
        * compressed video teleconferencing

    During the formative years of the Centre, it is unlikely that full motion video teleconferencing could be justified at present cost levels. However, this situation might change as the network grew and the costs of these technologies fell. Compressed video using T1 or a 56 kilobit/second channel might prove an attractive alternative if the price of the CODECs fell as a result of large-scale production.

    Network-standard studios and facilities for editing and replicating electronic media are not seen as initial

requirements under the Centre's mandate.   However, modest
facilities for training professionals in the use of low-cost
interactive media might be required from an early date.

2.   **System Requirements**

The following equipment and systems would be needed to
support the functional requirements identified above.

* PBX for data and voice (upwards of 50 lines)
* telephone sets (50)
* computer work stations (30)
* telex terminal
* facsimile
* low-volume page copy, collating and binding facility
* printer and plotter equipment (good quality)
* document reader (optical character scanner)
* audio bridge (50 ports)
* computer file server
* laser printers
* integrated teleconference room
* audiovisual room
* microfiche reader

Though integrated data and voice PBX (private branch
exchange) is listed, a separate local area network (LAN) or
data switch might be a preferred approach, depending on cost
and flexibility factors.

The work stations would include keyboard, monitor, printers,
file storage, and software for word and text processing,
page layout, spreadsheet, accountancy, and communication
applications.

Computer access to the external networks would be via X.400,
X.25, and regular modems. These would be used to access
existing databases, and new ones would be created and
maintained as necessary by the Centre.

The integrated teleconference room would provide specialized
equipment for audio and computer conferences, including
projection and electronic slate (blackboard or graphics
tablet) systems. Optional provision would exist for a slow
scan video transceiver and a TVRO (television receive only)
facility with antenna and receiver. The room would consider
future capability for video phones and broadcast standard
video (in terms of floor space and cabling).

The audiovisual room would include equipment for utilizing
various recorded media such as CD ROM (compact disk - read
only memory) and IVD (interactive video disk).

Depending on distances and the physical layout of the
Centre, the various electronic systems and equipment would
be linked together using some type of local distribution
system. Likely it would be cable based; however, site
specific factors would influence actual technologies and
topologies.

3.   **Service Requirements**

Access to external networks is, of course, essential. The
scale and scope of the Centre would preclude it from
becoming a common carrier. The Centre would, therefore,
access the world by subscribing to the following services:

* the postal system
* the public switched telephone network (PSTN)
* the telex network
* the public data network (PDN)

These services are readily accessible from virtually
everywhere in Canada. Datapac, the public (packet switched)
data network, is available in well over 100 serving areas
across the country and can always be reached by dialing over
the telephone network as a long distance call or using a
foreign exchange line (FX).

If, or when, the transmission of full-motion video became a
requirement, access would likely be via satellite. It is
also possible that satellite and/or submarine cable might be
used to establish private voice or 64 kilobit/second
circuits between the Centre and the participating
institutions. Such a possibility might mean that it would
be prudent to establish the Centre where there is good
access to both national and international satellites.

11.0 ACTION PLAN

The development of an initiative of this scope would be a
continuous process, with the pace of development determined, to a
certain extent, by national priorities and resources.

The key to initiating the development of a functioning network of
all Commonwealth institutions engaged in Distance Learning is the
establishment of a Commonwealth Centre for Distance Learning as a
focal point. It is estimated that the Centre could be fully
operational within five years. This is based on the phased
approach described below.

Implementation Phase - 15 months

During this phase it is envisaged that:

1.   A Commonwealth Distance Learning Agreement would be signed.

2.   The Governing Council would be appointed.

3.   An Interim Planning Committee would be established by the
      Governing Council to:

      a)   Recommend a President
      b)   Recommend a site for the Centre
      c)   Recommend the initial policies of the Centre

4.   Once appointed, the President would:

      a)   Select the senior staff
      b)   Develop a strategic plan
      c)   Establish the Centre in the selected location
      d)   Begin cooperating with existing Commonwealth
            institutions engaged in Distance Learning

Pilot Phase - 24 months

During this phase it is envisaged that the Centre would

1.   Identify and conduct initial activities

2.   Refine the functions of each service unit

3.   Gradually bring the core staff up to operational strength

4.   Fully establish the activities of all the sections

5. Initiate pilot projects in programme development, through the establishment of a small number of Programme Task Forces

6. Establish a functioning network between the main participants.

Operational Phase - 9 months

This would be a transitive phase for the Commonwealth Centre for Distance Learning from its pilot phase into full operation. With time, experience might indicate a need to refine the organization and redefine some of its goals. The Operational Phase can, therefore, be considered a vital part of the continuous development of both the Centre and the network of Commonwealth institutions which it is intended to serve.

APPENDIX I

TERMS OF REFERENCE FOR THE STUDY

STATEMENT OF WORK

Background:

Since October 1985, when the Commonwealth Heads of Government directed the Commonwealth Secretariat to "explore the scope for new Commonwealth initiatives in ... open learning through the use of communications technologies" and the Commonwealth Education Ministers also requested a report on how these "innovative methods and approaches could contribute to Commonwealth student exchange and educational cooperation...", the Commonwealth has been commissioning studies and consulting with Commonwealth experts on Open Learning and Distance Education.

In the spring of 1986, the Department of Communications was approached for advice on how communications technologies could be used to extend learning opportunities for students and to promote international information exchanges between learning institutions.

Since October 1986, in consultation with the Secretary of State, External Affairs and the Canadian International Development Agency, the Department of Communications has been exploring institutional mechanisms for increasing Commonwealth cooperation and interchange in Open and Distance Learning. The models for a Commonwealth Institution for Distance Learning which have been developed by this interdepartmental committee form the basis for Part B of this study.

In December 1986, the PMO's Coordinating on the Commonwealth established a Sub-committee on Education and Distance Learning which is co-chaired by DOC and the Secretary of State. This Sub-committee would review the results of the study.

DOC is also working closely with the Expert Group on Distance Education, under the chairmanship of Lord Briggs, which was recently appointed by the Secretary general of the Commonwealth, Shridath Ramphal. At a meeting in London last November, DOC offered to assist the Expert Group in its technical studies which explains part A of this report.

Work to be Done

A two part report:

Part A: DOC has offered to assist the Commonwealth Expert Group on Distance Learning in examining the full range of communications technologies that can be used for Distance Education and have a potential or actual

significance for Commonwealth cooperation in Distance Education. For additional details on the terms of references for Part A, please see Appendix III.

Part B: Should develop several models for a Commonwealth Distance Learning Institution including:

- functions
- financial implications
- technical implications
- organizational structure

The objective: Appendix IV provides a brief description of three possible Distance Learning Institutions:

- a Pan-Commonwealth Electronic Distance Learning Network
- a Commonwealth Distance Learning Centre
- a Commonwealth Open University Institution

Part B of this report should develop the afore mentioned options, and provide information in each case, if appropriate, on the following:

- target groups

- possible functions including:

a) information
needed to facilitate cooperation, exchange of expertise and sharing between distance-teaching institutions; determine technical means available

b) staff training and advisory service
both for full-time distance-teaching professionals and for academics developing courses; potential for pan-Commonwealth or regional co-operation

c) acquisition and delivery of teaching material
mechanisms to ease the exchange and secondary use of existing teaching material

d) promoting or commissioning teaching material
possibility of joint action to develop material to meet common needs (role of new technology)

e) local support services to students
support, monitoring and training for local support to students by cooperating institutions

f) mutual accreditation procedures
   possibility of Commonwealth credit; issues of
   accreditation by institution initiating or using
   material

g) facilitation of inter-institutional links
   potential for live/recorded exchanges between
   institutions; satellite seminars; data transmission

h) evaluation and applied research in Distance Education

- <u>costs</u>   establishment costs,
             annual operating costs

- <u>technical requirements</u>   e.g. information exchange,
                                 programme delivery

- <u>organizational structure</u>:   administration, operations

- <u>action plan</u> for implementation over next five years

The study should review existing Canadian institutions which
deliver Distance Education programmes on which a Commonwealth
institution could be linked or could be build upon.

The contractor should consult with the Canadian Association on
Distance Education on these options and with any other pertinent
Canadian association.

There is broad consensus that barriers to student mobility have
been created as a consequence of differential fees policies and
visa regulations in a number of Commonwealth countries. Distance
Learning can be seen as one way of overcoming these barriers and
ensuring a transboundary flow of educational programming.

The contractor is asked to provide an assessment of the
possibilities for the provision of educational programming in
developing countries using Distance Learning technologies being
capped by a residency experience in a university in another
Commonwealth country. The contractor is also asked to provide an
estimation of costs and savings to be realized.

The contractor should consult with CIDA and with other experts in
education and in Distance Learning relating to developing
countries (CIDA would provide a list of contacts).

The contractor should provide a suggested list of Canadian
experts on Distance Education which could advise the Sub-
committee and review the study.

The contractor should also formulate recommendations on the advantages or disadvantages of each of the options and, if required, suggest a "mixed" proposal or preferable alternatives.

APPENDIX II

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above documents in the present report.

APPENDIX III

**FOUR PROPOSALS FOR
COMMONWEALTH COOPERATION AND DISTANCE LEARNING**

The 1985 meeting of Commonwealth Heads of Government acknowledged the potential for collaboration through the use of new technologies in Open Learning, and requested the Secretary-General to explore the scope for new Commonwealth initiatives in this field.

The Commonwealth Ministers of Educations also requested that a report on the potential contribution of new communications technologies, and approaches to educational co-operation and student exchange, be presented to their Tenth Conference in Nairobi in June, 1987.

As a result, the Commonwealth Secretariat appointed an Expert Group, under the leadership of Lord Briggs, to formulate proposals on Open Learning co-operation within the Commonwealth.

Since the notion of a Commonwealth initiative was first raised, a number of different proposals have been advanced.

Annex II of the Statement of Work for the present study discussed four of these proposals, and the project team was specifically asked to formulate recommendations on the advantages or disadvantages of each option and, if required, suggest a 'mixed' proposal.

The following proposals were discussed in Annex II:

1. **A Pan-Commonwealth Electronic Distance Learning Network (PAN-COM.NET)**

    Originating from the Briggs group, this network would propose a single central office and data band on Distance Education, perhaps located in Canada. It is important to note that this proposal parallels the International Centre for Distance Learning directed by Dr. Keith Harry of the British Open University at Milton Keynes. Linked to this proposed office would be a series of special content centres or information nodes dealing with high priority thematic areas, especially for LDC's. Such modes could include, for example, detailed information on agriculture, veterinary science, health care, and studies on Distance Learning. The location of these nodes would be determined according to the specializations of Commonwealth member countries. Financing would be from Commonwealth countries but the expectation is that the developed nations would bear the major costs.

2. A Commonwealth Distance Learning Centre (CDLC)

This proposal is for a multi-purpose organization to serve academic, vocational, technical and professional interests in Commonwealth countries at both the degree-granting and at the non-degree-granting post-secondary level. It would probably require consensus among Commonwealth Education Ministers. The Centre would establish a director of all existing Distance Education courses, determine new courses that should be produced by developed or developing countries on priority issues, and adapt or modify existing ones if required. The Centre would also establish standards, format and procedures for the production of new courses both in developed and in developing countries. The Centre would have the capacity to assist in the production of new courses and supplementary materials on request. The Centre would serve as an information exchange service linking institutions offering existing programmes with potential recipient institutions. The Centre would also provide staff training both at the Centre and in participating institutions. Establishment of the Centre would require an initial lump sum which could be funded by participating countries. Alternatively, it could provide an opportunity for Canada to make a significant contribution to Commonwealth development. The administration of the Centre would be by professional paid staff, and an annual report to the Commonwealth Secretariat on activities and financial status would be required.

3. A Commonwealth Open University Institute (COM.UNIV.INST)

The Institute, which has been a subject of discussion within the AUCC, would have as its central activity the acquisition and organization of Distance Learning programmes obtained from participating colleges and universities and made available throughout the Commonwealth. This would enable developing countries to increase the number of post-secondary degree-granting programmes available. This principle could also be applied to Francophonie countries, although there are considerably fewer courses available, and a smaller market place. A secondary effect would be to facilitate cross enrollment and credit transfer, to increase student mobility by reducing students' time abroad, and to train staff working in Distance Education. This Institute would require agreement in principle by Commonwealth Ministers of Education. Its funding could originate from the Federal Government or, more appropriately, under some funding formula agreed to by the Federal and Provincial Governments. Canada would provide the headquarters, with a network of corresponding offices being located in different

Commonwealth regions. Other countries could participate in helping to fund the annual cost but Canada would assume primary financial responsibility, at least initially, in providing the headquarters. It is proposed that the Institute have a 10-member Board of Directors representing Commonwealth countries, and that it would report to this Board.

4. **A Canadian Foundation for International Development through Distance Learning**

Such a foundation would be directed to provide consulting services, and to promote and facilitate the use of Canadian Distance Learning Resources and Services in the Commonwealth, La Francophonie or elsewhere, and in collaboration with both academic institutions and other players as appropriate. It might be funded with grants from the Federal and Provincial Governments, as well as from the private sector. Such a proposal would be similar to the IDRC, provide ongoing operational grants to support Distance Learning activities in developing countries, and serve Canadian organizations providing Distance Learning in developing countries.

The merits of the above four proposals were reviewed by the project team and compared against the needs and guiding principles as set out in sections 3.0 and 4.0 of this report.

In many respects, the proposal for a Commonwealth Open University Institute came closest to meeting most of the identified needs. However, there were strong statements in many of the reports reviewed in Appendix II, echoed by most of the Canadian experts who were contacted during the present study, that any Commonwealth initiative in Open Learning and Distance Education should cover a much broader range than just undergraduate courses, important as these might be. Adult basic education, and technical and vocational training were identified as being particularly important. In addition, some of the experts tended to equate the proposed Commonwealth Open University Institute with a rather monolithic Commonwealth Open University, doing everything itself. This misconception impressed upon the project team the need for a working descriptor which would better capture the spirit of a modest, catalytical agency.

At the other extreme, the proposed Foundation seemed to the project team to have totally different objectives from the rest of the proposals. Although there is little doubt that such a Foundation could play a very useful role, it met the smallest number of the needs that were identified for a Commonwealth initiative in Open Learning and Distance Education.

The other two proposals - the Pan-Commonwealth Electronic
Distance Learning Network, and the Commonwealth Distance Learning
Centre - both seemed to the project team to offer good, but
partial solutions to the needs which have been identified.

By integrating the desirable features of the four proposals, it
has been possible to develop a model for which there is a clear
consensus, at least among the experts who were consulted during
the present study.

Such a model, which has been described in the main body of the
present report, will simultaneously address three essential
functions:

1. The ability to identify deficiencies which must be filled in
    resources and needs that are common across the whole
    Commonwealth, and to commission the development of such
    resources.

    This implies putting in place all of the necessary systems,
    procedures and specifications for the acquisition and/or
    development of such resources, meaning that they may be
    developed in one country and used in other countries. The
    Centre would also play a major role in ensuring that the
    materials were accredited. This will ensure that they are
    widely used by participating institutions. The key
    principle here is that the facilitating centre would not
    offer the courses per se, nor give them credit, but would be
    responsible for facilitating the accreditation of those
    courses in the appropriate institutions.

2. Ability to provide means of training professional educators
    and trainers in the practice of Distance Learning.

3. Acting as a focal point in the commonwealth in the area of
    information needs. This is defined as more than cataloging
    but also providing a service for matching needs and
    resources - a kind of matchmaking centre.

To provide an insight into the rationale leading to our choice of
a Distance Learning Centre the four proposals described above and
our Centre are contrasted in Table III-1 in their functions.

Table III-1 Functional Comparison of Proposals

Function	Pan-Comm Network	Comm Distance Learning Centre	Comm Open Univ. Inst.	Canadian Foundation	Recommended Centre
1. Information & Brokerage	Yes	Yes	Yes	Yes	Yes
2. Teaching Material					
acquisition	No	No	Yes	Yes	Yes
promotion	Yes	Yes	Yes	Yes	Yes
commissioning	No	Yes	Yes	Yes	Yes
3. Joint Resource Development	No	Yes	Yes	No	Yes
4. Advise on Development of Local Services	No	No	Yes	Yes	Yes
5. Communications Network	Yes	Yes	Yes	No	Yes
6. Facilitate Interinstitutional Links	Yes	No	Yes	No	Yes
7. Staff Training in Distance Education	No	Yes	Yes	No	Yes
8. Applied Research	No	No	Yes	No	Yes
development	No	No	Yes	No	Yes
evaluation	Yes	No	Yes	Yes	Yes
9. Accrediting of Learning Materials	No	No	Yes	No	Yes
10. Enrol & Teach Students	No	No	No*	No	No
11. Comprehensive Educational Mandate	Yes	Yes	No	Yes	Yes
12. Degree Granting	No	No	No	No	No
13. Funding Development	No	No	No	Yes	Yes

* Although COUI was not envisaged to enroll student, other
proposals for a Commonwealth Open University did assume
enrollment.

APPENDIX IV

LIST OF CONTACTS

List of Contacts

Ms. Arlene Zuckernick - CADE
Dr. Dennis Wing - North Island College
Dr. David Godfrey - Victoria
Ms. Lucille Pacey - Knowledge Network
Dr. G. Farrell - Open Learning Authority
Pierre Patry - CANAL Inc. Mtl.
Peter Senchuck - ACCESS Network - Edmonton
Dr. R. Hughes - CIDA - Hull
Dr. Barry Ellis - Olds College
Mr. Alan Bleiken - Athabasca University
Dr. Terry Morrison - Athabasca University
Ms. A. Stahmer - Ryerson Polytechnnic - Toronto
Mr. Lorne Smith - Ministry of Education - Toronto
Dr. L.I. Barber - University of Regina
Andre N. Lalonde - University of Regina
Dr. Allan F. Hersfield - University of Maryland
Dr. Bernard J. Luskin - American Interactive Media Inc.
Mr. Charles Urbanowicz - California State University
M. Jean-Michel Masse - Econosult Inc.
Dr. John Daniel, Pres. Laurentian University
Dr. W.A.S. Smith - University of Calgary
Dr. Paz Buttedahl - IDRC
Mr. Charles Morrow - CIDA - Hull
Dr. Jack Gray - Univ. of Waterloo - Ontario
Dr. Jim Cummins, OISE
Professor R. Watts - Queens University
Dr. Tony Bates - The Open University
Dr. Max House - Memorial University - Newfoundland
Dr. Jocelyne Picot - Associate of Atlantic Universities
M. Michel Umbriaco - Tele-universite - Quebec

APPENDIX V

A CONCISE REVIEW OF
COMMUNICATIONS MEDIA FOR DISTANCE EDUCATION

R-367-01

A CONCISE REVIEW
OF
COMMUNICATIONS MEDIA
FOR
DISTANCE EDUCATION

(R-367-01)

submitted to

Department of Communications
Ottawa, Ontario

prepared by

TELECONSULT LTD / TELECONSEIL LTEE
Vancouver, B.C.

Issue: 1

Date: 1987 02 18

Teleconsult ltd.

Date: 1987 02 18
File: 367.02

Ms. Elisabeth Châtillon
Director
Francophone and Commonwealth
Summits Coordination
Department of Communications
300 Slater Street
Ottawa, Ontario
K1P 6A6

Dear Ms. Châtillon:

It is my pleasure to submit to you our report assessing the full
range of technologies that can be used for distance education and
which have a potential for applications in Commonwealth distance
learning initiatives.

As indicated in the title, the report is quite concise due to the
very short time period available for its preparation. Should
further elaboration be needed on any specific area or if any
questions arise, we would be more than pleased to address them.

Sincerely yours,

Teleconsult Ltd / Teleconseil Ltée

N. Mark Lopianowski, P.Eng.

NML:aks

EXECUTIVE SUMMARY

This report represents a contribution to the deliberations of the Brigg's Group and presents a concise assessment of the communications media and technologies which are suitable for distance education.

It shows that there are numerous choices available to the architect of any distance education system. Through the use of charts and tables, it compares the different media and technologies which can be used to serve the learner 'at a distance'.

Finally, a design process is presented, which should ensure that the most appropriate media and technologies are selected, yet can withstand the continuing process of change.

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1.0   INTRODUCTORY REMARKS

The Commonwealth Secretariat's Expert Group on Distance Education (The Brigg's Group) is exploring the potential for Commonwealth co-operation in distance education and open learning. One of the areas addressed by the Group is the use of communication technology that can be used for distance education. Canada is playing an active part in this work and has agreed to assist. This report represents a contribution to the deliberations of the Brigg's Group and covers a concise assessment of communications media suitable for delivery of distance education.

The following members participated in the preparation of this report: N. Mark Lopianowski, Kathleen Forsythe, Duncan S. Sharp, and J. Raymond Marchand.

2.0   CONCEPTUAL STATEMENTS AND ASSUMPTIONS

Our technological assessment is based on the following principles:

Learning occurs through interactions. The role of communications media in the learning process is to facilitate these interactions by:

○   storing information which the learner can use to create their knowledge base, and

○   enabling interaction with others whose knowledge and experience can help the learner and provide feedback.

Both are required for interactions that aid learning.

The purpose of any open learning initiative is to maximize the potential for people to learn where they are and as they are.

All administrative, organizational, and technological decisions must be governed by this principle. The issue is not distance, but connecting people in the most appropriate way with the best resources for learning while minimizing administrative or technological barriers. This does not mean that only one model can be valid; every available and feasible method and resource should be used. What is needed is a basic infrastructure designed to meet all the diverse demands on its services.

Organizational structures that provide open learning opportunities must themselves be learning systems.

The system established for serving students must enable its staff to learn as well. This means that the patterns of interaction and feedback established for learners may be the same patterns used for administration and training of staff in the system.

Any system infrastructure, whether administrative or technological, must be designed to change.

Definitions of key terms:

Open learning is understood to mean a philosophical commitment to making learning more openly available across barriers of time, distance, institutional structure and socio-economic status.

Distance education (or teaching) is understood to be a **methodology** for providing educational opportunities where a significant proportion of the teaching is conducted by someone removed in space/or time from the learner.

Tele-education is understood to be a **methodology** where the means of instruction is mediated through the use of either one way or two way telecommunications.

The Commonwealth Initiative is understood to embody all three above definitions.

The indication of suitable telecommunications infrastructures and technologies must include the following assumptions:

Distance Education initiatives must be driven by needs. This means establishment of a lowest common level of access for interaction which can be used by each country on an equitable basis. Thus dependance on mail and paper for information exchange may not necessarily be the correct choice. Innovative solutions may mean providing an electronic computer/telex connection. Each participant must choose how to be involved.

The initiative must **build on existing resources**. This may mean introducing new uses for old technology, or combining technologies in new ways.

Though some countries currently lack even the most basic services, the initiative must anticipate **emergent technologies**. These technologies, such as satellite communications, could provide a mechanism to deliver, not just enhanced education, but an industrial strategy for overcoming the lack of telecommunications infrastructure in developing countries.

The technological models should be designed to maximize the features of various communications media to serve a **variety of purposes.**

3.0 TECHNICAL AND ECONOMIC APPRAISAL

This section includes a technical and economic appraisal of the means of communications that are suitable for application in distance education systems. For conciseness, the information is presented as a series of charts and tables in the following order:

CHART: Information Flows in a Learning System

Starting with a learning System Model, this chart identifies and characterizes the various information flows associated within the model and summarizes their properties.

CHART: User Equipment Technology Alternatives

Emphasis in this chart is on the interactive instruction function which is a prerequisite to the learning process. The chart shows a logical progression from a minimally equipped scenario to a fully enhanced one and indicates which of the facilities may be used for other non-interactive functions.

CHART: Channels of Communication in a Learning System

The communication channel options applicable to the three information flow functions are depicted on this chart together with their main characteristics.

TABLE 1:   Encoding Technology Appraisal

This table presents five means of encoding (print, audio, graphics, pictures, and coded data) and appraises their characteristics relative to a number of technical factors.

TABLE 2:   Communications Channel Technology Appraisal

The presentation is similar to that of Table 1 but relates to six different types of communication channels: terrestrial radio, cable and fibre optics, and satellite trunk, light route, and multipoint.

TABLE 3: <u>Relative Costs of Communications Technology</u>

This table compares the relative costs of user technologies and encoded media.

TABLE 4: <u>Examples of Specific Costs</u>

A small number of examples are provided in this table showing communication channel and user equipment costs.
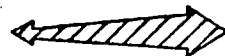
INFORMATION FLOWS in a LEARNING SYSTEM

Starting with a learning system model, this chart identifies and characterizes the information flows required by the model
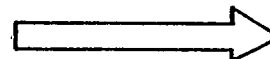
SYSTEM MODEL
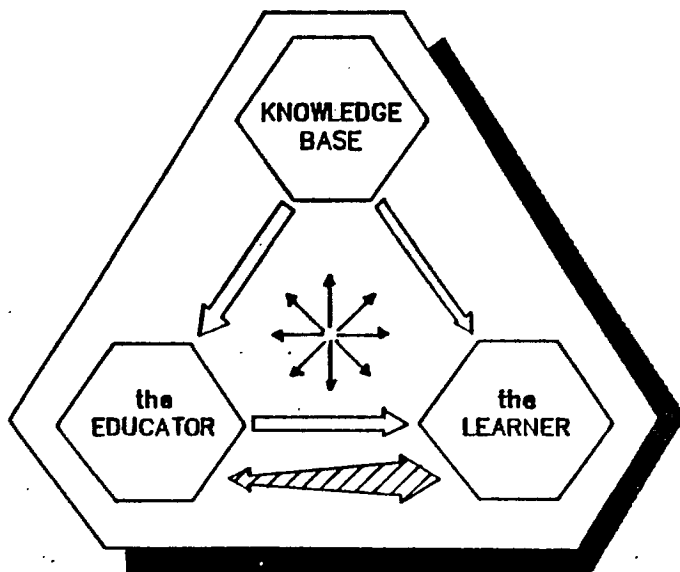
|	INTERACTIVE INSTRUCTION	KNOWLEDGE BASE DISTRIBUTION	ADMINISTRATION AND LOGISTICS
SYMBOL:			
FUNCTION:	INTERACTIVE INSTRUCTION	KNOWLEDGE BASE DISTRIBUTION	ADMINISTRATION AND LOGISTICS
PURPOSE:	to allow real time interaction between educator and learner that improves efficiency & quality of learning	to distribute bulk information from where it is stored (produced and revised) to where it is needed	to notify, advertise, order, make requests, issue & submit exams & accreditations, coordinate, etc. between all elements and systems

CHARACTERISTICS:	• bi—directional
	
	• minimum delay
	
	• asymmetrical
	
	  — volume (mostly educator to learner)
	  — continual from educator — bursty from learner
	
	  — distribution (one to many)
	
	• session oriented
	
	• session set—up time permissible (but variable)
	
	• minimum capability is an audio link from educator to learner and audio or data/telex link back
		• information stored at various points for use or onward distribution
		
		• asymmetrical
		
		  — one—way flow
		  — one to many distribution
		
		• delay acceptable
		
		• usually large volumes
		
		• how often and how much information in the KNOWLEDGE BASE changes varies with subject
		
		• how often and how much it is used varies with subject
			• information volume per exchange tends to be small
			
			• bursty time distribution
			
			• one—way and two—way
			
			• real time and delayed exchanges

USER EQUIPMENT TECHNOLOGY ALTERNATIVES

(Primarily for the
INTERACTIVE INSTRUCTION
FUNCTION)

starting with the assumption that the interactive instruction function is a necessary condition for a learning system, this page shows a logical progression from a minimally equipped situation to a fully enhanced one, and indicates which of these facilities may be used for other functions.

DIAGRAM
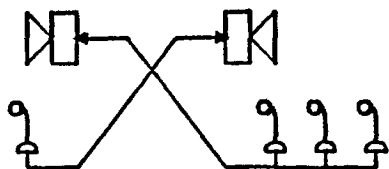
GRAPHICS
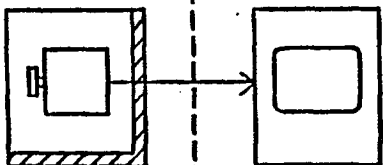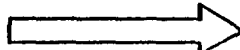
PICTURES
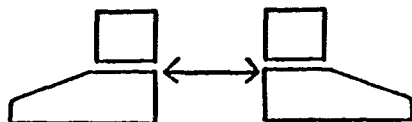
MEDIA CLASSIFICATION		INTERACTIVE INSTRUCTION EQUIPMENT REQUIREMENTS		OTHER FUNCTIONS	
		● EDUCATOR	● LEARNER	KNOWLEDGE BASE DISTRIBUTION	ADMIN. & LOGISTICS
AUDIO	MINIMUM	microphone and speaker (eg. headset)	speaker and microphones	could be used (audio recorder/ player may be needed)	minimal use
VIDEO (ONE–WAY)	ENHANCEMENTS	facsimile slow scan video electronic black– board electronic OHP color/full motion video camera	facsimile video display	could be used (additional equipment required to record, store & play back)	minimal use
TELEX COMPUTER (Artificial Intelligence)		terminal / computer (eg. PC)	terminal computer	useful to very useful	useful to very useful
VIDEO (RETURN)		video display	video camera	no use (wrong direction)	minimal use
HOLOGRAPHY	FUTURE				

CHANNELS OF COMMUNICATION in a LEARNING SYSTEM

- appropriate channel of communication must be selected for a particular application; the channels can be asymmetrical, eg. using say private satellite channel in one direction and public switch network in the other

- satellite technology is particularly suited to applications where a large number of learners are to be served from a node; system costs can be apportioned to make the learner's terminals low priced; the cost of a single hub becomes high. This technology also works well in teleconferencing applications.

INTERFACE TO/FROM COMMUNICATION CHANNELS

- Telephone
- Modem
- Data/Voice Multiplex
- Mainframe Computers
- Microcomputer
- Data Base

COMMUNICATION CHANNEL OPTIONS			
TYPE OF FLOW			COMMENTS
INTERACTIVE	PUBLIC { Switched Telephone Network / Data Network		Generally slow information transfer rates
	DEDICATED (Point-to-point) [Leased Owned Hybrid Full Term Virtual (shared)]	•Satellite •Microwave •Cable	Slow to high speed information transfer rates
KNOWLEDGE BASE DISTRIBUTION	PUBLIC { Switched Telephone Network / Data Network / Broadcast — audio / Broadcast — video		Generally low speed Wideband
	DEDICATED (Point-to-multipoint) [Leased Owned Hybrid Full Time Virtual (shared)]	• Satellite Audio • Satellite Video • Broadcast Radio • Broadcast TV • Satellite Data	Easy to cover a wide geographical area Limited to local area of broadcast stations Slow to medium speed information transfer; wide geographical area
ADMINISTRATIVE	PUBLIC or DEDICATED	• any of above options	Tend to be slow and bursty; one—way or two—way transmission

TABLE 1 - ENCODING TECHNOLOGY APPRAISAL

	Print	Audio	Graphics	Pictures	Coded Data
Devices	o Books o Bulletins o Pamphlets	o Telephone o Speaker o Headphone o Cassette Player	o Telewriter o Telesketch o Electronic Blackboard o Slow-scan o Facsimile	o TV o Slow-scan o Compressed Video o Video Disc o Video Cassette	o Magnetic Disc o Magnetic Tape o Optical Disc
State of Development	Evolving	Mature	Rapidly evolving	Rapidly evolving	Mature
Changes in Train	Desk-top publishing	Compression techniques	New & improved devices	Compressed video at a low cost	Mass storage devices, CD ROM, CDI
Current Educational Use	Widespread in developed countries	Interactive and one-way (cassettes)	Common in developed countries	Small	Minimal
International standards	Minor differences with paper sizes	–	Various standards (Prestel, Captain, Antelope, NAPLPS)	Conversion required in video	Protocols generally standardized
Learners Reception Requirement	Minimal	Telephone, speaker or cassette player	A device of medium to high cost	TV	Microcomputers
Comments	Paper a costly commodity in some developing countries	Devices available in all countries and inexpensive	Very positive value in the learning process	Slowscan and compression equipment still quite expensive	User interface is still sophisticated requiring much learning

Teleconsult

TABLE 2 - COMMUNICATIONS CHANNEL TECHNOLOGY APPRAISAL

	TERRESTRIAL			SATELLITE		
	Radio	Cable	Fibre Optics	Trunk	Light Route	Multi-point
State of Development	Mature	Mature	Evolving	Mature	Evolving	New
Changes in Train	Spectral efficiency improvements	Data Rate Enhancements	Local loop distributors system	Onboard Processing; satellite-to-satellite links	Very low cost terminals for digital applications; MSAT	Multiple access techniques
Current Educational Use	Trunking	Trunking	Trunking telephoning and TV	International (INTELSAT) and some domestic	Business use	Business & Education
International Standards	Available	Available	Evolving	Mature	Evolving	Evolving
Equipment	o VHF o Microwave point-to-point o Subscriber	o Telephony o CATV	o Telephony o TV	o Large E.S.	o Very small terminals SCPC, TDMA	o Ultra small terminals
Comments	–	CATV available in developed countries	Not for near term	Applicable for large volume knowledge based distribution among Commonwealth Countries	Suitable for domestic interactive networks	Particularly suited for the Educator to Learner links

TABLE 3 - RELATIVE COSTS OF COMMUNICATIONS TECHNOLOGY

	Production(1)		Distribution	Reception	
	cost	scale sensitive	cost(2)	cost	scale sensitive
USER TECHNOLOGY					
Audio	low	no	medium	low	minimal
Video - live	very high	no	high	low	minimal
Video (one-way)					
- slow-scan	medium	no	low	medium	minimal
- compressed	high	no	medium	high	minimal
Computer	medium	no	low	medium	no
Telex	low	no	medium	low	no
Electronic mail	low	no	low	low	no
ENCODED MEDIUM					
Book	high	no	low	medium	no
Audio cassette	low	minimal	low	low	no
Video cassette	medium	minimal	low	medium	no
Video disc	high	very high(3)	low	medium	no
C D ROM	high	very high(3)	low	medium	minimal
C D Interactive	high	very high(3)	low	medium	minimal
Floppy disc	medium	minimal	low	medium	minimal

Note: (1) Production referes to costs associated in preparing the information for distribution.
(2) The distribution costs are generally a function of the number of users.
(3) Very high for small number of learners, but increasingly attractive for large volumes.

TABLE 4 - EXAMPLES OF SPECIFIC COSTS (U.S. DOLLARS)

1. **Vancouver, Canada to Kuala Lumpur, Malaysia**

   (a) Live one-way video: $7,000/first hour
                              $2,200/each additional hour

   (b) Two-way audio conf.: $180/hour

   (c) Telex (typical): $8.50/page of text

   (d) Data: connect time is $14/hour
                      plus $.65/page of text

2. **Vancouver, Canada to New Delhi, India**

   (a) Live one-way video: $11,600/first hour
                              $4,300/each additional hour

   (b) Two-way audio conf.: $450/hour

   (c) Telex (typical): $8.50/page of text

   (c) Data: connect time is $14/hour
                      plus $.65/page of text
                        or $14/kilo segment of data (1)

3. **Some User Equipment Costs**

Desk-top Publishing Systems	$ 10,000 -	$ 20,000
CD Read-only Memory (ROM)	1,000 -	1,500
Picture Phones	1,000 -	75,000+
Terminals/Computers	200 -	5,000+
TV Monitor/Receiver	500 -	2,000
Project TV	2,000 -	7,000
PC to OHP Interface (2)	1,300	
Facsimile	2,000 -	5,000
VSAT Remotes (3)	6,000 -	20,000
Hubs	300,000 -	1,000,000
Inmarsat	5,000 -	35,000

Note: (1) One kilo segment of data = 1000 64-character segments
       (2) OHP = overhead projector
       (3) VSAT = very small aperture terminal

4.0 CONCLUSION

A review of the preceeding charts and tables indicates that there are numerous communication technology choices available to the "architect" of distance eduction systems. The most important factor that must be borne in mind prior to starting the design process are the needs of the distant learner. Working through a design process as depicted on the following chart will ensure that the correct technology options are selected with a view to establishing the framework of a model that can withstand the continuing process of change.

En algunos

**DESIGN PROCESS
TO CREATE
A MODEL FOR A
COMMONWEALTH INSTITUTION
FOR DISTANT EDUCATION**

```
┌─────────────────────────┐      ┌─────────────────────────┐
│ Analyze immediate and   │      │ Review proposals made to│
│ evolving needs of.      │      │ date for functionality  │
│ distant learner         │      │ and ability to meet the │
│                         │      │ distant learner needs.  │
└─────────────────────────┘      └─────────────────────────┘
```

```
┌───────────────────────────────────────┐
│ Develop a conceptual Institutional     │
│ framework considering:                 │
│        o significant concerns          │
│        o existing facilities           │
│        o potential for development      │
└───────────────────────────────────────┘
```
CONCEPTUAL
DEVELOPMENT

```
┌───────────────────────────────────────┐
│ Develop a working model of the required│
│ institutional infrastructure and document│
│ its functional requirements            │
└───────────────────────────────────────┘
```

ORGANIZATIONAL
PLANNING

TECHNOLOGY
PLANNING

```
┌─────────────────────────┐      ┌─────────────────────────┐
│ Develop financing       │      │ Analyze the information │
│ options and organizational│    │ storage and transport   │
│ structure               │      │ needs of above design (Note 1)│
└─────────────────────────┘      └─────────────────────────┘
```

```
┌─────────────────────────┐      ┌─────────────────────────┐
│ Develop operational     │      │ Considering existing/   │
│ and Implementation Plans│      │ planned facilities and  │
│                         │      │ available/expected      │
│                         │      │ technology, design a cost-│
│                         │      │ effective information   │
│                         │      │ network (Note 2)        │
└─────────────────────────┘      └─────────────────────────┘
```

```
┌─────────────┐
│ Implement   │
└─────────────┘
```

Notes:

1. Define requirements in terms of a traffic model and set of service quality objectives (prioritized and including future enhancements and expansion forecasts)

2. Look for economies of scale by sharing equipment and telecommunication resources between functions. Make trade offs: including ownership versus lease, transmission rates/bandwidth versus terminal equipment complexity, etc.

APPENDIX VI

DEFINITION OF TERMS

It is worth noting that the term "Open Learning" is starting to be used in lieu of "Distance Education". As the study 'Commonwealth Cooperation in Open Learning' (Jenkins, 1987) points out: 'Open Learning is best understood as an attitude rather than a system: the intention is to make education and training available to learners in forms, at times and in places such that they can take advantage of it. The task of the Open Learning developer is to identify the barriers which stand in the way of potential students and work to remove them. . . .

The first and in a sense the most dramatic step towards overcoming these limitations is to provide learning at a distance, which both frees the students from the need to come to the teacher and also, since the teaching has to be provided in a form which can be transmitted over distance, can begin to free learners in the choice of the rate and time at which they will study. Distance Learning is thus the best established form of Open Learning, and indeed many of the terms are synonymous.'