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FINAL REPORT

The Use of Information and Communications Technology (ICT) in Learning and Distance Education

Prepared by Intelecon Research

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OVERVIEW REPORT

1. Overview Report

1.1 Introduction

This report on the use of information and communications technology (ICT) for learning and distance education in Commonwealth countries has been prepared on behalf of the Commonwealth of Learning, Vancouver, by Intelecon Research & Consultancy Ltd. The key objectives are:

- to provide an appreciation of the current state of affairs regarding the level, range and diversity of ICTs in use for learning and distance education in Commonwealth countries

- to highlight key policy and regulatory issues relating to telecommunications and media impacting the use of ICT for education and learning, the financing and operation of infrastructure services and the self-sustenance of projects

- to examine the impact of technological trends on future use of ICT for learning and distance education, and

- to review the experience to date of multi-purpose tele-centres in selected Commonwealth countries and provide basic guidelines for successful models

Six country case studies were undertaken to examine ICT based learning and distance education across the Commonwealth. The countries were selected to be illustrative of the Commonwealth's diversity, based on criteria such as geographic size, economy and region. It was realised early on that six countries would not be enough to capture or represent a full picture, but the selection does provide an indication of both the possibilities and the challenges faced by Commonwealth countries. A full set of baseline data for all 48 countries of the Commonwealth is provided in Annex A.

The countries selected were Canada, Trinidad & Tobago, Fiji, South Africa, Mozambique and Ghana. Each country is presented in a standard format providing full socio-economic, policy and technological context, as follows:

COUNTRY REPORTS
BASELINE DATA ON COUNTRY ECONOMY, EDUCATION, IT & TELECOMMUNICATIONS
GENERAL COUNTRY CONTEXT
ENVIRONMENT & FUNCTION OF ICT-BASED DISTANCE EDUCATION
INFRASTRUCTURE & TECHNOLOGIES
OVERVIEW OF THE POLICY ENVIRONMENT IN THE RELEVANT SECTORS
SPONSORS: INTERESTS, KEY MOTIVATIONS AND STRATEGIES
COUNTRY EVALUATION
SET OF ILLUSTRATIVE ICT PROJECTS IN STANDARDISED FORMAT

The information was gathered through a blend of desk-based research, using primarily Internet sources and published reports, and personal interviews carried out by e-mail and telephone with key organisational and country contacts. The consultants were in contact, on behalf of the COL, with other international organisations interested in ICT and distance education, such as the International Development Research Centre (IDRC), the ITU, the World Bank and UNESCO.

1.2 Learning and education - Definitions and Terms

This report is not restricted to one kind of education. The various types of learning noted by researchers and educators fall into three general categories:

1. Formal learning takes place in schools and higher education institutions providing systematic education.
2. Non-formal learning occurs outside the formal education system but is nevertheless an organised event with specific target groups or clients and learning objectives. This includes 'continuing education', 'adult education', 'professional training,' 'literacy programmes' and other organised programmes.
3. Informal learning is the individual acquisition of skills, knowledge and attitudes from the everyday experience and environment.

While the term 'distance education' (DE) is most easily applied to the first two categories, the third is also becoming a major target area. The term 'lifelong learners' is increasingly used of people who want to make use of learning tools and material which would traditionally be available in libraries but now are readily accessible via the Internet and through educational outreach programmes of major institutions. Many of these people, in Canada for example, are using 'Community Learning Networks' (CLNs) to access information and materials.

In this report, we have used the term 'distance education' (DE) broadly to include services and facilities available to all three categories of learner, as this best addresses the objective of the study which was to survey and report on the use of ICTs across the whole landscape. We therefore use the term 'learning' and 'education' relatively indiscriminately to emphasise the inclusiveness of concepts and developments discussed.

1.3 Technology trends

1.3.1 Overview

It is now commonly stated in development circles – and seems to be increasingly widely accepted – that advances in telecommunications and related information technologies offer exciting new possibilities for DE delivery that will also have an impact on educational strategies in developing countries. The evidence that this

can eventually take place is available from observing developments in countries such as Canada, which this study has allowed.

Given suitable conditions, DE schemes that have until recently relied mainly on the mailing of written materials, videos, cassette recordings, and radio or TV broadcasting techniques, can be augmented, enhanced or replaced by new on-line tools and technologies which have the power to transform the learning environment.

Several terms are now seen as descriptive of current trends, for example:

- *Convergence:* the coming together of information, communications and media technologies, which promises seamless access to a full range of multi-media resources which educators, students and lifelong learners can use

- *Wireless and satellite:* the delivery of communications services by new, go-anywhere technologies which also promise lower costs

- *Leapfrogging:* the opportunity for countries to jump to a new paradigm before problems associated with the delivery of high quality telecommunications or education services have been solved by traditional means

- *Privatisation & liberalisation:* seen as the twin vehicles for accelerating and facilitating technological advance and access to the wide range of options increasingly available to people living in high income and advanced countries

Allowing for the fact that descriptions of the new model all too often contain a huge amount of rhetoric and 'hype' as to how rapidly new technologies can be adopted or provide impacts, the trends are indeed unmistakable.

1.3.2 The main trends and opportunities

It is clear that technological developments are coming together which offer the following benefits:

1. *through the Internet and worldwide web*, new and enlarged sources of information and knowledge that offer teachers and students opportunities for self-development as well as benefits from incorporation into classroom environments
2. *through e-mail and other Internet-related feedback mechanisms*, greater opportunity to reduce the isolation and time delay associated with distance education
3. *through the extraordinary pace of software development*, enriched teaching and learning with enhanced graphics, interaction, animation and visualisation
4. *through lowering telecommunications bandwidth costs* and emergence of enhanced cable, wireless and satellite systems, greater opportunities for

basic access, video-conferencing, on-line interactive learning, and live interaction with the central place of a distance education programme, and

5. *through community access schemes*, more potential to make the benefits of distance education eventually available to lower income people and rural communities.

In summary, current trends are offering a combination of benefits that will truly improve cost-effectiveness and make DE an increasingly powerful alternative to the traditional classroom, even in developing countries.

Importantly, this combination is also creating an 'education market' in the technology and internet service sectors which will, in turn, increase the level of core funding available from commercial companies who stand to benefit from the demand generated. This will supplement the funding from aid agencies, which have been promoting distance education for some while.

The tables on the following pages summarise some relevant trends in computers and LANs, the Internet, telecommunications, public access systems and support systems such as electrical power.

Table 1 – Computers & LANs		
Category	**Trend**	**Impact**
General	Higher operating speeds Lower cost of memory	Pictures, graphics and powerful software packages can be used economically. DE can thus harness ever-improving graphics capabilities to improve interest and acceptability to learners.
PC development and marketing	Rapid pace of development will make more previous generation equipment available to education establishments which can't afford their own.	More equipment availability at marginal cost (this may not be ideal in the rapid paced developed country environment, but could be significant at start-up level in some developing countries).
Software	Enhanced educational software: • integrates several elements seamlessly • offers learners, teachers & administrators control over the learning environment, results, records, etc.	More effectively moderated & controlled DE and learning programmes are possible.
Standards	XML (extensible mark-up language) and IDML (Int'l Development Mark-up Language) will increase database sharing possibilities.	More inter-agency data and experience sharing should improve the rate of development of ICT based distance education.
LINUX operating system	Promises rapid growth	Impact on DE uncertain

Table 2 – The Internet		
Category	**Trend**	**Impact**
General growth of Internet	Becoming ubiquitous as a service in urban and sub-urban areas at least, and becoming available in rural areas through various access strategies and technologies [see 'public access' Table 4].	On-line DE techniques available to more and more students and lifelong learners.
Web-site technology	Web based learning becoming widespread	Making incredible amount of information resources, learning management, & student-system interaction available in very user-oriented fashion.
Special access hardware	Low priced internet devices	These will make internet based computer use available to more and lower-income students, and facilitate more devices per classroom and more individualized usage.
Growth of e-commerce	Internet will become increasingly essential to households and communities, and will finance both the internet access, devices & even public access kiosks.	Internet-based DE will have lower marginal access & technology costs. Also, DE products will eventually be marketed on a similar, 'priced & packaged' and deliver basis as other products.
IP Telephony	Better integrated media learning tools will be available through IP systems	Lower costs and greater affordability for all of the long distance communications components of DE. More seamless integrated learning packages and human interface possible.
Desk-top video	Teachers and students can create & exchange real-time or message based talking-head & multimedia materials from their office, school room or telecentre, without expensive production studio.	Easier and lower cost video-based lesson materials, and non real-time video clips will be sent by email, enhancing contact between teacher and learner.

Table 3 – Telecommunications		
Category	**Trend**	**Impact**
Radio & wireless	LMDS/LMCS broadband systems provide over-air video and data and/or add two-way features to traditional TV broadcast.	Will provide another, more enriched delivery option for enhanced learning systems to compete with traditional media delivery.
	3G Mobile (2002+) & fixed-mobile convergence will provide broadband IP access to many sub-urban areas.	Competitive service provision will lower costs and make DE access available on a more mobile or semi-fixed basis.
Existing wire facilities	Digital subscriber loop (DSL)	Will offer higher speed Internet access to more locations including those without cable TV or fibre access.
Satellite	VSAT technology with integrated video and IP applications such as multi-casting.	Opens up remote areas and also provides cost-effective multiple-site networking. VSAT's natural 'star' configuration is suited to many distance education environments. VSATs will enable evolution from the limited video-conferencing (comprising broadcast video with audio teleconferencing) into full and more enriched video-conferencing.
	Digital satellite radio systems will allow agencies to offer radio programmes direct to small handsets anywhere on the globe. MSS soon to provide voice+64 kbps data, then ultimately bandwidth-on-demand (later - maybe not until 2004+) anywhere on the globe.	This will facilitate low cost delivery of education programmes globally that have traditionally been delivered only nationally or with lower quality. MSS is a competitive, though probably inferior alternative to VSAT & other geo-stationary satellite techniques for DE purposes until 2004+.
Network & lesson management products	Various companies developing integrated systems for open learning networks, e.g. Gilat's Learn*Net* ™ is designed to integrate VSAT, media, learning tools with special software.	More seamless application of technology. Private telecom & technology companies more involved in the promotion of DE systems and services.
Video transmission	Compression technologies improving.	Allows video to be delivered over a range of telecom facilities.

Table 4 – Public Access systems		
Category	**Trend**	**Impact**
Multi-purpose Community Telecentres (MCCs)	Many pilot systems will result in large number of MCCs, including in rural communities.	Makes computers, internet and email available to low-income people on a community basis.
e-commerce centres	Educational packages and materials could also be accessed on an order and collect basis.	Mass marketing of DE products

Table 6 – Support systems		
Category	**Trend**	**Impact**
Solar power	The unit cost hasn't changed as much as other technologies.	Onus is on technology equipment manufacturers to reduce their power consumption.
Wind-up systems	Radios, cassette and video players that do not need external power source.	These make technology available to the very lowest income village communities.

1.3.3 Case example – Satellite systems

To illustrate some changing issues with the deployment of ICTs we note, from one South African source[1], cases where the use of satellite for live broadcasting was considered to be expensive and inappropriate. Sound pedagogical principles would increasingly dictate the need for a more interactive learning environment which is either difficult to achieve or adds considerably to cost. While satellite improves accessibility to the remotest areas, it was noted that its deployment for this type of delivery requires expensive satellite resources as well as an expensive face-to-face lecture and broadcast system running in parallel. Weaknesses observed were that:

- learners are required to gather at a certain place at a certain time
- learners have no control over the pacing of the broadcast
- broadcasts tend to encourage passivity among learners (and strategies to overcome this weaknesses are very costly)
- integrating other media is challenging and may lead to inefficient use of the video bandwidth
- broadcasts tend to be organised in time packages that exceed the student's ideal concentration span

On the other hand, VSAT satellite systems are increasingly seen as a powerful distribution mechanism for Internet-based resources, with ready access to interactive learning tools and e-mail, especially when linked or packaged with key educational web-site sources, servers and services. VSATs can overcome many of the bandwidth/ delivery speed limitations of terrestrial systems, particularly in developing countries, and can be especially economic when deployed in an asymmetric multi-casting mode in which high-speed 'downlink' capability is combined with slower speed 'uplinking.' These features, and the emergence of specially designed DE network management and learner software packages, are noted in Table 3.

[1] The possibilities & pitfalls of harnessing ICTs to accelerate social development

Also noted in the tables is the capacity for VSAT, combined with desk-top video and multi-media tools, to facilitate the emergence of relatively low cost video consultation and conferencing. This was also noted in the South Africa report[2] as a potential growth area, especially to support discussion groups between teachers as a professional development tool. This form of interaction is also utilised effectively for health education, training and remote consultation in Canada. It will increasingly become valuable as a means for regional, small centre and rural health development in lower income countries, as international organisations, commercial agencies and eventually governments see the potential and promote its use.

1.3.4 Summary

It is impossible to offer an exhaustive analysis of which technologies will have the most impact, or to be precise about the most important matters influencing adoption, namely:

- *cost:* particularly cost per student, cost per graduate, or fixed versus ongoing operational costs, all of which require detailed case-by-case analysis, and
- *effectiveness:* involving the all-important pedagogical principles, completion successes, etc.

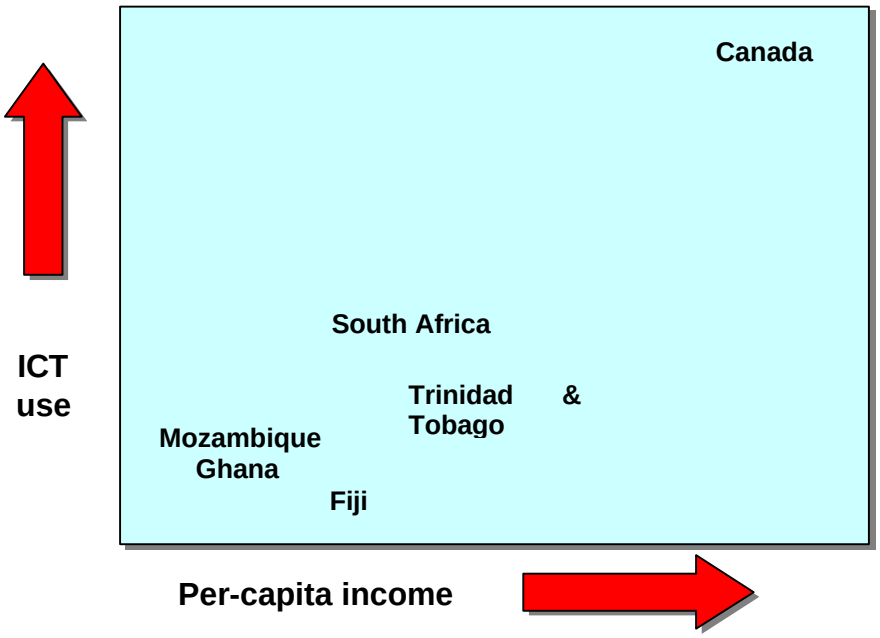
This is partly due to the fact that most of the available material is replete with evidence that the important lessons regarding use of ICTs in distance education are in the early stages of being learned in most countries, and especially in the developing world. With the exception of Canada, in the countries highlighted by this report the educational potential of ICTs is still largely unfulfilled, hence estimating the precise implication of the observable trends for them is hazardous at best.

1.4 Overview of country findings

1.4.1 General

The six countries studied essentially provide a view of 'two different planets,' with South Africa currently making serious attempts to bridge the gulf between the advanced and developing world with the assistance of international organisations. It is often said that the developing world is in serious danger of falling further behind the advanced world in the information economy. Graphically, this is illustrated using just the single dimension of per-capita as follows:

[2] Ibid



Clearly, the use of ICTs in distance education actually depends on at least five factors, not just one. These are

- *Geographical size & situation*

  Large countries with dispersed people and communities, such as Canada, or island nations such as Fiji or Trinidad & Tobago, have an additional drive or motivation to use communications to deliver some educational services cost-effectively.

- *Policy on telecommunications, the Internet, IT and Education*

  Privatisation and liberalisation of telecommunications and the Internet are improving quality, lowering costs and accelerating innovation around the world. Education policy is often key to raising awareness and providing leadership in educational use of ICTs.

- *Population & market size*

  Small markets attract fewer investors and less competition, and offer fewer economies of scale which would lead to price reductions, while regional schemes can overcome that, aggregate market size and achieve scale economies.

- *Per-capita income*

  The means to address start-up investment challenges and the market affordability to attract commercial players are all-important ingredients to ease the way to change and growth.

- *Perceived educational or developmental needs*

  These can relate to educational delivery challenges due to geographic or cultural isolation, or appreciation for the more systemic challenges – such as adapting to the demands of the information economy which can only be seriously addressed with ICTs.

The latter two factors are, in fact, very much related but unfortunately the level of income often hinders the government's freedom to act on perception of need. Many developing countries are facing fundamental problems with education delivery in which ICTs could assist, however they face a severe challenge garnishing the necessary skills and resources to address the opportunity. They may also find difficulty in putting into place a policy environment with which they are entirely comfortable. Meanwhile high income countries can afford to address a wide range of felt needs; not all their initiatives can be labelled as successes, but such countries can afford to experiment until they get it right.

For example, Canada sees a need to address the educational and skills acquisition requirements of its whole labour force in the information age, as well as the special needs of its rural communities, native communities and language minorities. With high national income, forward looking policies, market liberalisation and heavy government investment, it can afford to address the needs and develop new opportunities for its citizens. Most of the other countries see the strategic importance, in lesser or greater degrees, but have comparably less financial resources to act unless they are assisted in doing so.

The dilemma of developing countries is acute. Furthermore, many are justifiably worried that opening to new technology increases their dependency on outside resources. Nevertheless, they will have even fewer options and fall even further behind unless they open their markets sufficiently to improve their Internet access, and adopt policies that encourage the entry of private sector investors and service providers as well as the indigenous use and development of electronic resources.

1.4.2 Summary of projects, initiatives & technologies

In Canada, we identified at least 11 Federal Programmes and many hundreds of 'electronic highway' and distance education or learning initiatives using ICTs at the provincial level. Many of the latter are also programmes of provincial educational institutions offering their service nationwide. Canada's ICT initiatives have been summarised in the case study as including the following sectors:

- 'Kindergarten to Grade 12' (K-12) elementary and secondary school networks
- Tertiary education programmes including 'Open Universities'
- Professional training and skills

- Lifelong learning
- Health education
- Rural communities
- Language minorities and native ('First Nations')

ICT usage ranges all the way from financially assisted telephone dial accessed Internet connectivity for schools and rural communities to satellite based programmes and advanced fibre-linked 'Skills Centres' equipped with video-conferencing for university courses and software job re-training packages.

The other country projects portrayed are as follows:

Country	Projects	Technologies
South Africa	SchoolNet	PCs, Internet & website
	Community Information Services	PCs, Internet, touchscreen kiosks, CD-Roms, information delivery systems
	TELISA Technology Enhanced Learning Centres	PCs, LANs, Internet, scanners, photocopiers & other office services
	Distance Education Digital Learning System	Planning a wide range of open learning technologies
	African Virtual University (Regional)	Satellite, video broadcast, PCs, website
	Multipurpose Community Telecentres	Telephone, PCs, fax, email, scanners, photocopiers, etc.
Ghana	African Virtual University (Regional)	Satellite, video broadcast, PCs, website
	'WorLD Links for Development' SchoolNet (International)	PCs and Internet, broadcasting (radio & video), CD-ROMs, databases, satellite
	Multipurpose Community Centres	Telephone, PCs, fax, email, scanners, photocopiers, etc.
Mozambique	'WorLD Links for Development' SchoolNet (International)	PCs and Internet, broadcasting (radio & video), CD-ROMs, databases, satellite
	Multipurpose Community Telecentres (pilots)	PCs, fax, email, scanners, photocopiers, etc.
	University DE Programme	Satellite broadcast, PCs, Internet, CD-ROM
Trinidad & Tobago	University DE Centres	Print, video & audio tapes, PCs, Internet & Website, CD-ROMs, satellite,
	Caribbean Univ. Network (Regional)	Internet
	Education and Health-Care Network	Satellite, broadcast, video, Internet
Fiji	University of the South Pacific (Regional)	Satellite, Internet, video, CD-ROM, audio, printed materials

1.5 Multi-purpose Telecentres – Experience, Lessons & Trends

1.5.1 General introduction to the telecentre concept

Telecentres are strategically located facilities providing community access to telecommunications and other information technologies. Telecentres are typically equipped with a combination of the following:

- telecommunication services such as telephony, fax, e-mail and Internet (via dial-up or ISDN);
- office equipment such as computers, CD-ROM, printers and photocopiers;
- media services, including radio, TV, audio and video devices and multi-media hardware and software; and
- meeting space for local business or community use, training or special purposes.

Depending on the size and extent of services provided, the centres are usually managed by a small staff comprising a manager, who could be the owner-operator, and some assistants. The concept emerged, first of all, out of the perceived need of rural and remote areas for better telecommunications access and computer technology. Created in Sweden around 1985, tele-centres, also known as "tele-cottages", experienced fairly rapid growth in Western Europe and other industrialised countries where rural isolation, lack of purchasing power, or low quality telecommunications facilities were seen to be a hindrance to participation in the information economy. By 1994, there were more than 230 telecentres in at least 12 countries, including Australia, Austria, Canada, Denmark, Finland, Germany, Ireland, Japan, Norway, Sweden, UK and USA.

The idea then spread and has become adapted to the needs of emerging markets and developing countries. Hungary is the first country in Central Europe to have a large number (over 100) of rural ‘Telehouses’ with a range of ICT equipment. Brazil has also piloted the European model while other countries such as Peru, South Africa, Indonesia, India and Bangladesh independently developed simpler models and ‘phone shops’ with a range of facilities. These naturally commenced in urban or larger rural communities that have a low level of private telephone penetration and/or a large enough market for public access businesses to be commercially viable. They often comprise just a telephone, fax and, in some cases, a PC and peripherals. By 1996, India had about 10,200 such centres and by 1998, there were also more than 9,000 in Africa alone. In Senegal, 5% of all telephone lines serve phone shops and telecentres.

In summary, telecentres vary a great deal. Some provide only basic telecommunications services and are best referred as phone-shops, while others provide a full range of IT services, including video-conferencing, tele-health imaging equipment, etc. Some are mobile or transportable (containerised) units.

In some cases, the telecentre is the only access point to basic services in a village, whereas in other cases it complements the local telecommunication network.

1.5.2 Multi-purpose Community Telecentres (MCTs)

The telecentre has also now become a potential vehicle to provide a wide variety of services, including distance education and health services. The advanced concept as developed and promoted by the International Telecommunications Union (ITU), called Multi-purpose Community Telecentres, includes additional facilities such as a library, workshop and teaching rooms. MCTs take advantage of the growing availability and access speed options for Internet service, along with the variety of uses, including 2-way teleconferencing and multi-media, to offer distance education and medical consultations, as well as to act as delivery points for government information. The equipment and specialised staff can also be used to train people on computer use and the Internet.

MCTs also function as community information centres, providing access to databases and receive and post information of general interest such as government notices, information on spread of diseases, weather information, prices of farm products, educational opportunities, etc. Thus the purposes of MCTs include:

- expanding access to ICTs
- extending the reach of basic services such as education, health and training
- providing information of general interest to the local community, including businesses, and
- providing access to infrastructure for the development of business (virtual offices, banking, tele-customer care)

One of the advantages of MCTs is thus of providing a means to deliver both public and private services to rural and remote locations without incurring immediate large investments in infrastructure. If fulfilling these goals, MCTs are expected to have a positive impact on the socio-economic development of the communities they serve, helping to:

- develop rural and remote infrastructure;
- provide rural regions with better public services such as education, health, and administration, including the paper work of government procedures;
- generate employment;
- integrate relatively isolated communities into the national and international information network and thus accelerate exchange of private goods and services;

- transfer expertise in a number of areas, such as agriculture, to and from the community; and
- give local producers access to information on the market, thus reducing the need of middle men and increasing rural incomes.

In this study, 43 MCTs projects involving key organisations were identified. MCT projects have been initiated in at least 21 developing countries, namely: Suriname, South Africa, India, Mozambique, Uganda, Philippines, Egypt, Ghana, Mali, Bhutan, Benin, Honduras, Tanzania, Mexico, Brazil, Hungary, Estonia, Romania, Haiti, Maldives and Vietnam.

Annex B lists the main MCT projects identified for this study, along with their main features such as stage of implementation, sustainability, services and uses offered, as well as operational issues. Most MCTs are still in the planning or pilot stage. In addition, the ITU has set aside funding for the implementation of MCT pilots in Burkina Faso, Egypt, Philippines, Trinidad and Tobago, and Zimbabwe.

Annex B shows that while facilities and usage vary across MCTs, most include basic telecommunication equipment, reflecting the intention to address the need for basic telecommunications access. The enhanced facilities depend on the situation, need and focus of the associated development programme. Annex B also gives a brief description of the issues that many pilot projects have faced in testing the concept.

Experience with services, usage, sustainability, and the problems, issues and achievements of MCTs in both industrialised and developing countries are described in the next section.

1.5.3 MCT Experience and evaluation

Evaluation of MCTs in developing countries, especially in terms of impact assessment on socio-economic development, are so far non-existent. This can be attributed to the very early stages of most of the projects. However, systematic evaluation frameworks and methodologies are currently emerging and more efforts are made to their development.[3]

Evidence of performance in developing countries is still very limited. It must also be borne in mind that cases vary according to the nature of the location, year of development and regulatory environment, among other factors. Thus, generalisations can be made only very cautiously at this stage.

[3] See "Telecentre Evaluation – A Global Perspective; Report of an International Meeting on Telecentre Evaluation", IDRC (Ed. R. Gomez and P. Hunt) Canada 1999

Services

MCTs are geared to provide more sophisticated services beyond basic access to telephone services, such as:

Tele-medicine - consisting of consultation and, in the cases of MCTs equipped with clinical diagnostic terminals connected to an ISDN interface, included image transfer, interactive remote consultation and the transfer of data (patient history and records).

Tele-administration - relating to public administration, including welfare and employment applications, grievance filing via e-mail, etc., and also includes government information to be posted in a bulletin board.

Tele-education - ranging from administrative paperwork such as school calendars, syllabus and admissions to virtual lectures and video-teleconferences.

Tele-trading - referring to agriculture produce auctioning, with farmers securing better deals by contacting buyers directly, and other e-commerce applications.

Tele-customer service - including connection registration and bill collection for public services such as water, electricity, etc.

Other uses of MCTs include *tele-banking*, *tele-work* such as *word processing* and *virtual office* (use of office equipment for business purposes).

Priorities in uses of the equipment made available by MCTs vary according to the degree of development of the country. For example, a summary published by the ITU on MCTs in Ireland indicates that 50% or more offered access to computers and the Internet, word processing, photocopying, desktop publishing, and computer and Internet training. More than 20% offered some web-site development. MCTs in Ireland are clearly geared towards assisting small business development. Access to basic telecommunications is a secondary objective.

Usage

In contrast, out of the 43 MCTs in developing countries to date listed in this study, virtually all have basic telecom equipment for public use which also represents the primary demand.

A recent study[4] of 8 telecentres established by the Universal Service Agency in South Africa shows clearly that the strongest demand and usage is for the following type of services:

- phone calls and faxes

[4] Unpublished Masters of Communications Thesis, New York 2000

- photocopying
- printing documents
- typing services
- bookkeeping services for micro-businesses

In addition, it seems there is a considerable demand for computer training and IT skills since it is seen as increasing the employment opportunities. However, most telecentres are not yet able to cater effectively to this market e.g. they do not provide certificates which makes the courses less useful for people looking for employment.

However, in order to justify the deployment of MCTs it needs to provide services beyond basic access to telecom and office equipment, which can be, and mostly is better provided by simpler phone shops. Evidence for this is the increasing number of PCO-type operations in emerging markets and developing countries which are deployed by incumbents and new entrants alike. [5]

Although praised as a crucial development tool and with no doubt a considerable potential, the information available on rural Internet demand and usage in MCTs gives mixed evidence today in developing countries and emerging markets.

The operational telecentres of the Universal Service Agency (USA) in South Africa found that PCs and the Internet are severely under-utilised. The reasons are thought to be the following:

- illiteracy in general and computer illiteracy in particular;
- language problems due to the fact that the Internet is mostly in English but there are many local languages;
- lack of awareness and culture about usage and benefits of ICT;
- high cost for Internet connection through long-distance calls due to lack of local Points-of-Presence (POPs); and
- poor quality of telecom connections.

Apparently, also computer training has increased the PC usage only minimally. The experience of low Internet & PC usage of the South African telecentres seems to reflect the general trend.

[5] Well-known examples are Senegal's Sonatel with about 10,000 PCO franchisees, Indonesia's Wartels, the Grameen phone-ladies in Bangladesh, PCOs in India, and the franchised PCOs in South Africa by the mobile operator Vodacom and MTN, and MTN in Uganda.

Local content

Another major key issue explaining the under-utilisation of the Internet mentioned by telecentre practitioners and people involved in telecentre discussion is that there is hardly any content on the Internet which is relevant and worth accessing for rural people in Africa. Therefore, more recent telecentre initiatives have the element of local content development in-built and actively seek partners that can contribute to that such as local farmers organisation, local or international universities and many NGOs.

An example of local information demand and local content creation can be found in 4 'Infoshops' in Pondicherry India, in an area with around 20,000 inhabitants. It was demonstrated that rural villagers have a demand for information that is relevant and useful to them. On top of the list of info requirements were government programmes and entitlements for social welfare etc. The trial period also showed that farmers requested the following information:

- cost and availability of inputs such as seeds, fertiliser and pesticides
- grain prices in different markets in the region

Volunteers in the villages created a local database with the following types of information:

- government programmes for low income rural families
- directory of insurance plans for crops and families
- pest management plans for rice and sugar cane
- directory of local hospitals, medical practitioners and their specialities
- regional timetable for buses and trains
- directory of local veterinarians, cattle and animal husbandry programmes

Without consideration of the local content component to drive Internet usage telecentres will have limited success.

Whereas examples for e-commerce applications especially in rural Africa are very limited to date, the development of Internet based transactional services in MCTs is coming more and more into focus.

An example of emerging e-commerce applications in rural areas in developing countries is the online ordering of vanilla from rural Uganda. With support and funds from USAID and its Agribusiness Development Centre, a web-site for the Uganda National Vanilla Association (UNVA) has been developed. The UNVA is a private sector association of small farmers and processors that grow vanilla beans in addition to other crops as a supplement to their usually low income.

The web-site has an on-line store where it is possible to order the vanilla with a credit card. The proceeds go back to the UNVA, but are currently more a means of supporting the further development of the association then a serious business. However, the web-site also provides contact for commercial importers with an interest in larger quantities.

1.5.4 Financing, sustainability and ownership models

Financing

Given their potential as a means to accelerate socio-economic development, MCTs initiatives are financed and supported, often in partnerships, by:

- international and regional organisations such as the International Telecommunications Union (ITU), UNDP, the World Bank, FAO, and OAS among others;
- national international development agencies, e.g. International Development and Research Centre (IDRC), CIDA, USAID, DANIDA, SIDA; and
- educational and cultural institutions, e.g. UNESCO, the British Council and the University of West Indies.

The commercial private sector involvement in MCTs so far is rather limited and comprises mostly in-kind contributions. International and local NGOs play a considerable role in implementing MCTs.

In contrast, small-scale phone shops or Public Call Offices (PCOs) are overwhelmingly privately financed and run. Sometimes a form of licence or franchised brand name is also introduced to standardise appearance or regulate the number of outlets, though this is sometimes more of a hindrance than help to the development of the market, offering more opportunities for official control than are necessary.

PCOs tend to emerge where a sustainable and profitable market exists. It is noteworthy though that many PCO type operations have been induced by specific obligations on operators – on the incumbent, the second national operator or even cellular operators. Examples are:

- Vodacom and MTN in South Africa which run PCO franchises and subsidise the call rates;
- PT Telkom's Wartels in Indonesia;
- Sonatel in Senegal; and
- Teleboutiques in Morocco.

But it is not only these obligations that have created a favourable market and the expansion of PCOs in order to provide access to telecom for the poor and the

rural population. Through 'rural funds' or universal service/ universal access funds commercial operator have been incentivised to provide services to rural and under-served areas. Operators can receive or bid in competition with other operators for a subsidy to provide service to rural areas. These rural funds often receive their finance from a 1% contribution of all telecom providers in a country. Successful and prominent examples are Chile and Peru.

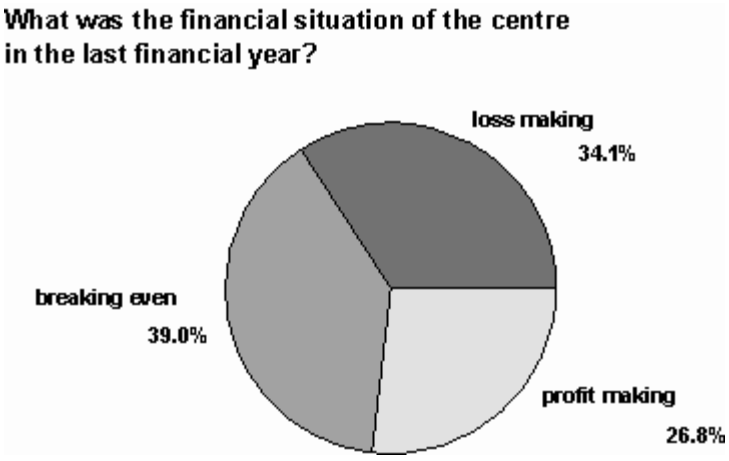
Sustainability

MCTs are expected to be sustainable in the long term, as their socio-economic impact and the opportunity cost of alternate modes of delivering the services they can offer are realised. At the moment, almost all MCTs thus combine public involvement with 'an eye' towards eventual self-sustainability.

Some MCTs also have the *potential* to be self-sustaining in the medium to long term. In the early stages, however, many MCTs require a certain amount of public investment to offset the high start-up costs and piloting of new ideas.

MCTs allow public agencies and private IT companies to assess the demand for products and services while creating the market through exposing the public to the applications. MCTs thus provide a means to explore rural locations as potential new markets for IT companies.

Experience in the UK suggests that profitability is possible, however this has not been universally so. Many telecentres have not been able to move beyond the stage where they are dependent on institutional or volunteer support and donations of equipment, as shown below.



Source: ITU, December 1998

It can be observed that about 25% of MCTs in the UK are profitable while about one third experienced losses. This has been the typical experience of telecentre projects in European countries.

Experience on sustainability of MCTs in developing countries is very limited, as most of the projects are young and are not expected to be self-sustaining until after 3-4 years in operation.

The financial advantages which MCTs could enjoy in developing countries, compared to advanced countries, is that:

- a larger income can be made from basic telecommunications access in case they are the only provider, by extending the infrastructure to as of yet unserved areas e.g. using satellite or wireless technology (otherwise it is at the expense of smaller businesses and shops being able to operate a basic phone shop profitably in the absence of an MCT).
- block funding from the education, health and administrative ministries of government could provide substantial income if MCTs are recognised (as they should be) as a cost-effective means of delivering services which would otherwise not be provided, and therefore paid reasonable fees.

The ITU[6] suggested that after initial investments are made, telecentres could provide annual pre-tax profits of US$71,300, about 60% of total annual revenues.

However, caution is necessary, as the (few) financial analyses carried out by some international agencies use hypothetical or optimistic revenues, which cannot be achieved unless managers are astute commercial entrepreneurs. Some of the analyses also do not take full account of the need for rapid depreciation and amortisation of equipment common to the commercial ICT environment.

Currently there is no MCT in a developing country which has proven to be self-sustaining. The reasons are many-fold, but the most evident reason is that many have been operational for only a short time and have been challenged with all sorts of teething problems.

However, judging from the limited data available on financial performance of MCTs and practitioners and expert opinions, the prospect of MCTs becoming self-sustaining is considered rather dim. A look at the ownership and operating model as well as the typical size of MCTs can shed some light on the reasons for this not so optimistic outlook, but will also show emerging trends and solutions for different approaches.

[6] Ernberg, Johan "Universal Service by Means of Multipurpose Community Telecentres", 1997

Ownership and operating models

While MCTs vary in many aspects, one common characteristic is that hardly *none of them has been either initiated by the private sector nor any individual MCT is run by a local entrepreneur on a commercial basis*. MCTs are predominantly initiated by development agencies and often run by local NGOs.[7]

This ownership model is naturally reflected in many elements of the operating model and some problems related to it. The objectives of many local NGOs responsible for operating the MCT are to foster their individual and specific development purposes. The MCT is just a tool to facilitate specific development efforts. Thus, a main characteristic is that those NGOs, as non-profit civil associations, have mostly no primary intent to make profit using the MCT and are often not commercially minded and skilled.

Consequences in many cases, though there are obviously also exceptions, have been problems with:

- Pricing – pricing strategies and guidelines are often missing, and prices do not reflect the cost of providing the services.

- Market analysis & business plan – proper demand studies prior to the establishment and planning of MCTs are often missing as is the case for business planning.

- Competition – there are two threats relating to competition in places with existing infrastructure, first local entrepreneurs can compete with the MCT which is not bad in itself but many MCTs are not prepared for this, and second, if MCTs provide subsidised services they distort the market for emerging local entrepreneurs who provide telecom access and business services etc.

- Human resources – many MCTs rely on volunteer work and managers often do not get compensated with an appropriate salary; this results in difficulties of retaining motivated staff long-term.

MCTs are therefore often seen as 'supply-driven'. Due to these difficulties there is an emerging trend that calls for 'demand-driven' models.

[7] Examples are the info-shops in India Pondicherry, funded by IDRC and implemented by the M.S. Swaminathan Research Foundation; the Universal Service Agency's telecentres in South Africa, awarded to 'Community Based Organisations' (CBOs); Uganda National Council for Science and Technology (UNCST) for the MCTs in Nabweru and Buwama, funded by IDRC; Nakaseke MCT in Uganda is financed and supported by UNESCO, UNECA, IDRC, ITU and World Bank

1.5.5 Recommendations and Guidelines for implementation of MCTs

In this section we suggest an approach for COL and international organisations to pursue in the development, promotion and support of telecentres. Our recommendations incorporate three important principles:

1. Basic telephony services can be delivered commercially without major outside investments, if the basic telecom access infrastructure exists. MCTs should not compete with or be planned in such a way as to reduce the viability of an already developing basic telecommunications retail business involving local agents and entrepreneurs.
2. Despite some variety, there is room for more types of telecentres, in particular those involving the private sector. Explore models which are in size between a PCO and a MCT, which are privately run and commercially oriented, and provide also more advanced ICT services that foster socio-economic development through smart-subsidy mechanism and other incentives.
3. Larger MCTs could be used more as a laboratory and incubator for services and ICT applications fostering rural socio-economic development than as the model for replication itself. Only economically successful models are likely to replicate themselves in larger numbers and can spread the benefits beyond singular locations. Still the costs and financial performance of the more advanced internet based ICT services in MCTs should be accounted for, financed and supported separately, taking every step possible to maximise their revenue generating capacity and ultimate self-sufficiency.
4. The cooperation and contribution of government (national and local) must be enlisted to:
   a) create supporting regulations and allow pricing for effective operation, and
   b) generate revenue from the beneficiaries (including government departments) of those ICTs which cost-effectively deliver social infrastructure services, such as education, health and public information.

General recommendations

The general implementation strategy recommended by Intelecon is as follows:

1. Government regulators should be strongly encouraged to:
   - liberalise the reselling of basic telephony service at the local retail level, and to remove all bureaucratic obstacles which discourage private entrepreneurs from operating phone shops and small telecentres, and
   - work with incumbent and/or other telecom operators and ISPs to devise reliable and local-call-charged points of presence (POPs) in all localities

likely to have MCTs, in order to optimise their operational performance and help create successful implementations.

2. Various financial options should be offered by international organisations seeking to develop telecentres, depending on local market conditions, e.g.:
   - Micro-loans (say up to US$15,000) to enable entrepreneurs and phone shop operators to purchase PC equipment and advanced communications services, to establish small privately owned and operated telecentres.
   - Seed finance (US$100,000 maximum) on matching basis for qualifying co-operative or community owned MCT projects. It is suggested that part of the community contribution to capital and/or operating cost may be in kind.
3. Enhanced MCT services –i.e. the 'non-basic' services such as internet, tele-learning, tele-health, tele-administration, PC training, meeting room rental – should usually be organised and developed separately from telephony and fax, but according to an approved business plan. They may be financed by contributions from international agencies, government, community cooperative groups and service or technology suppliers. MCTs should however have definite goals and targets for self-sufficiency, and clear bases on which self-sufficiency – financial or socio-economic - is calculated.
4. Best standardised telecom access for the ICT services in MCTs and smaller telecentres might, in some situations, be achieved with a satellite based VSAT service. It is recommended that this be considered where the regulatory and operator environment is suitable, and that the co-sponsorship of a VSAT operator or supplier and ISP be sought.
5. Preference should be given to telecentre marketing & management solutions which have a 'franchise' element – name branding, standardised look and methods, standard payment vehicles (e.g. pre-pay cards), quality control and training package – in order to increase their recognition nationally and their presence in both urban and rural localities. This will tend to increase their quality and also the chances that urban dwellers would purchase pre-pay cards or otherwise finance participation by their rural friends and relatives.
6. Sponsoring agencies must have a standard 'application procedure' for each of the micro-loan and MCT financial package. The micro-loan procedure will be much simpler than that of the MCT package, since the primary objective is to assess the borrower's marketing plan and financial viability, whereas larger MCT projects will have much more complex relationships and dependencies. The lead funding agency should also provide consulting assistance to help the application procedure.

Business Planning

A good business plan, as part of the financial application documentation, is critical. It must provide a clear vision of the need, services and expected performance of the project or commercial venture. It must also create confidence

and clarity among the owner/participants, sponsors and financiers of the project. The plan also serves as an ongoing reference for owner, financiers, management and staff and provides the basis for continual or periodic assessments of the strategic and financial health of the project.

Although micro-loan applications will be simpler than full MCT applications, all business plans should contain the following [micro-loan exceptions noted]:

- A mission statement and programme description.
- A clear outline of the ownership structure and participants in the project, and whether the centre will be a franchised or independent business, a community co-operative, an arm of local government, etc. Preferably the centre should be, from the outset, a commercial entity, even if parts – to be clearly identified - are known to need subsidisation.
- A demand assessment (community demographics, interests and affordability). The assessment should include a market study that assesses the availability of telecommunications, the presence of other suppliers in the location (e.g. phone shops, schools, hospitals) and the specific needs of the region (including the kind of information needed by the local community).
- [Mainly for MCTs] an assessment of the site's access to telecom infrastructure, the local topography, and the best access technology and other systems (e.g. power) required for the centre. This assessment should suggest the technology that best fits the characteristics of the site.
- A financial proforma should contain start-up expenses and start-up costs, as well as projections of number of users, fees/prices, revenues, expenses, financing costs, operational costs and salaries/profit, depreciation and amortisation of equipment, marketing costs, etc.
- Sample schedules, showing costs and revenues for each major department or service - e.g., telephone, fax, computer, training, photocopying, tele-health, tele-administration, etc. - allowing management to make periodic assessment of the performance of the centre against the plan.
- Financial 'bottom line' performance must be shown and any variations from profitability explained, justified and projected into the future to show how the situation will improve.
- Summary of funding requirements and of financial or in-kind contributions from all sources. The scale of the investment and the scope of services proposed must be justified.
- An operational plan (organisational chart, staffing plan, equipment and facility plans and assessment of possible problems and solutions) [Mainly for MCTs].
- For MCTs mainly, an assessment of support from the local community (to confirm that benefits of the MCT to are understood by the local entrepreneurs and residents) and for commercial telecentres a marketing plan.

A business plan should be realistic and be elaborated after a careful assessment of the characteristics of the location to be served.

Management & human resources of MCTs

Basic principle: On balance it is best for the MCT to be planned and run on a commercial basis, with a clear outline of the role, rationale and contribution of community and other public organisations. The success of MCTs relies heavily on the skills and entrepreneurial spirit of the local manager, and the backing he receives. Recruitment should target local and 'highly spirited' entrepreneurs capable of developing a management and monitoring system.

Form of business control and management assistance: Some forms of business structure – e.g., a franchise relationship – carry the advantage of providing standards of recruitment, training, and support in the form of a start-up package, operating manual, quality standards, etc. Allowing for the fact that MCTs will have a range of structures, sound principles of recruitment, training and support should be established and adhered to.

Recruitment of manager: Ideally the manager-entrepreneur should be recruited before the form and final scale of the MCT investment is decided. Large visions should not be imposed from outside, but astute local business people should be able to sense where good opportunities exist and help to maximise both the scale and viability of an MCT. Preferably, the entrepreneur-manager should be known and respected in the locality.

Training: Managers should have proper training as part of their engagement. They should help to train their staff, local users and volunteers in the use of the equipment, customer service and provide clarity on responsibilities.

Senior staff in large MCTs: In relatively large MCTs, it is advised that two senior people have responsibility. One would be a project co-ordinator who is in charge of business development, including the co-ordination with other participants and creation of awareness of the MCT. The other would be a competent site manager who foresees daily operations.

Partnerships: Given the nature of MCTs to provide social benefits while being sustainable, it is often suggested that they should include participation from both private and public organisations. Thus, in a number of cases, such as South Africa, it is recommended to adopt a "3P" (private-public partnership programme) strategy.

Monitoring: It is useful to set a performance criteria of all kinds and to set a timetable, with milestones, to monitor the operational and financial performance of the centre, in order to confirm operational policies.

Marketing & financial matters

Awareness: MCT managers should create awareness of the MCT and its benefits through presentations and demonstrations. The location of the MCT is important. So is 'branding' – one of the advantages of franchising - such that a similar name and logo appears across the country.

Image & location: It is useful to keep the image of the site local and familiar. It has been observed that local image lessens the risk to vandalism and theft. Being close to a market or main square provides visibility of the site.

Operating hours: These should allow accessibility to the full potential demand

Appropriate tariff policy: A good, cost-related pricing scheme should ensure sustainability of the MCT and be practical. Clear guidance on tariffs and price setting should be given to staff, and appropriate peak and off-peak rates offered.

Business development: It is advisable to constantly make optimal use of resources to produce money. For instance, where possible a MCT manager could offer to establish or arrange for web-site development promoting, for example, a local farming co-operative, etc.

Ongoing commitment of sponsors: It is important to keep sponsors and participants informed of the performance and achievements of the MCT to ensure their ongoing commitment. It also important to continue to build a local business network.

Equipment Management

Power supply: The quality and reliability of the local power supply is an issue. It is important to have power break, surge and lightning protection, battery back-up, etc. as well as a source of replacement supplies.

Appropriate and useful software: Workstations should be loaded with software useful to the residents, to avoid sub-optimal use. Equipment should be adapted to the local needs and thus it is important to make an assessment of what is necessary and most suitable to service local residents.

Modularity and flexibility: Managers should implement a systematic modular approach to the equipment and services contained and offered in telecentres, so that investment and expansion can be staged. Equipment should be easily upgradable and compatible with peripherals. Equipment capacity should be planned according to the demand. It is important to adopt state-of-the-art technologies and also be prepared to evolve as technology and local needs change or develop.

Optimisation of use: Strategies should be developed to take advantage of equipment in off-peak hours (e.g. by offering telecom-intensive and word processing services at those times or prices which maximise use and efficiency).

1.6 The Policy environment for ICTs – lessons and needs

In this section we identify and summarise important favourable conditions for ICT based distance education. We draw on international experience and discuss the six countries of this report: South Africa, Ghana, Mozambique, Fiji, Trinidad & Tobago and Canada.

First we will discuss the policy environment which is favourable to the development of the telecommunications and Internet infrastructure, and second how elements of education policy can help the use of ICT in distance education.

1.6.1 Policy affecting infrastructure, information technology & the Internet

Distance education using information and communications technology is, to a large extent, dependent on the reach and quality of a country's existing telecommunications infrastructure. For example, telephone density either limits or allows people to have access to the Internet, and the quality, and capacity of the network determines the potential for DE multi-media applications. Another key condition is the cost of access; high cost telecommunications can severely limit the take-up of DE initiatives.

1.6.2 Privatisation and liberalisation

It is now widely understood that privatisation and liberalisation are important steps in the telecommunications sector reform process, resulting in accelerated infrastructure development.

Privatisation typically injects needed capital into the sector. In developing countries this often means foreign capital injection. The private investment allows a more speedy network upgrade and roll-out than the state-owned cash-strapped former monopoly operator could accomplish. National policies need not only to privatise their incumbent operators but also ensure that the investment climate is secure and attractive. With privatisation comes a more entrepreneurial and efficient management to the telecom operation.

The introduction of competition is the next step and an important condition for network development. Whereas privatisation brought needed investment to the sector and the efficient management of the operator, competition is the factor that drives the prices down for telecommunications services.

Except for Canada which has just recently also opened its local loop market to competition, none of the six case study countries has a fully liberalised telecommunications sector. Ghana created a duopoly by issuing a licence for a private second operator in 1997, but the operator could commence operation only at the beginning of 1999, due to regulatory difficulties. The duopoly expires in 2001.

None of the other countries has liberalised their basic fixed service market and only South Africa has provided a fixed date for the liberalisation. However, all of the operators except Mozambique's are partly privatised.

1.6.3 Effective regulation

Although telecommunications sector reform is called deregulation, it is misleading to think regulation is no longer needed in a liberalised and competitive market, or that the market simply regulates itself. Governments faced with the need to liberalise often fear that national objectives and development goals are neglected by the market, assuming that liberalisation is synonymous with the absence of regulation. This is not the case if effective regulation is in place, as the section below on rural telecommunications will show.

Deregulation means mainly that the government stops influencing the operation of telecommunications networks. Often the ministry responsible for telecommunications is the policy setting body, the regulator and the operator. This needs to end with privatisation and liberalisation. Effective liberalisation requires an independent regulatory outside of the ministry responsible for telecommunications, since the ministry often still has an ownership interest in the former monopoly operator. The privatisation process usually takes place over several years, with the government retaining a majority or minority share during that period.

A recurrent key problem is that the former monopoly operator uses its market dominance to hinder the new entrant. The regulator's role is to ensure a level playing field and fair competition. One of the most common problems is the question of interconnection between the incumbent's network and the new entrant. The former monopolist can delay the start in operation of the new entrant through delaying agreement to interconnect arrangements. Competitive service provision is virtually impossible if interconnect is delayed or the interconnection tariffs are overprized and not cost-related.

Ghana, although partly liberalised (duopoly), has experienced exactly this problem. Although the independent regulator, the National Communications Authority (NCA), was established in 1996 according to recent reports adequate qualified staff for the NCA have yet to be appointed. This has partly caused long delays in competitive network roll-out by the new entrant, due to interconnection disagreements with the incumbent operator. The new entrant could only

commence its operation two years after the license award. Clear interconnection regulation, enforced by an independent regulator acting as arbitrator in case of conflict, is essential for effective competition.

1.6.4 Rural programmes

Distance education is often most needed in rural and remote areas, where it is economically challenging to provide for a small number of residents the same depth and range of education opportunities as cities enjoy. Distance education can enhance and complement local resources. Also, the need for economic development in rural areas makes education all the more crucial.

Unfortunately, in terms of telecommunications infrastructure, rural and poor areas are the most neglected part of the country, making ICT based distance education difficult.

Favourable conditions for ICT based distance education can be found in countries that have special programmes for telecommunications network development in rural areas. There is a wide range of possible rural policy plans and actions, some of the most common of which are listed below:

- obligation attached to licenses requiring a certain roll-out target in rural areas (this could be individual lines, payphones, or – most effective in developing countries – private-run phone shops or small telecentres)

- special rural licenses which are auctioned to the bidder asking for the least subsidy

- the set-up of a rural subsidy fund to supply the above subsidy, levying a small % of revenues from all telecom operators to finance rural network expansion

Ghana has only postulated teledensity goals, but they are not coupled with concrete plans or a mechanism for implementation, although a rural fund is under discussion. Mozambique has no policy or plans on rural access at all.

South Africa is the outstanding example having a very definite policy and institutions to foster access to telecommunications services in rural and disadvantaged communities. In 1996 the government created the unique Universal Service Agency (USA), a statuary body which has the function of promoting, fostering and overseeing the provision of universal access (defined as telecommunications services within walking distance for everybody) and later universal service (affordable individual service).

The USA has initiated a telecentre programme to improve access to telecommunications in the country, and a Universal Service Fund (USF) was also

created to help finance the telecentres. The USF receives its money from a levy taxed on all telecom operators, as well as from international donations.

In addition, the fixed network operator and the two mobile operators have obligations to provide services to disadvantaged urban and rural areas. For example, the mobile operators Vodacom and MTN have an obligation to roll out 22,000 and 7,500 community service phones respectively by 1999.

In Canada, with its vast territory and low population density, the incumbent telecommunications carriers have the obligation to provide universal service, i.e., affordable telephone service to every person regardless of location. As can be seen later, Canada has initiatives such as the Community Access Programme (CAP) which are unique in ensuring that rural communities also have access to the Internet.

Mozambique, Fiji and Trinidad & Tobago have no special provisions for their rural areas.

1.6.5 Internet and IT

The Internet plays an important part in ICT based distance education, and most applications are dependent on using the Internet. Therefore, in addition to the policy focused on the telecommunications infrastructure supporting the Internet, the policies and laws directly regulating the Internet have an impact on the potential of ICT based distance education.

The following policy principles and regulations are important:

- *Liberalisation of Internet Service Providers (ISPs):* The majority of countries seem to be following this principle, including developing countries.

- *General "hands off" approach towards Internet regulation:* This approach recognises the fact that the Internet has developed so rapidly, largely owing to the fact that it was free of hindering regulation. Although still in debate, a view seems to be evolving that the common law should be sufficient to regulate activities on the Internet (i.e., the commerce law for e-commerce, criminal law for Internet pornography, etc.).

- *Promoting broadband and advanced communications:* This can be achieved by allowing competition to flourish and the government remaining 'technology neutral.'

- *Low import tax on computer hardware and software:* This applies also to telecommunications equipment.

- *Ensuring that transmission capacity pricing is low and cost-based*: Otherwise ISPs cannot offer affordable consumer prices to achieve a mass market. Again, competition is an important prerequisite for lower prices.

Similarly crucial is the pricing of local dial-up access to ISPs, which determines the speed of Internet take-up. There is an African policy initiative to guarantee local call prices for access to ISPs nationally, however only 13 countries have thus far subscribed to the concept.

All six countries have liberalised ISPs, but with various success if measured by the number of ISPs. Canada, not surprisingly, has a huge number of ISPs: 210 in 1998, followed by South Africa which had 75 ISPs in 1998, then doubling in number to 150 by 1999.

Ghana and Mozambique had nine and six ISPs respectively in 1998, reflecting a slow take-up and regulatory problems.

The two island countries, Fiji and Trinidad & Tobago, had two ISPs each. However, this not only results from less decisive Internet policies but is due also to a naturally limited market.

1.6.6 Education policy

From the observation of the six case studies, it seems that the following policy initiatives are important conditions and facilitators of ICT based learning and distance education:

1. *Government awareness of the importance of ICTs for national education*

   This demands understanding that a) information and communications technology are vitally important to the development of the economy and to participation in the global information society, with a corresponding need to develop appropriate skills, and b) ICT based learning and distance education can play a crucial role in broadening access to education for the whole society.

2. *A strategic plan or policy*

   This must be based on an analysis of needs and priorities for the use of ICT to improve education. Key elements and concrete steps of such a strategic plan are:

   - ICT skills integration in national curricula
   - equipping schools with computers
   - teacher training on ICT

- initiatives and programmes which invite and attract private sector involvement

Two other conditions are important for the success of ICT based distance education. These are 1) the presence of local participation and initiative, and 2) serious considerations regarding the self-sustainability of projects.

From its review Intelecon gained the impression that in developing countries the more modest projects are the most successful because they are better able to secure sufficient funding to sustain themselves. Also, it seems that the less ambitious and more concrete projects find it easier to secure private sector contributions.

The large scale projects are often still in the process of securing and negotiating funding and it remains unclear how operating and recurrent costs will be covered in the long run. In order to develop sustainable ICT based distance education in developing countries, models of financing need to be devised which provide for transition from initial dependency on the international donor agencies to self-sustaining and continuing institutions.

Some initial ideas encountered in our case studies are the following:

- *Fee-based usage of ICTs for distance education:* Even small charges help to finance ongoing operating costs. E.g., in Ghana schools charge an additional monthly fee to sustain computer labs; funding could be arranged for pupils who definitely cannot afford even the most modest charge.

- *Universal service fund or equivalent as 'seed capital':* In South Africa the USF which supports the establishment of telecentres is secured from a small levy on telecommunications operators. Also, the projects are sufficiently modest that many centres promise to become self-sustaining in the medium term if the operational glitches are ironed out.

- *Multi-user concepts in facilities usage:* e.g., in Ghana some schools in the WorLD programme charge for evening use of their computer lab for adult teaching of software skills.

- *Regionalisation:* This seems to be the best answer for large-scale projects, especially in small markets (e.g., the African Virtual University or the University of the South Pacific).

- *Private sector sponsorship:* In the projects reviewed evidence exists of considerable willingness by a broad range of private sector companies (even many non-IT companies) to make cash or in-kind contributions, including computer equipment for schoolNets, and discounts on services to well-defined projects. National governments and international agencies can broker such partnerships; the WorLD programme is a very successful example of such a strategy.

In conclusion, it was noted in the Canada case study that most rapid progress in policy development seems to be made when various ministries and departments – e.g., telecommunications, industry, human resources and regional development – are all convinced of the need for leadership and co-operate on jointly developing ICT strategy. This reflects common conviction, in Canada at least, that a policy on ICT in education is just one facet of preparing the population and workforce in all parts of the country to be productive, competitive and at-ease in the information economy.

Hence all of the policy concepts presented in Sections 1.6.1 – 1.6.6 should be considered as a whole if the use of ICT is to be encouraged and facilitated to the optimum extent.

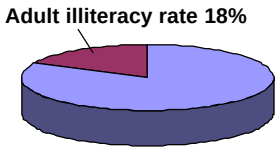
2. SOUTH AFRICA

Country Characteristics

Government type	Republic
Territory	1.22 Million Km^2
Population (1997)	40.6 Millions
Annual population growth (expected 1997-2015)	1.1%
Urban population	20.3 Million (50%)
Population density	33 People/Km^2
Major villages and towns	6,000 approx.
Average village size	3,400 inhab

- *Administrative divisions:* nine provinces: Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Mpumalanga, North-West, Northern Cape, Northern Province, Western Cape
- *Culture:* Heterogeneous, with four ethnic groups (black 75.2%, white 13.6%, coloured 8.6%, Indian 2.6%) and 11 official languages, including Afrikaans and English
  - *Topography:* 60% Mountain, 20% Prairie, 15% Desert and 5% Steppe
  - *Climate*: mostly semiarid with subtropical along the east coast

Education

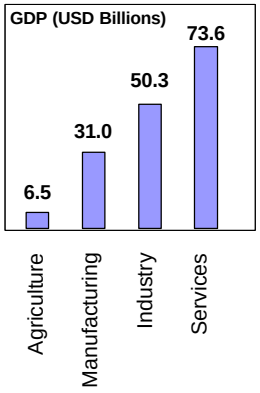


Illiteracy rate, 1997	18%
Public Spending on Education (GNP Share)	7.9%
Universities	NA

- *Gross enrolment ratio* (% of relevant age group)[1], 1996: Primary 131%, Secondary 94% and Tertiary 19%

[1]Percentages may exceed 100% since enrolment includes repeaters and over-aged. Tertiary enrolment includes non-university diploma studies and programmes requiring secondary-education certificates.

Economy



GNP, 1997	US$ 130.2 Billion
GNP/Cap, 1997	US$ 3,400
GNP/Cap PPP, 1997	US$ 7,500
GDP Growth, 1998	1%

Output (Share of GDP[2]), 1997:	
Agriculture	5%
Manufacturing	24%
Industry	39%
Services	57%

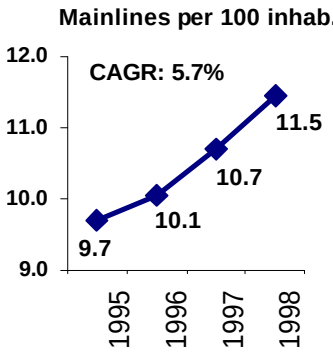
[2]Sum of shares may surpass 100% due to output overlaps

[3]Services output includes public services

- *Government Revenues: (Share of GDP), 1996:* 29%
- *Industries:* mining (world's largest producer of platinum, gold, chromium), automobile assembly, machinery, textile, iron and steel, chemical and fertilizer.
- *Agriculture products:* corn, wheat, sugarcane, fruits, vegetables, beef, poultry, mutton, wool and dairy products.

Information and Communications Technology

Telephony



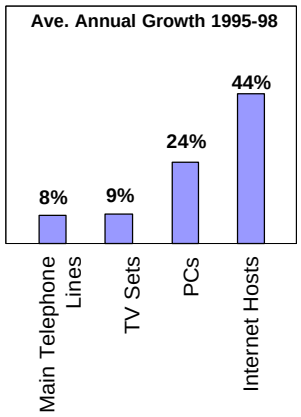
Main Telephone Lines:	
existing, 1998:	5.1 Million
expected, 2000:	5.9 Million
Compound Average Growth Rate, 1995-98:	8.2%

Main Telephone Lines per 100 inhab:	
existing, 1998:	11.5
expected, 2000:	12.5
in urban areas, 1995:	12.9
in rural areas, 1995:	5.2
Compound Average Growth Rate, 1995-98:	5.7%

Quality and Investment

Digitalisation, 1998	82%
Telecom Investment, 1998	US$ 2.7 Billion
Telecom Revenue, 1998	US$ 6.0 Billion
Reinvestment Ratio (Investment/Revenues):	50%

Internet and Media



PCs, 1998	2.1 Million
PCs per 100 inhab, 1998	4.74
PCs per 100 CAGR[4], 1995-98	24%
Internet Users, 1998	1.26 Million
Internet Users per 100 inhab, 1998	3.31
Internet Users CAGR[4], 1995-98	40%
Internet Hosts, 1998	144,500
Internet Hosts per 100 inhab 1998	0.326
Internet Hosts CAGR[4]	44%
ISPs, 1998	75
TVs, 1998	5.4 Million
TVs per 100 inhab, 1998	12.5
TVs CAGR[4], 1995-98	9%
TV Broadcast Stations, 1997 (incl. 144 repeaters)	700
Radios, 1997	7.5 Million
Radios per 100 inhab, 1997	20
Radio Broadcast Stations, 1997	180

[4]CAGR = Compound Average Growth Rate

2.1 General Context

South Africa is the fourth largest country in the Commonwealth and has the sixth largest population. With 50% of its population living in urban areas, South Africa has a higher urbanisation rate than most of the Sub-Saharan countries. However, some of the huge and disadvantaged townships are included in this urbanisation rate.

Within Africa, South Africa's population density of 33.3 persons per km^2 falls between that of Mozambique which has 21.2 persons per km^2 and Ghana's with 78.9. With a GNP per capita of US$ 3,400 in 1997, South Africa is the richest country among the three African countries selected for this study and has, with 5%, a very low percentage of its economy dependent on agriculture.

South Africa, with its history of apartheid, has an outstanding commitment for changing its legacy of inequalities in freedom, access to information, wealth and opportunity based on race. The country is strongly devoted to overcome and mitigate disadvantages for large parts of the society resulting from past policies: Access to information and communications as well as education, freed from the crippling and discriminating concept of Bantu education, are crucial elements and building blocks for the so-called 'empowerment.'

2.2 Environment and Function of ICT- based Distance Education

The baseline data gathered on South Africa show the following features of the education situation:

- With gross enrolment ratios of 131%[8] for primary and 94% for secondary, it appears that South Africa has successfully managed the delivery of education to these age groups.
- A lower enrolment ratio of 19% can be found in tertiary education, however compared to the U.K.'s 48% with its GNP six times higher than that of South Africa, this seems to be a relatively high enrolment ratio for a middle income country. Within the African Commonwealth countries, South Africa's GNP per capita compares approximately with that of Botswana (US$ 3,260) which has a tertiary enrolment ratio of 6%.
- With nearly a fifth (18%) of the population illiterate, adult education and continuing education are still major issues in South Africa. (Botswana has an adult illiteracy of 30%.)

[8] Percentages sometimes exceed 100% since enrolment includes repeaters and over-aged students

In South Africa, the following important projects were identified and used to gain an appreciation of the use of ICT in distance education.

- SchoolNet
- Mamelodi Community Information Services (MACIS)
- Technology Enhanced Learning Initiative of Southern Africa (TELISA)
- Distance Education Digital Learning System (DEDLS) – in planning stage
- the African Virtual University (AVU) – pilot stage completed
- the Universal Service Agencies telecentres

In regards to the focus of those projects there are clearly two concentrations, namely tertiary education and community projects.

The African Virtual University, which has just completed its pilot phase, is not only focussed on tertiary education but also on continuing education for professionals from the private sector. The Distance Education Digital Learning System (DEDLS) is still in the planning stage but its first pilot is intended to create content which can be digitally transmitted using different delivery technologies. Its main target audience is post-secondary learners.

The third project aimed at tertiary education is the Technology Enhanced Learning Initiative of Southern Africa (TELISA) which already has one ICT centre operating in South Africa. One of its objectives is to improve the access to tertiary education. The TELISA initiative also has a focus on the community: its ICT centres are located or planned in a community setting, serving the needs of the community in general and the business community.

The following tables give an overview of the functions and environments of ICT based distance education of the six initiatives examined:

	TELISA	DEDLS	SchoolNet	MACIS	AVU	
Function of DE						
Primary (literacy, numeracy)						
Secondary			√			
Tertiary	√	√			√	
Postgraduate research						
Profession oriented						
Teacher training	√		√			
Continuing education						
Computer literacy	√		√	√		√
Health Education						
	TELISA	**DEDLS**	**SchoolNet**	**MACIS**	**AVU**	
Environment of DE						
Community	√		√	√		√
Rural/ remote	√	√				√
Content production	√	√	√			
Access to education	√				√	
Access to technology	√	√	√	√		√

One other initiative in South Africa has a major emphasis on the community. The Telecommunications Act of 1996 has established the statutory body of the Universal Service Agency (USA). It is responsible for promoting, enabling and overseeing the provision of universal access to all South Africans, especially those in remote and disadvantaged communities. Universal access is defined as access to a telephone within 30 minutes' walking distance. The Universal Service Agency is using the implementation of telecentres as a major tool to provide universal access to communities.

Telecentres are operated and managed by franchisees which need to be approved by the USA. By fiscal year 1997/1998 it had approved more than 60 telecentres. The Agency has a five-year target which aims to have one

telecentre-type facility in each community (villages, townships, farm community and other) by 2004.

One of the telecentres approved by the USA is the Mamelodi Community Information Services (MACIS). MACIS is run by and situated in a community of around 750,000 residents. Though it was launched in 1995 before the USA had been established, it is now financed by the Agency.

SchoolNet South Africa is geared towards providing ICTs for secondary education. As in the school-net in Ghana, some of the schools have acted as ICT centres for their community. In Ghana this was part of the effort to self-sustain the computer labs.

Naturally, ICT based distance education and learning projects provide access to ICT technology and infrastructure. However, the primary goal for some is to provide access to ICT, while for others it is to provide access to certain specific educational content, using ICT as a tool for delivery.

- The primary goal of MACIS and the USA telecentres is to provide access for the community or secondary students to ICT, enabling them to use it to their benefit.

- The AVU, DEDSL and TELISA all aim to broaden the access to specific tertiary education (diplomas, degrees and certificates etc.) by the means of ICT, making ICT access the tool for education delivery, not the main goal.

- SchoolNet features to some extent in the middle, since its main goal is school connectivity but it also stresses online content and curriculum development.

Three of the six projects portrayed also have a focus on content production. Similar to SchoolNet, TELISA has a strong focus on content. It plans a series of internet-based information servers in order to provide appropriate support material to existing educational institutions, lecturers, teachers and businesses.

One of these servers is already in place: www.africaeducation.org. It is a special web-page for education, development and lifelong learning in Africa. It has not only curriculum content and resources and information on other distance education projects and school projects, but also hosts the 'Africa Digital Library.' It has been available since November 1999 and offers a growing book selection (3,000 to 4,000 currently) free of charge to African residents.

The planned DEDLS project seems to focus on developing distance education content which is independent of the delivery system as long as it is digitally based. The idea is to develop content which is not produced with a specific medium for transmission in mind but which can be transmitted via a range of alternative technologies.

Within the six initiatives only two were found which specifically included teacher training: the TELISA initiative and SchoolNet SA. Educator training is part of their strategy with the intention to train academic staff and secondary teachers respectively on how to use computers and the Internet for educational purposes.

2.3 Infrastructure and Technologies

With an average of 11.46 main lines per inhabitant, South Africa has the highest telephone penetration in Sub-Saharan Africa except for Mauritius. However, there are large disparities between provinces, and between urban and rural telephone penetration. In 1995 the rural telephone penetration was less than half of the urban teledensity. This has since improved significantly, but the disparity is still high.

Gauteng and the Western Cape both had a teledensity above 20 per 100 inhabitants in 1995, whereas Mpumalanga, the Eastern Cape, and the Northern provinces had a teledensity just above 5 per 100 or even below.

With a GNP per capita almost 10 times that of Ghana, and over 36 times that of Mozambique, South Africa also has a computer and Internet penetration many times higher than the other two countries. There are approximately 3.31 Internet users per 100 inhabitants whereas Ghana and Mozambique have just 0.03 and 0.02 respectively. South Africa had 75 Internet Service Providers (ISPs) in 1998 and more than 144,000 Internet hosts, compared to 192 in Ghana and 141 in Mozambique. A huge difference can also be found regarding the PC penetration: In South Africa the ratio is nearly 5 PCs per 100 inhabitants. Mozambique and Ghana both have a ratio of 0.16 per 100 inhabitants.

In traditional media, South Africa has a TV penetration of 12.5 TVs per 100 inhabitants and 20 for radio receivers.

The projects can be broadly divided into those which have only user technology in mind and those which also provide or include the infrastructure and transmission technology to deliver education.

Both the AVU and TELISA use satellite broadcasting to deliver education and establish their own transmission facilities. Also, telecentres funded by the Universal Service Agency focus on infrastructure provision to underserved, remote and rural communities, using landlines and cellular technology (the latter through obligations on the two mobile operators, MTN and Vodacom).

Another key infrastructure initiative not portrayed here is Uninet, a provider of national network backbone to its member institutions which are tertiary education institutions, research institutes and some school networks.

DEDLS focuses neither on the infrastructure nor on the technology for the end-user, but on digital content packaging, which allows it to be adapted to whatever transmission technology or end-user technology is available.

The following tables give an overview of technologies used in the six projects examined:

	TELISA	DEDLS	SchoolNet	MACIS	AVU	USA tele-centres
End-user equipment						
PC	√		√	√	√	√ (in some)
LAN	√		√	√	√	√ (in some)
Telephone	√					√
Internet connection	√		√	√	√	√
E-mail	√				√	√
Touch screen info- kiosk				√		

	TELISA	DEDLS	SchoolNet	MACIS	AVU	USA tele-centres
Transmission technology						
Satellite broadcasting	√				√	
Wireless				√		√
Fixed networks	√		√	√		√
Content platform						
Web-page hosting	√				√	
CD-Roms				√		
Electronic DB				√		

MACIS and SchoolNet focus on equipping the end user, the student and the community with technology and the connection to the infrastructure which provides access to worldwide information.

AVU and TELISA, as projects which are more focused on education content delivery than merely on access to IT, both consequently also host information web-pages, providing access to specific information regarding education.

MACIS, geared towards the community, includes touch-screen information kiosks, which can be used by computer illiterate people.

These examples of ICT based distance education projects illustrate that in South Africa a wide variety of technologies is used to facilitate or deliver education.

It seems that there are two determining factors for technology choice:

- the available supporting infrastructure in the country
- the appropriateness for the purpose and end-user of a distance education initiative

2.4 Policy

Starting with basic statistics, there are two important factors in South Africa which reflect underlying policy decisions and strategy:

1. The 1998 investment in the telecom sector equals approximately 50% of the telecom revenue in the same year, showing a commitment to expand the infrastructure for the future.
2. In 1996, public spending on education was at 7.9% of GNP. In the Commonwealth there are only six countries with higher relative expenditure on education (Botswana, Maldives, Namibia, Saint Lucia, Swaziland and Zimbabwe).

The following sections look in detail into various policies which affect the use of ICT based distance education in South Africa and examine their impact.

2.4.1 Telecommunications and IT

Fixed basic services including international - not liberalised

The sole fixed-line operator (PTO), Telkom SA, has a five-year period of exclusivity to supply local, national and international telephony, ending in 2002. Telkom has the prospect of a sixth year if it achieves 90% of the five-year total line target by the fourth year of its licence and 80% of its five-year line target. News articles in mid 1999 seem to suggest that it is not likely that Telkom SA will meet the target to obtain an additional year of exclusivity.

A second fixed-line operator licence will likely be issued in 2000 or 2001. The second operator will need time to roll out its network in order to come on line as soon as Telkom's period of exclusivity ends in 2002 or 2003.

Internet Service Providers (ISPs) – liberalised

In 1999 there are about 150 ISPs. Approximately 10 are large and more than 120 are 'second-tiered' (virtual ISPs). The 10 'top level' (first-tier) ISPs in South Africa have their own international leased line links.

- Telecommunications regulator SATRA ruled that the Internet was in the competitive domain and falls under the Value Added Network Services (VANS) licence, not the voice network licence. This ruling was in response to Telkom's challenge that its monopoly over telecommunications services extended to Internet access. Internet access is provided under a VANS licence under section 40 of South Africa's Telecommunications Act.

SATRA has created an Internet regulatory environment based on the following principles:

- universal service obligations on ISPs
- a common 'peering point' (or node), neutrally located and run by a Steering Committee composed of ISPs
- keeping Internet traffic within the country to avoid having to communicate locally via international gateways, thus minimising the need for international bandwidth
- overcoming the lack of interconnection of Internet networks.

In addition, ISPs in countries which share borders with South Africa benefit from the low tariff policies instituted by the South African telecom operator for international links to neighbouring countries. As a result, South Africa acts as a hub for some of its neighbours - Lesotho, Namibia and Swaziland.

South Africa has ISPs or local points of presence (POPs) in 70 locations. Unlike the majority of African countries, South Africa has Internet connectivity outside its capital city in most other cities and areas, however there is no low cost local access method in areas outside cities, so the issue of local connectivity is still problematic.

Plans, programmes or policy for rural access or universal service

The South African Telecommunications Act No.103 of 1996 provides a summary of objectives for the regulation and control of telecommunications matters in the public interest. They include

- to promote Universal Service and affordable telecommunications service, including advocacy to raise awareness of telecommunications
- to increase the provision of telecommunication services through rollout and infrastructure provision

- to promote the innovative development of telecommunications services responsive to consumer/ user needs
- to ensure the needs of local communities and areas are taken into account in relation to the provision of telecommunications services

The Universal Service Agency

The Universal Service Agency (USA) is a unique statutory body established by the South African Telecommunications Act of 1996. It will promote affordable Universal Access and Universal Service in Information and Communication Technologies (ICTs) for disadvantaged communities in South Africa to facilitate development, empowerment and economic growth. Its short to medium term objective is to facilitate the provision of telecommunication services where everyone can access them, i.e., within a reasonable distance, which means 30 minutes' travelling.

The USA manages a Universal Service Fund (USF) which was established to finance needy telecommunications users in terms of the Telecommunications Act of 1996. A portion of it will be used to subsidise the initial funding of telecentres. The USF is built up by contributions from telecommunications service providers and donor organisations.

The Universal Service Agency launched a Telecentre Pilot Project with the objective of providing universal access to telecommunications in South Africa. These telecentres are managed and operated by approved franchisees and are located in disadvantaged communities, particularly rural areas. The objective of the Telecentre Project is to provide universal access through public facilities: telecommunications, facsimile, e-mail and telephone. Some will provide access to the Internet.

The Agency's aim is to develop a model of how to run telecentres effectively in disadvantaged areas which can then be reproduced, such that they will not need continued funding from the Agency. This will also promote community ownership and control.

Operator obligations

All fixed-line and mobile operators have community service obligations laid down in their licences. SATRA has also imposed universal service obligations on ISPs. Among other things, this means that they have to provide services to rural areas.

Mobile operators Vodacom and MTN have an obligation to roll out 22,000 and 7,500 community service phones (rural telephones) respectively by 1999. These community service targets were originally put forward by Vodacom and MTN in their licence applications. Phones will operate at a subsidized rate costing approximately 40% of a normal cellular phone call.

Vodacom has franchised members from previously disadvantaged communities to become 'phoneshop' operators in order to provide telecommunication in these communities. MTN has also introduced phoneshops in black townships, consisting of cargo shipping containers with 10 telephone booths installed inside.

A third mobile licensee will also be required to provide affordable cellular services to under-serviced areas.

In order to promote universal and affordable service, Telkom SA was granted a period of exclusivity in exchange for stringent rollout dates. The exclusive licence was issued to Telkom in May 1997. Telkom and its strategic equity partners, SBC and Telkom Malaysia, are to double the network in five years. They are particularly required to ensure that villages, schools and clinics receive priority.

In order to accelerate the pace of line rollout to fulfil its obligation to provide universal telecommunications service, Telkom introduced its Vision 2000 programme in March 1996.

- Vision 2000 is a five-year network expansion and modernisation programme, where up to 3 million lines will be added to the network (a 75% increase) while another 1 million lines will be replaced.
- Of the 3 million additional lines, an estimated 2 million will be aimed at increasing telephone penetration in under-serviced urban and rural areas, with the remaining 1 million lines catering for growth in developed areas.

Information society initiatives or information superhighway policies

The Department of Communications (DOC) has established the Commission for Information Technology (CITA) which will form the initiating platform for public and private partnerships in ICTs, with specific emphasis on creating an Information Technology hub in South Africa. CITA will promote the ideal of a knowledge-based society throughout Africa.

The Department of Arts, Culture, Science and Technology has established a Science and Technology Innovation Fund to support large projects (R1-5 million) in three priority areas, one of which is the development of an information society.

In March 1998, the South African cabinet approved a proposal to develop a national information and communication technology strategy. The key elements of the strategy include consolidating all existing government networks in one 'Intranet' and offering the public a 'one-stop shop' through the use of smart cards and public access points. Features of this initiative are:

- Telkom will build the Intranet, which is based on a high-speed fibre optic backbone.

- The public will be able to obtain identity documents and driver's licences as well as information on tenders and health and welfare services through the new system (PITs).
- The Department of Communications will involve various government departments with the aim of preparing legislation for e-commerce, digital signature, multimedia convergence, and encryption.

The former communications minister of South Africa, Jay Naidoo, heralded an intensive public awareness campaign on the evolving information society and the need for information superhighways across the continent. He undertook an 'African Connection Rally' from March-April 1999: this was a 16,000 km journey through Tunisia, Libya, Egypt, Sudan, Ethiopia, Kenya, Tanzania, Malawi, Zambia, Zimbabwe and South Africa, where he visited telecommunication centres in remote areas, inspected facilities, and met with ministers of telecommunications and other government officials.

In summary, the South African government actively plans, encourages, and supports the development of necessary information and telecommunications infrastructure and has a unique focus and tools for providing telecommunications services to rural and disadvantaged communities.

2.4.2 Media

The Broadcasting Division of South Africa's Department of Communications subscribes also to the vision of establishing an information and knowledge-based society in South Africa. It allocated R1 million at the end of 1998 to provide much needed financial support for broadcasting programmes aimed specifically at the needs of children in the poorer rural areas of the country.

It was decided that all funds will initially be concentrated on radio programming and particularly on community radio programmes because of the limited amount of funding available. This project was a huge success and reaffirmed the enormous need for and the positive impact of educational and entertaining community programmes.

South Africa has one public broadcaster, SABC, which has three TV stations, and two private broadcasters. The country is covered by a network transmitting the TV stations, as well as some FW, AM, and shortwave radio stations.

The two private broadcasters are MNET and ETV. MNET uses terrestrial and digital satellite broadcasts and its satellite footprints cover large areas of Africa. This operator has also broadcast the TV signals of the three SABC stations since October 1998. ETV is a commercial free-to-air broadcaster that has been awarded the licence to broadcast in South Africa.

There are many small local radio stations all over the country, rendering local service in many indigenous languages.

A Community Radio Broadcasting Service, the first in South Africa, was introduced especially to meet the needs of previously neglected rural and disadvantaged communities. The Danish Government Aid Agency (DANIDA) offered to donate R3.1 million for the development of community radio broadcasting with the provision that the South African government match the donation. In response to this, the South African government approved a similar amount to fund the Development of Community Radio Project, which resulted from initiatives taken by the National Community Radio Forum.

2.4.3 Education

By 1996 the Ministry of Education had appointed an investigation team to explore technology-enhanced learning and develop a national strategic plan. Two of the foci were infrastructure and partnerships between the education sector and other stakeholders. Some of the main recommendations of the group were as follows:[9]

- establishment of a clearing house for information on technology-enhanced learning
- inclusion of 'technology-enhanced learning' perspective in teacher development
- integration of IT into national qualifications framework (i.e., school curricula and universities)
- content development
- inclusion of IT in management and administration of education institutions
- co-ordination between ministry and provincial departments

In January 1997 South Africa produced a draft policy document on technology-enhanced learning, setting a framework for planners, decision-makers, administrators and educators.[10] The document recognises the need for enabling conditions and a framework for technology-enhanced education, and it names decision making capabilities and instruments, information, educational infrastructure, physical infrastructure, human capacity and course material as necessary resources.

The outflow of the policy document was a strategic plan, which also concerned itself with funding, and six lead projects which are:

[9] South Africa, Department of Education. (1996). Technology Enhanced Learning Investigation in South Africa. Discussion document. Pretoria.

[10] South Africa, Department of Education. (1997). The Use of Technologies in Education and Training: A Policy Statement. Draft document. Pretoria.

1. curriculum development and delivery in three areas at grade eight
2. technically oriented vocational education in three areas of national priority
3. generic IT course for use in schools, community centres, and other locations
4. development of educators in use of IT for education and training
5. training of managers of learning centres
6. provincial pilot project to test new technologies for education management and administration support

Another important policy document on continuing education[11] promotes the concept of an open learning society and highlights the use of IT, such as the Internet, and the access it provides to learning on the web or to a network of education providers.

Key also is teacher education, which has a separate policy document.[12] It is sought as a necessary element of the national curricula development for students, outlined and reflected in the national qualifications framework (NQF), the South African Qualifications Authority (SAQA) and new education legislation such as Curriculum 2000.

The technology literacy requirements for teachers include certain skills and capabilities for dealing with the information society in which they live, processing of data, and computer literacy including Internet and e-mail.

The Department of Education plans and focuses on computer and Internet connectivity for schools, and it works closely with SchoolNet SA.

2.4.4 Policy conclusion

The review of the policy in the telecommunications and IT field, in media and education demonstrates impressively that in all those areas

- there is an awareness by the government of the issues
- there are national policies and strategies in place aimed at creating favourable conditions, with a huge level of achievement
- the government itself is leading major concrete initiatives

In the case of South Africa, there thus appears to be a well-integrated set of strategies which has resulted in major initiatives, although most are still in relative infancy and results are not easily gauged at this stage.

[11] South Africa, Department of Education. (1998). Education White Paper No.4: A Programme for the Transformation of Further Education and Training. Pretoria

[12] South Africa, Department of Education. (1997). Norms and Standards for Teacher Education, Training and Development. Discussion document. Pretoria.

2.5 Sponsors: Interest, Key Motivations and Strategies

It is interesting to see that in South Africa ICT based distance education is sponsored by a range of local organisations and commercial sponsors. Five of the six projects portrayed in this report were initiated by South African organisations (TELISA by Technikon SA, DEDSL by COLISA/ UNISA), by people directly concerned with the issues (SchoolNet SA, MACIS) and the government (Universal Service Agency). The exception is the AVU which is a regional initiative led by the World Bank.

Three of the five local initiatives are also sponsored by South African based commercial organisations. The exceptions are the government-led telecentres (according to the latest information from 1998) and DEDLS, which is still in the planning stage. The commercial sponsors range from technology and infrastructure providers (Telkom SA, the incumbent PSTN operator; Dimension Data Holding, one of South Africa's largest IT integration companies) to companies in unrelated sectors such as an insurance company and breweries.

The World Bank and the IDRC are each sponsoring three of the projects. Other sponsors are national governments, the EU and a special funding trust for South Africa. International commercial sponsors are all large corporations in the IT field, such as Microsoft, Siemens and many others which are part of the WorLD global partnership, which is involved in SchoolNet SA.
South Africa thus possesses the advantage of having strong national leadership, as well as a large potential market, which attracts major corporate interest.

The DEDLS initiative has no sponsors yet but is expecting to attract sponsors which are interested in experimenting with the design of a content delivery system and content platforms.

The interests of the MACIS sponsors are focussed around economic development and political empowerment. Sponsors are keen to support the development of the community, provide high quality computer literacy, and foster the creation of employment and employers.

The government through the Universal Service Agency is also motivated to support the economic development and empowerment of the people through its telecentres. It is interested in attaining economically sustainable telecentres and focuses its efforts on the least developed communities.

The AVU is a project designed to address two key problems of tertiary education in Africa: lack of access for many students and insufficient quality. It is seen as an innovative way to address these problems.

The vision of SchoolNet's sponsors is to create an 'information backbone' of South African Education. The interests of commercial sponsors are understood to be threefold:

- boosting the public image and take part in building the future of the country
- introducing their products to future potential users
- contributing to creation of an educated and computer skilled workforce, thus boosting market size for their products.

Similar motivations and interests of sponsors apply to TELISA.

2.6 Country Evaluation

South Africa is a country where ICT-based distance education projects and initiatives flourish and a large number of international donor agencies and agencies involved in distance education are present which initiate or participate in those projects.

However, most impressive is the leadership and support of local organisations, education providers and companies in using ICT to deliver and broaden the access to education.

The success of so much activity in the ICT-based distance education field can be largely accounted for by an extremely supportive policy environment. In all three areas, telecommunications and IT, media and education, the government has not only formulated policies which clearly identify and determine the role of ICT and education in its future economy and society, but has also created the tools and initiated concrete steps to foster and achieve its goals.

2.7 Project Descriptions

2.7.1 African Virtual University (AVU)

A) Short description of purpose

The objective of AVU is to build human capacity and support economic development by leveraging the power of modern information and communications technology to provide world-class tertiary education and training programmes to students and professionals in sub-Saharan Africa.

It is a first-of-its-kind interactive instructional telecommunications network. AVU uses interactive satellite and computer-based technologies to make academic

faculty, library resources and laboratory experiences available simultaneously to a network of sites across Africa.

Since 1997, AVU has broadcast over 2,000 hours of interactive instruction. More than 9,000 students have completed semester-long courses in the sciences and over 2,000 participants have attended seminars on topics such as e-commerce, accounting and Y2K issues.

As of July 1999, the AVU has a digital library that enables users to access thousands of journals from various countries.

B) Initiator (lead agency)

The World Bank

C) Non-profit providers/ sponsors and area of sponsorship/ donation

The World Bank has provided financing through its Information for Development Programme (*Info*Dev), the Development Grant Facility (DGF), several Institutional Development Grants, and through the use of a number of IDA credits to African countries. A small core team at the World Bank manages the AVU.

The European Union and the governments of Belgium, Canada, Ireland, Norway, Sweden, and the United States have provided funding for AVU.

Approximately 30 institutions in North America and Europe, mainly universities and training institutions, have provided course content.

D) Commercial providers/ sponsors and area of sponsorship/ donation

INTELSAT provides AVU with satellite capacity and it had initially, in 1997, sponsored free services. INTELSAT is operated as an international commercial cooperative, with 143 member countries. As a wholesaler of satellite communications, it owns and operates a global communications satellite system providing capacity for voice, video, corporate/ private networks and Internet in more than 200 countries and territories.

E) General key motivation/ interest of sponsors and strategic view of developments in these areas

Test an innovative way to address the main constraints of higher education in Africa, i.e., lack of access and insufficient quality.

F) Other participants

The AVU has formed partnerships with 24 universities in 15 sub-Saharan countries. Partner institutions in Africa provide academic, administrative, technical and student support services and infrastructure required to implement AVU operations in-country.

Specifically, the three participating universities in Ghana are (a) University of Accra, (b) University of Cape Coast, and (c) University of Science and Technology, while the two participating universities in South Africa are (a) Technikon Southern Africa and (b) University of Pretoria.

AVU is supported by international consultants with experience in academic matters, distance learning, library systems, ICT, business planning and marketing.

G) Type of users (description of users)

- Main target audience is undergraduate students.
- Additional audiences are high school students or graduates wishing to enrol in AVU degrees (remedial instruction for students not qualified to enter technical, medical, or scientific fields of study).
- Professionals from the public or private sector including teachers (continuing education)

H) Function and environment of usage

Higher education for students and professionals. The main areas of focus are degree courses in computer science, computer engineering and electrical engineering (currently being developed), IT certificates and courses, language training, and continuing education for professionals from the private sector. AVU offers courses in English and in French.

AVU soon plans to offer undergraduate degrees as well as teacher training, executive business education, and IT training.

I) Technology used

- Satellite
- Broadcasting/video
- PC
- Internet AVU website that provides access to e-mail and a digital library

J) Evaluation of project

The pilot phase is currently being evaluated, having been tested in 16 English-speaking and 8 French-speaking African universities in 15 countries, proving the project to be technically and operationally feasible. The 15 participating countries are Ethiopia, Ghana, Namibia, South Africa, Tanzania, Uganda, Zimbabwe, Benin, Burkina Faso, Burundi, Mauritania, Niger, Rwanda, and Senegal.

K) Time frame / plans

The AVU was established in 1996. Its pilot phase will be completed in 1999. Preparations are currently underway to launch operational phase (degrees) in 2000.

The AVU has plans to expand enrolment by developing further partnerships with local universities, private educational institutions, and business entrepreneurs. The AVU plans to establish up to 200 financially self-sustaining learning centres in the countries of sub-Saharan Africa by 2002.

L) Key material

www.avu.org

David A. Light. (1999, September/October). Pioneering distance education in Africa. Harvard Business Review.

Mark Turner. (1999, February 17). Virtual learning spurs Africa's universities: As the continent's education deteriorates at an alarming rate, the AVU is offering quality courses. Financial Times, USA edition,

Charlotte Kukunda. (1999, November 4). World Bank Boss Dares Journalists. Africa News Service.

Sherna Berger Gluck. (1999, October 5). Namibia Host Business Reporting Workshop. Africa News Service.

Andrea Useem. (1999, April 2). Wiring African universities proves a formidable challenge. The Chronicle of Higher Education.

A Learning Boost for Africa [ALL Edition]. (1999, February 25). Christian Science Monitor.

Bruce S. Byrne. (1999, January/ February). Distance learning in Kenya, and the African Virtual University. Technical Training.

Kariuki Waihenya. (1998, November 9). Distance education only way out for poor countries. Africa News Service.

M) Key contacts

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N) Financing and budget

Total cost of pilot phase (1996-1999) was US$ 12 million. AVU plans to seek additional funding of $10 million for the next development phase in 2000 as well as further sums for its operational phase from a wide range of public and private sector partners.

The AVU hopes that the development of further partnerships with private educational institutions and business entrepreneurs will promote the emergence of entrepreneurial private educational centres that will provide financing to AVU through sharing revenues already being generated from tuition fees.

The AVU plans to become a non-profit organisation some time in the year 2000 with the involvement of its major stakeholders in Africa and abroad.

O) Last update

December 1999

2.7.2 Mamelodi Community Information Services (MACIS)

A) Short description of purpose

MACIS is a community-based organisation, registered under Section 21 Company Act. Its mission is to provide information on all aspects of life to community members to cope with their normal day-to-day problems and to improve their quality of life. The aim is also to bridge the perception of inaccessibility that surrounds the term ‘information’ and to introduce information and communication technologies to the community of Mamelodi.

The Canadian IDRC is supporting the project through the Universal Service Agency, a statutory body established by South Africa's Telecommunications Act of 1996 to promote universal access to telecommunications for all in South Africa.

The project is situated in a community of around 750,000 residents. There are 40 primary schools, 14 high schools, one university, two technical colleges and one private school. Mamelodi is 22 kilometres to the east of Central Pretoria, in the Gauteng Province of South Africa.

MACIS is the only telecentre in the community. A number of vendors are offering services on a smaller scale, e.g., telephones and fax. Most are telephone shops.

B) Initiator (lead agency)

Initially the project came from the Mamelodi Youth Organisation in 1986, but they were stopped due to apartheid laws. In 1993 the CSIR (Council for Scientific and Industrial Research) came with a concept of establishing Community-Based Information Services (CBIS).

The CSIR targeted Mamelodi to be their pilot location. The idea was discussed with the leaders and a workshop was convened with representatives from youth, women, political parties, religion, education, health, government and other organisations. The project was launched in 1995.

The CSIR phased out in 1997 and the project became a community project, run by a board of directors elected by the community, a project manager hired by the board, and some volunteers.

C) Non-profit providers/ sponsors and area of sponsorship/ donation

The World Bank initially sponsored the project through the CSIR. The project is presently sponsored by the IDRC, a Canadian organisation, through the Universal Service Agency. Ithuba Trust, Pretoria Development Trust and Independent Development Trust also funded the project after it became a community project.

The Ithuba Trust, Pretoria Development Trust and Independent Development Trust (IDT) are funding organisations in South Africa whose main areas of funding include education, welfare, and health as well as job creation, career guidance, leadership and skills development.

The project created partnerships with Telematics for African Development (TAD), National Information Technology Forum (NITF), IDRC and USA, the CSIR and Mamelodi Planning Zone Forum 4 (PZF4). Planning Zones Forums have been set up by the local government "where stakeholders can come together at grassroots level to consult and inform ward counsellors."

D) Commercial providers/ sponsors and area of sponsorship/ donation

- South African Breweries funded the newspaper project and the update of the Directory of Services (in print).
- Siemens sponsors used computers.
- Telkom SA funded the initial implementation of the project.

E) General key motivation/ interest of sponsors and strategic view of developments in these areas

The interests of the sponsors have been outlined as community development, computer literacy, and encouragement of a well-informed community that takes part in decision-making on issues that affect their daily lives, identifying their needs and prioritizing them without fear.

F) Other participants

Local NGOs, Community-Based Organisations (CBOs), the business sector, schools, etc. In South Africa, CBOs may be involved in regional planning in the areas of economic development, education and health intervention.

G) Type of users

School children, high school and tertiary students, local business people, professionals, ordinary members of the community

H) Function and environment of usage

- Research by tertiary students, health training students
- Internet by business people and students and pupils

I) Technology used

PC, Internet, touch screen information kiosk, Multimedia CD-Roms, electronic database, a wireless network system called Community Information Delivery System (CiDS) invented by the CSIR to connect to the Internet

J) Evaluation of project

Feedback from the end users, evaluation process by the CSIR and Human Science Research Council (HRSC)

K) Timeframe/ plans

The project is ongoing.

L) Key material

1995-1996 MACIS report
1996-1997 MACIS report
1997-1998 MACIS report
1998-1999 MACIS report
MACIS Business Plan

M) Key contacts

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Ms. Nebo Legoabe, Founding Member Tel: +27 082 454 2235

N) Financing and budget

Annual project budget = R128,768

O) Last update

December 1999

2.7.3 SchoolNet South Africa

A) Short Description of Purpose

SchoolNet SA is a national organisation (NGO) formed to develop and support the implementation of Information and Communication Technologies (ICTs) in schools. It works directly with schools at a provincial level.

In early 1998, SchoolNet adopted and began managing the World Bank's World Links for Development (WorLD) project as a lead implementation project in three provinces: KwaZulu-Natal, the Eastern Cape, and North-West. The WorLD project in South Africa is a pilot educational project that aims to introduce ICTs to disadvantaged schools nationwide.

A feature of SchoolNet's model is to build and work through provincial school network structures. In 1998, SchoolNet worked with provincial departments of education and existing or emerging school networks in six provinces, with support to be extended to the remaining three provinces in 1999. SchoolNet and

provincial school networks provide a number of services to schools, including SchoolMail (a low-cost, multi-user e-mail solution), connectivity services, and domain registrations.

B) Initiator (lead agency)

SchoolNet's formation emerged from the activities of provincial school networks in four provinces. South Africa's Centre for Educational Technology and Distance Education in the Department of Education agreed to act as co-ordinator for SchoolNet's establishment.

C) Non-profit providers/ sponsors and area of sponsorship/ donation

SchoolNet has established a partnership with the government and the school networking, NGO and donor communities. This strategically positions SchoolNet to draw on a wide range of resources from different sectors while ensuring that the organisation works within government policy and implementation frameworks.

SchoolNet's provincial school networking partners are (a) Western Cape Schools Network; (b) Pretoria Education Network and Gauteng Schools Network, (c) Eastern Cape Schools Network, and (e) Kwa-Zulu Natal Schools Network. These collaborative NGOs were established by groups of schools between 1993 and 1998 to assist fellow schools to connect to and use the Internet.

Besides the school networks, SchoolNet also partners with research organisations and donors, including

- World Bank Economic Development Institute - World Links for Development (WorLD) programme, which provided initial legal, administrative and financial assistance. As well, the WorLD Programme provides equipment, training and educational support to schools, with the objective of developing participation in collaborative projects and partnerships between schools.
- World Bank - SA Resident Mission, which provided initial direct funding of some programme activities prior to IDRC involvement.
- IDRC ROSA and IDRC Acacia which provided considerable support in the process of SchoolNet's formation as well as initial legal, administrative and financial assistance. Acacia's funding and support extends over two years. SchoolNet SA is housed within the IDRC. The World Bank and IDRC have a bilateral agreement for the WorLD programme, whereby the IDRC will manage WorLD funds for SchoolNet.
- Open Society Foundation for South Africa (OSF-SA), which provided initial legal, administrative and financial assistance (funding). OSF-SA was established in 1993 to promote the development of open society in South Africa. To that end, the foundation supports a variety of programmes in the areas of educational, social, legal and health care reform. It is one of 31

active national foundations and other entities established and supported by George Soros.

D) Commercial providers/ sponsors and area of sponsorship/ donation

SchoolNet SA has formed a number of key private sector partnerships and, in October 1999, funds from the private sector exceeded those from its traditional funding organisations and are key to the project's implementation. Private sector partners include a large number from the supporters of the overall WorLD programme:

- Microsoft - WorLD software (desktop operating system) and event sponsorship
- Internet Solution - WorLD Connectivity (leased line connectivity). The Internet Solution is a member of Dimension Data Holdings, South Africa's largest Information Technology integration company
- Cisco
- Mweb - dialup connectivity (provide dial-up Internet accounts)
- Intekom - server hosting and events sponsorship
- Nortel
- Sun Microsystems - WorLD equipment (Sun Servers and ongoing training)
- Uniforum - SchoolMail establishment funding
- 3COM - WorLD equipment (hubs)
- Gas Software - WorLD software (F-Prot Anti-Virus)
- Brilliant Software Solutions - accounting software
- Pinnacle Communications - pro-bono public relations
- Telkom South Africa - subsidized line costs and event sponsorship. Telkom SA is South Africa's national telecommunications operator.
- Corel - event sponsorship
- Novell - WorLD software (PC Server software)
- UUNet Internet Africa - dialup connectivity and server hosting
- SAIX - dialup connectivity
- NEC - equipment
- Thawte Consulting - secure server certificate
- NetDay (its sponsors are Cisco, Sun and Gemini) - WorLD partnership and cabling kits

E) General key motivation/ interest of sponsors and strategic view of developments in these areas

SchoolNet's objective is to assist in the development of a national education network, forming an ‘information backbone’. Its programme objectives are to

work in the areas of connectivity and technology, human resources development, online content and curriculum support material, and marketing and advocacy.

SchoolNet SA seeks to support educators and learners in transforming education through the application of ICTs by providing leadership, expertise and resources. To realize these aims, SchoolNet forges partnerships in the areas of Internet connectivity and relevant technology, content and curriculum development, human resource development and capacity building with various people and organisations that share a common vision.

F) Other participants

SchoolNet SA partners with four national government departments which have key stakes in South Africa's education and training system:

- Department of Education's Centre for Educational Technology and Distance Education (CETDE) - it has adopted SchoolNet SA as one of its projects for 1998 and has been involved in SchoolNet SA activities. CETDE provides SchoolNet SA with primary guidance.
- Department of Arts, Culture, Science and Technology
- Department of Communications
- Department of Trade and Industry

G) Type of users

Secondary school students, communities (in certain communities, schools have been performing telecentre / Multi-Purpose Communications Centre functions).

H) Function and environment of usage

Secondary school learning

I) Technology used

Personal computers and the Internet

J) Evaluation of project

IDRC Acacia views SchoolNet SA as one of the most successful national school networking initiatives they support. According to Acacia, SchoolNet has been able to make impressive inroads because of South Africa's more established infrastructure and policy environment.

Evaluation of SchoolNet SA's impact at participating schools is scheduled for the second half of 1999. The World Bank has commissioned an evaluation tool, which had to be scrutinised for local suitability before being adopted or amended.

In April 1998, training sessions in Eastern Cape and Kwazulu-Natal provinces were assessed by outside evaluators.

K) Time frame / plans

The project is ongoing. SchoolNet SA was established in November 1997 and will enter phase two after November 1999. To date, there are about 32 participating schools, with the majority located in four provinces. Two training centres have been established and one more is planned for 1999.

The WorLD programme is being rolled out in secondary schools and will reach more than 30 schools in the North West, Eastern Cape, KwaZulu Natal and Gauteng provinces.

L) Key material

SchoolNet SA 1998 Annual Report

"Report on School Networking Projects supported by Acacia" - compiled by Shafika Isaacs and Frank Tulus, 14 November 1999.

M) Key contacts

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N) Financing and budget

Private sector contribution, which is in the millions of Rand, has consisted primarily of in-kind contributions. Initially, the majority of company contributions came from marketing budgets, but increasingly large portions of money are coming core development and strategic funding. It is thus anticipated that contributions from the private sector will continue to increase dramatically.

IDRC/Acacia is providing funding of CAD $472,000 (R1,964,320) for two years. The funding supports three staff positions, support costs, a connectivity programme in four provinces, and other activities in support of SchoolNet's aims and objectives. It will also provide equipment and connectivity to at least 48 schools as well as eight training workshops. Funding was approved by the IDRC on 23 July 1998. This is the largest of six school networking projects in South Africa which Acacia has supported to date.

The Open Society Foundation for South Africa (OSF-SA) provided an 18-month grant of R755,000. This supports one position as well as associated programme grant to further SchoolNet's work in the area of online content and curriculum resource material (specifically supporting mathematics, science and technology education) and working with the OSF's programmes in the Northern Province and Eastern Cape. The OSF approved the grant on 10 June 1998.

In addition to the IDRC and OSF funding, SchoolNet is indirectly supported through its role as implementer of the WorLD programme, which contributes a staff member as project manager, as well as associated local programme funding of approximately R320,000 annually, excluding equipment and international support costs.

O) Last update

December 1999

2.7.4 Technology Enhanced Learning Initiative of Southern Africa (TELISA)

A) Short description of purpose

The TELISA initiative aims to facilitate the establishment of a number of Information Technology (ICT) Centres throughout the sub-region of the Southern African Development Community (SADC) and a series of Internet-based information servers to provide appropriate support material to existing institutions, lecturers, teachers and businesses. TELISA currently has ICT centres in Lesotho and South Africa.

ICT Centres will promote lifelong learning, telemedicine, safety and security in a community setting. A grant was provided by Technikon SA to establish three ICT Centres in three South African provinces: Mpumalanga, Eastern Cape, and Free State. Technikon SA regional directors, in co-operation with local business and community structures, will run the centres on a self-sustainable basis. The Kgautswane ICT Centre in Mpumalanga Province, South Africa was officially opened in October 1999. An ICT Centre in Lesotho was opened 5 March 1999.

TELISA has also enabled a special web-page for education, development and lifelong learning in Africa: www.africaeducation.org. This is their information server, also called an information clearing house. Besides information and access to curricula content resources, other distance education projects and school projects, it offers the Africa Digital Library. The digital library has been available free for residents of Africa since November 1999 and offers a growing digital book selection (around 3-4,000 currently).

TELISA has a focus on three components of distance education: affordable infrastructure, access for learners, and content.

B) Initiator (lead agency)

The Centre for Lifelong Learning (CLL) of Technikon of Southern Africa (SA).

Technikon SA is a technology/ polytechnic university that specializes solely in distance education. This has been and is still mainly based on print material, but they are shifting to new technologies. Technikon SA has approximately 80,000 students per year and is funded partly by the government and partly through student fees. Technikon SA funds TELISA through external funds. Technikon has regional offices throughout South Africa.

Established in 1993 by Technikon of Southern Africa, the CLL seeks to promote non-formal education through programmes custom designed at Technikon. The Centre operates in collaboration with all academic programme groups that are able to support the Centre's programmes and a range of outside organisations. The Centre has a small, full-time staff complement and contracts staff where necessary for specific projects.

Technikon SA has had a community outreach programme since 1993.

C) Non-profit providers/ sponsors and area of sponsorship/ donation

Technikon SA is the most substantial sponsor of TELISA with approximately US$ 200,000 from their strategic reserve towards the ICT centres.

Technikon SA also sponsored US$ 120,000 for the initial establishment of the African Digital Library.

World Bank (Africa Sector) sponsored US$ 50,000 toward the cost of the computer system as well as training and support of the Kgautswane ICT Centre.

D) Commercial providers/ sponsors and area of sponsorship/ donation

Safmarine company is a local shipping company which provided used shipping containers for the Kgautswane ICT Centre. Those were remodelled to build rooms and offices for the ICT Centre.

The Old Mutual Company is a large South African insurance company which supported the Centre. Old Mutual contributed financially and with technical support to the Kgautswane community.

Daimler-Chrysler sponsored US$ 54,000 for the ICT Centre in Lesotho.

E) General key motivation/ interest of sponsors and strategic view of developments in these areas

According to its vision and mission statement, the Centre for Lifelong Learning (CLL) is committed to promoting awareness of educational opportunities, improving access to tertiary education, and serving the expressed and dormant needs of the business community, the community in general, and disadvantaged learners in particular.

CLL is interested in providing a life-long, career-orientated educational path for learners from all walks of life.

F) Other participants

Technikon SA had discussions with members of the following organisations to plan the TELISA initiative:

- The Distance Education Association of Southern Africa (DEASA)
- The Telematics for African Development (TAD) Consortium
- UN Economic Commission for Africa (Food, Safety and Security) - UN ECA
- SADC HR Development Co-ordinating Office (Swaziland)
- P.E.A.C.E. Foundation
- The Centre for Educational Technology and Distance Education (South Africa's Department of Education)
- Universal Services Agency of South Africa

G) Type of users

The Kgautswane ICT Centre is located in the deep rural area between the towns of Lydenberg, Ohrighstad and Burgersfort. The area reaches into both the Northern Province and the Mpumalanga Province. The immediate area of Kgautswane has a population of approximately 60,000 people. It has no piped

water or electricity, few roads, and little industry/ business. The nearest post office and photocopier were approximately 28 km from the Centre.

Intended users are business communities, schools and institutions of higher education and disadvantaged learners.

H) Function and environment of usage

The focus is on career-oriented life-long learning and higher education (university and college level).

The CLL provides services in the following areas:

- teaching to the community and business community and offering capacity-building programmes by means of contact, participation, and distance education
- researching the needs, relevance and efficiency of CLL programmes, including the research generated by students and course participants
- facilitating and contributing to community-based initiatives aimed at the enhancement of the community in general.

I) Technology used

The Kgautswane ICT Centre has three PCs, a local area network (LAN), and a server. It is constantly busy with clients requiring computers or photocopies and making telephone calls.

Most centres will likely comprise 10 PCs, a server, telephones and a range of work-station equipment to support business and learner needs. This includes Internet, e-mail, and shareware programmes to access the Internet. As well, ICT Centres typically have payphones, fax machines, scanners, photocopiers, typing services, community information and document lamination.

Technikon also established a satellite reception area to receive programmes broadcast from C-Band satellites. A second reception centre is planned for installation during December 1999/January 2000 in Port Elizabeth, South Africa. This will be equipped with a sub-centre having two workstations some 10 km away and it will be run and based by the regional office of Technikon SA. It will have a satellite reception facility and receive programmes from the African Virtual University (AVU). The 10 PCs at the main centre plus the two remote PCs will all have Internet access.

J) Evaluation of project

No evaluation has taken place yet as both centres have existed less than a year.

K) Timeframe / Plans

Planned implementation of the third and fourth ICT Centres in Mpumalanga Province and Free State Province. Detailed business plans are being drafted and will be implemented early in 2000.

L) Key material

The TELISA Concept Document, July 1998
Updates on the TELISA Initiative, March and August 1999
http://pgw.org/telisa/
http://pgw.org/telisa/news.htm
http://pgw.org/pw/

The Centre for Lifelong Learning (CLL) http://pgw.org/cll/
Technikon of Southern Africa (SA) http://www.trsa.ac.za/

M) Key contact

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N) Financing and Budget

The Kgautswane ICT Centre received a grant to get started (i.e., the capital cost for the equipment and infrastructure of the centre), but is now charging for services to sustain itself. It is not geared for commercial operation, but to be run by the community. This means that it is required to generate enough revenue to cover all running and upgrade costs.

Also the information server on African education (web-page) and the African Digital Library are designed to sustain themselves. The web-page will use advertising to cover its cost. The cost of domain registration was covered by the CLL Director, and a grant from TSA covers some of the costs of a staff member who assists with finding learning content on the Internet.

The African Digital Library offers companies to sponsor the purchase and digitalization of books. The library books are provided in encrypted format allowing only one user to access each purchased book at the same time.

Additional copies of eBooks or their print equivalents may be purchased via an e-commerce interface provided by netLibrary.

O) Last update

December 1999

2.7.5 The Distance Education Digital Learning System Project - A digital Open Distance Learning (ODL) system for Africa

A) Short description of purpose

The Distance Education Digital Learning System (DEDLS) project is currently in its conceptual design phase. The project aims to provide quality distance learning and student support particularly for students in remote areas in Africa. The project is unique because it seeks to "establish the next paradigm for distance education." Africa's limitations with existing communication technologies and traditional delivery systems have necessitated a solution that leapfrogs previous eras of technology. The pilot is seen as a stepping stone for the foundation of the 'African Digital University.'

The project's first pilot will develop 10-15 hours of distance learning content that can be delivered using multiple 'digitally-based' delivery alternatives: print, compressed video, audio and electronic interaction.

The pilot will also demonstrate the feasibility and sustainability of one or a network of mobile or fixed telecentres to deliver tertiary distance education (DE) and to provide student support in remote areas of Africa. Initially, one mobile telecentre will undergo limited testing in remote rural areas. Mobile telecentres will have their own power-generating capabilities and a range of ICT equipment.

The telecentres are to be managed and operated by small business entrepreneurs in the community in such a way that teaching and digital student support is provided at no extra cost to the learner. One of the projected outcomes of the pilot is to demonstrate financial sustainability of the model and to develop the corresponding business plans.

The dominant target group is post-secondary learners in rural and urban township environments. However, once the systems are developed and digital learning centres are operational, the project is envisaged to have application potential for secondary, preschool and basic adult education.

B) Initiator (lead agency)

The University of South Africa (UNISA) is the lead agency and initiator, but the pilot project will be conducted under the auspices of COLISA (Confederation of

Open Learning Institutions of South Africa, including Technikon South Africa, UNISA and Vista University).

The pilot project will include participation from SAIDE (South African Institute of Distance Education – regional DE NGO), CSIR (Centre for Scientific Research) and is being conducted in consultation with the World Bank. These members will form part of the core project team.

C) Non-profit providers/ sponsors and area of sponsorship/ donation

- The project's leading participants (see section B above) are currently in the process of approaching the donor community for funding of the pilot. The project is currently being introduced to the donor community as a COLISA project regarding funding of the pilot. The pilot is estimated to cost approximately $350,000.

D) Commercial providers/ sponsors and area of sponsorship / donation

A global approach is being planned for an alliance among governments, the private sector and public education providers, from the African continent and worldwide.

E) General key motivation/ interest of sponsors and strategic view of developments in these areas

The primary motivation for sponsors is the development of a continental open digital learning system that is capable of reconfiguring knowledge according to specific developmental needs and delivering this in a sustainable way to rural communities in Africa.

There are also many contextual factors that have driven the initiative, including the challenge of improving DE pedagogy and student support, the challenge of diminishing resources in higher education and increased competition in the DE sector.

F) Other participants

There are plans to involve the Economic Commission for Africa, one of the UN bodies. The lead agency is currently working in close consultation with the World Bank.

A workshop is planned for the first quarter of the year 2000, with assistance from COL. The plan for this workshop is to bring together a selected group of African and international DE and ICT experts to plan the way forward for the African Digital University.

G) Type of users

The project's initial focus will be post-secondary learners, primarily on rural and township communities but not excluding delivery in urban areas. The system will also be capable of delivering to other users such as schools, colleges, universities, education ministries, libraries, village communities and professionals.

H) Function and environment of usage

The plan is to focus on structured degree, diploma and certificate programmes rather than a wide-ranging open choice of subject fields. However, because the system is based on a digitised knowledge domain, it will be technically possible to customise choice of content for individual learners. The plan is also to focus on critical areas such as the sciences, training for good governance, and financial and business training.

I) Technology used

The intention is to design the system in such a way that it would be capable of teaching using technologies including radio, broadcasting/video, PC, Internet, multimedia CD-Roms, electronic databases, satellite, wireless, etc. The idea is to be able to respond quickly to existing and new infrastructures within Africa.

J) Evaluation of project

To date, no evaluation has been conducted given the early stages of the initiative. There are plans for extensive evaluation of the development as it progresses.

K) Time frame / plans

Concept completion - September 1999

On November 20th, 1999, the board of COLISA approved the DE digital learning system project and agreed in principal to investigate the foundation of the African Digital University. The details of the African Digital University concept still need to be worked out but the DE Digital Learning system project will become an important building block of the concept.

L) Key material

Overview of the project, describing the pilot phase and rationale can be found at
www.unisa.ac.za/dept/buo/projects/dedls/index.html
www.unisa.ac.za/dept/buo/projects/dedls/foundations.html
www.unisa.ac.za

M) Key contacts

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N) Financing and budget

The pilot is estimated to cost approximately $350,000. A more detailed budget for the pilot is about to begin.

O) Last update

December 1999

2.7.6 Universal Service Agency – Franchised telecentres

A) Short description of purpose

The Universal Service Agency (USA) launched a Telecentre Pilot Project with the objective of providing universal access to telecommunications (defined as within 30 minutes' walking distance) in South Africa. These telecentres are managed and operated by approved franchisees and are located in disadvantaged communities, particularly rural areas. The objective of the Telecentre Project is to provide universal access to telephones, facsimile and e-mail. Some will provide access to the Internet.

Besides providing telecommunications, many telecentres will also provide other services such as small business support, health, education and training. Some may offer a range of services from telemedicine to telelearning and telelibraries. There is also a plan to link these telecentres directly to both government and private databases around the country in the near future.

By the 1997-1998 fiscal year, the Agency had approved 68 telecentre applications throughout the country, including six pilot telecentre communities. Telecentres are funded by the Universal Service Fund (USF).

The responsibility of managing a telecentre lies with the franchisee, not the Agency. The Agency aims to develop a model of how to run telecentres

effectively and to be self-sustaining in disadvantaged areas; this can be reproduced, and it will also promote community ownership and control.

B) Initiator (lead agency)

The USA is the initiator and lead agency. It is a statutory body established by the South African Telecommunications Act of 1996.

The Agency will subsidise the least developed communities, individuals and organisations in acquiring telecentres. The Agency may provide capital or start-up funding to equip telecentres with telephones, a printer, a fax machine, a photocopier, and computers.

C) Non-profit providers/ sponsors and area of sponsorship/ donation

By year-end 1998, the USA had formed partnerships with the following organisations:

- United Nations Development Programme (UNDP) - funding and capacity building
- IDRC - funding, capacity building and monitoring - (funding commitment $475,000)
- South African Postal Services, Interkom and SABC - co-deployment of Public Internet Terminals (PITs)
- Nepostel - capacity building and monitoring
- National Youth Commission - co-funding

In addition, to establish telecentres, the USA works with a range of other organisations such as schools, libraries, churches and existing community or civic centres. The criterion is that these should be credible with successful track records in a community - they could be a ‘Section 21’ company, an Informal Community Based Organisation (CBO), an NGO, a small business, a government organisation, or a ‘Trust.’

D) Commercial providers/ sponsors and area of sponsorship/ donation

By year-end 1998, the USA formed partnerships with the following companies:

- Orbicom - Tele-education applications - negotiations are under way. Orbicom is an international signal distribution organisation. It pioneered the use of digital satellite broadcasting technology in South Africa and on the African continent. It is one of two signal distribution carriers in South Africa.
- Interkom - Tele-education applications
- Information Technology and Telecommunications Afrika Limited - co-deployment of Internet Kiosk and Telecentres: The partnership has been finalised but not yet implemented.

- New MIS - co-deployment of telecentres

E) General key motivation/ interest of sponsors and strategic view of developments in these areas

The Agency will promote affordable Universal Access and Universal Service in Information and Communication Technologies (ICTs) for disadvantaged communities in South Africa, to facilitate development, empowerment and economic growth.

The Agency is focusing its efforts towards the least developed communities, with the intent to stimulate economic and social development. For example, the Ga-Seleka telecentre in South Africa's Northern Province aims to provide telephone, e-mail, fax and Internet services to the public at affordable prices. Prior to its installation in 1997, the nearest telephone to this town of 400,000 people was 80 kilometres away.

F) Other participants

The Agency works with the following organisations to co-ordinate different initiatives for universal service:

- Department of Communications
- South African Telecommunications Regulatory Authority (SATRA)
- service providers: Telekom SA, Vodacom and MTN
- representative bodies: National Telecommunications Forum and National Information Technology Forum
- community and labour organisations: the SANCO and CWU

The Agency is setting up a network of Universal Service Forums by forming relationships with people in various areas to assist the Agency in implementing policy and recommending further policy options. The Agency wants to bring together all organisations (governmental, private sector, community, NGO, labour and other) that are interested in the work of providing universal service in telecommunications.

Partnerships with the Agency should provide participants with the opportunity to

- develop creative methods of attaining universal service
- stimulate public awareness of the benefits of telecommunications and other information services
- define universal service and access, facilitating planning of universal service projects
- ensure the successful implementation of universal service

The Agency had launched Universal Service Forums in the provinces of Free State, Mpumalanga, North West, Northern Cape, KwaZulu Natal, and Eastern Cape prior to 1998 and planned to launch follow-up forums in the Western Cape, Gauteng, and Northern province.

G) Type of users

Village and township communities, particularly disadvantaged communities and rural areas with no or low telephone penetration.

H) Function and environment of usage

Community access to ICT

I) Technology used

PC and Internet access, depending on the model, finance and the needs of the community served

- Mini Telecentres - one-person shops providing a telephone, fax/ e-mail and word processing services. This consists of three telephone lines, PC, a 3-in-1 printer/ scanner/ copier, fax machine, metering device and cabinet.
- Standard telecentres – run by individual or community organisation, managed by two telecentre managers. Services depend on the size of the structure provided. These include four to eight personal computers, six to ten telephone lines, printer, scanner, copier, fax machine, and overhead projector and screen.
- Multi Purpose Community Centres (MPCCs) – these include much more sophisticated technologies such as tele- and videoconferencing, and technologies facilitating multimedia applications.

J) Time frame / plans

The Agency completed drawing up a Telecentre Implementation Plan at the end of 1998. The five-year target is to have one telecentre-type centre in each community (villages, townships, farm community and other) by 2004. Many of these can be based at schools, libraries and other existing centres. A range of models of telecentres from basic phoneshops to elaborate Multi-purpose Community Telecentres is being planned.

K) Evaluation of project

The latest available evaluation report of the first six pilot telecentres was published in November 1998, after six to nine months' operational experience. Each telecentre had six fixed Telkom exchange lines. One line was dedicated to fax, one to Internet and e-mail, and four to telephone. The centres were each equipped with a PC, a photocopier and a scanner.

Two of the six centres were not operational at the time of evaluation.

The evaluation noted that revenues from the centres which were operating were encouraging enough to offer the prospect of eventual financial sustainability, though several operational problems were highlighted, namely these:

- intermittent Internet service due to a combination of lack of operator management skill, poor quality ISP software, and problems associated with the fact that the ISP points of presence (POPs) were mostly not local
- very sub-optimal computer use, again due largely to poor operational management in the early months
- no tariff and pricing guidelines, hence prices charged and user affordability varied significantly from case to case
- lack of a proper financial management system, hence there was no clear financial or usage logging
- no clear understanding amongst management and staff of their roles, responsibilities, whether they would be paid a salary, etc.
- security concerns (theft and responsibility)

Suggested solutions included adoption of a '3P' (private-public partnership programme) specifically addressing the following areas:

1. developing a management and monitoring system for telecentre organisation
2. providing more clarity on ownership and management responsibilities
3. offering clear guidance on tariffs and prices
4. implementing a systematic modular approach to the equipment and services contained and offered in telecentres

The evaluation's role was, hopefully, one step in the improvement and refinement of the telecentre concept leading to smoother and more successful operations in the following, larger number of telecentres brought into service in late 1998 and 1999.

L) Key material

http://usa.org.za/projects/field.htm explains the telecentre project in terms of selection criteria and provides a table showing the provincial breakdown of approved telecentres

www.usa.org.za/works/bplan.htm provides a business plan.

www.usa.org.za "Universal Access and Universal Service Discussion Paper" - second draft
www.vodacom.co.za/a3five.html: Vodacom webpage - community services

M) Key contacts

Universal Service Agency
Government of South Africa
Pretoria, South Africa
usa@usa.org.za

N) Financing and budget

In the 1996-1997 financial year, R3,000,000 were allocated to the Universal Service Fund (USF). Larger amounts were expected to be allocated to the USF in 1997-1998 from licence fees.

Much of the USF will be used for the Agency's Telecentre Pilot Projects and related initiatives, managing field workers and other support service for the Telecentres.

O) Last update

December 1999

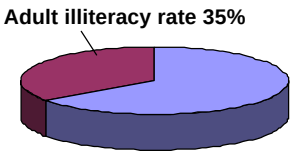
3. GHANA

Country Characteristics

Government type	Constitutional Democracy
Territory	228,000 Km^2
Population (1997)	18 Million
Annual population growth (expected 1997-2015)	2.3%
Urban population	6.7 Million (37%)
Population density	79 People/Km^2
Major villages and towns	47,800
Average village size	237 inhab

- *Administrative divisions:* 10 regions; Ashanti, Brong-Ahafo, Central Ghana, Eastern Ghana, Greater Accra, Northern Ghana, Upper East Ghana, Upper West Ghana, Volta, Western Ghana
- *Culture:* Ethnicities: Black African 99.8% (major tribes: Akan 44%, Moshi-Dagomba 16%, Ewe 13% and Ga 8%), European and other 0.2%
- *Languages:* English (official), African languages (including Akan, Moshi-Dagomba, Ewe and Ga)
  - *Topography:* 70% Prairie/Steppe and 30% Jungle/Forest
  - *Climate*: tropical: warm and dry along the southeast coast, hot and humid in the southwest, and hot and dry in the north

Education

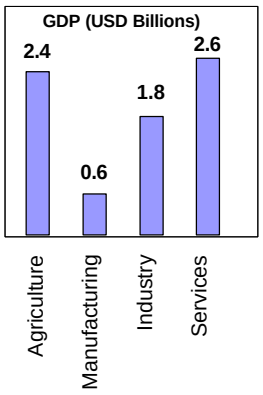


Illiteracy rate (1997)	35%
Public spending on education (%GNP)	3.3
Universities	5

- *Gross enrolment ratio (% of relevant age group)*[1]*, 1996:* Primary 77%, Secondary 37% and Tertiary 1%

[1]Percentages include repeaters and over-aged. Tertiary enrolment includes non-university diploma studies and programmes requiring secondary-education certificates.

Economy



GNP, 1997	US$ 6.6 Billion
GNP/Cap, 1997	US$ 370
GNP/Cap PPP, 1997	US$ 1,790
GDP Growth, 1998	4.5%
Output (share of GDP[2]), 1997	
Agriculture	36%
Manufacturing	9%
Industry	26%
Services [3]	39%

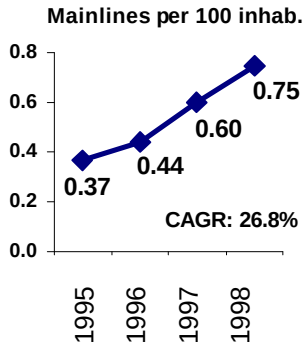
[2]Sum of shares may surpass 100% due to output overlaps

[3]Services Output includes Public Services

- *Government Revenues: (Share of GDP), 1995:* 18%
- *Industries:* mining, lumber, light manufacturing, aluminium melting, and food processing
- *Agriculture products:* cocoa, rice, coffee, cassava (tapioca), peanuts, corn, bananas and timber

Information and Communications Technology

Telephony

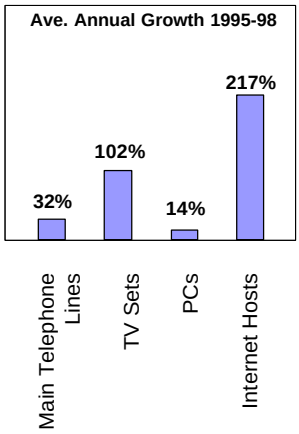


Main telephone lines:	
existing, 1998	144,200
expected, 2000	245,000
Compound Average Growth Rate, 1995-98	31.7%
Main telephone lines per 100 inhab.	
existing, 1998:	0.75
expected, 2000:	1.22
in urban areas, 1995:	0.64
in rural areas, 1995:	0.07
Compound Average Growth Rate, 1995-98:	26.8%

Quality and Investment

Digitalisation, 1998	70%
Telecom Investment, 1998	US$ 7.3 Million
Telecom Revenue, 1998	US$ 146 Million
Reinvestment Ratio (Investment/Revenues)	5%

Internet and Media



PCs, 1998	30,000
PCs per 100 inhab, 1998	0.16
PCs per 100 CAGR[4], 1995-98	14%
Internet Users, 1998	6,000
Internet Users per 100 inhab, 1998	0.03
Internet Users CAGR[4], 1995-98	364%
Internet Hosts, 1998	192
Internet Hosts per 100 inhab, 1998	0.001
Internet Hosts CAGR[4]	217%
ISPs, 1998	9
TVs, 1998	2.2 Million
TVs per 100 inhab, 1998	11.5
TVs CAGR[4], 1995-98	102%
TV Broadcast Networks, 1997 (incl. 8 repeaters)	15
Radios, 1997	12.5 Million
Radios per 100 inhab, 1997	70
Radio Broadcast Stations, 1997	27

[4]CAGR = Compound Average Growth Rate

3.1 Ghana: General Context

Ghana is geographically small and, with a per capita GNP in 1998 of US$ 370, a low-income country. Its society is predominantly rural, like the majority of African countries, with an urbanisation rate of 37%.

The data below on Ghana indicate three prominent features of its education situation:

- Illiteracy, at 35% of the population, is a major issue (for comparison, South Africa has a rate of 18%).
- Secondary education enrolment is only 37% of the relevant age-group (compared with South Africa's 94%).
- Post-secondary education enrolment is only 1% (the South African figure is 19%).

From an interview with Ghana's national co-ordinator of distance education within the Ministry of Education, it was noted that Ghana has serious capacity problems in education. For example, its five universities can only admit 40% of qualified applicants. Four of the five universities engage in distance education, but this is still exclusively print-based.

As a result of its capacity problem, Ghana has a three year backlog of senior secondary school graduates trying to get into universities. Also, it seems that Ghana faces a quality problem at its teacher training colleges. In addition, once qualified, the majority of its trained teachers refuse or resist postings in remote or deprived parts of Ghana, which is at least partly due to the low salary structure offered to teachers. The table below gives an appreciation of numbers of educational institutions and enrolment figures.

Institutions	1998	1998 Enrolment
Senior secondary schools	465	194,785
Polytechnics	8	12,853
Teacher training colleges	39	N/A
Universities in Ghana	5	34,000 (1999/2000)

3.2 Environment and Function of ICT-based Distance Education

Three projects are examined for Ghana. Their focus lies in different areas of ICT based distance education:

- The African Virtual University (AVU) focuses on higher education for students and professionals, especially in the field of information technology, and it is a regional project – a description of this project is contained in the South Africa section.
- The World Links for Development (WorLD) programme is for secondary schools and teachers and focuses on providing computer and Internet access.
- The Asante Akim Multipurpose Community Telecentre (MCT), sponsored by Ghana Computer Literacy and Distance Education Inc. (GhaCLAD), is geared to the needs of a whole community comprising private business, governments, NGOs, educational institutions and individual citizens.

The AVU uses ICT as a tool to broaden the access to education, responding to the limited capacity of the five existing Ghanaian universities and offering more diverse content and quality.

The WorLD programme is providing access to information technology within the existing secondary education and is improving employment prospects of students by more access to ICT and the corresponding skills and opportunities.

The MCT is also facilitating access to ICT, but it is not dedicated to a specific user group or a specific function. It is open to the whole community, catering to different needs.

Other initiatives in Ghana include the Ghana National Committee on Internet Connectivity (GNCIC) which was formed in February 1996 to promote the *Info*Dev Ghana Project. The objective of the project is to promote the development of telematics in areas of public concern in Ghana. The GNCIC was formed with the support and sponsorship of UNESCO, ITU, UNDP and the World Bank's *Info*Dev Programme.

*Info*dev is also funding a project called "Business Plan Development for Telecommunication / Information Centres in Ghana." The objective of the project is to produce a business plan for the establishment and operation of a network of information service centres in Ghana. These information service centres will provide telecommunication and information services primarily to unserved or underserved communities in Ghana. The project will be implemented by Volunteers in Technical Assistance (VITA).

The U.S. Leland Initiative in Ghana is in the process of establishing Community Learning Centres. The initiative has extended the availability of full Internet service outside the capital Accra.

The Centre for Information and Communication Technology (CICT) is a project which will initially focus on training ICT specialists in networking and applications. The project expects to facilitate an annual average of 500 ICT trained specialists entering Ghana's workforce.

Also a National Information Clearing House (NICH) is planned and aims at linking various databases run and maintained by private companies and governmental institutions, and at making the information accessible to users in the private and public sector.

The three projects examined in detail demonstrate that ICT based distance education is used in Ghana for broadly different functions and caters to different users and needs. All three respond to specific needs or problems of the education sector. Other important areas not covered yet are the education of teachers and the access to secondary education.

However, the three projects also show that ICT based distance education is still in its infancy in Ghana. Only one - WorLD computers and Internet connectivity for secondary schools – has clearly been successfully implemented.

3.3 Infrastructure and Technologies

Ghana has a quite low teledensity, at 0.64 per 100 people in urban areas and 0.07 in rural areas. This is clearly a hindrance for the spread of the Internet. However, improvements are taking place in urban areas at least, with the liberalised telecommunications regime taking root and the second basic service operator Westel having finally started operations in February 1999. There are also nine Internet service providers (ISPs). The prospects for rural teledensity improvements are dimmer, since the incumbent operator and a special rural operator, Capital Telecom, have shown only moderate success in expanding services.

Ghana has local ISPs or points of presence (POPs) in its capital city and some secondary towns. The ISPs are not dependent on the incumbent telecommunication operator for their international bandwidth. There are negotiations taking place with at least one prospective partner willing to roll out service in the Northern region, however progress is slow.

Compared to other West African countries, Ghana is among the leaders in the use of ICTs. However, the West African region lags behind the Southern African, North African and East African regions.

A survey from 1998 found that only 52 out of 232 African academic and research institutions have full Internet connectivity; most of the others have only e-mail service. Ghana is no exception with all its five universities having e-mail service at most.

Despite differing purposes and target users, the use of PCs and the Internet is common to all of the projects reviewed.

As might be expected, the sophistication of technology tools rises with the sophistication of the purpose and target audience. For the AVU, satellite broadcasting is used. The selection of satellite as the technology for that project is also due to its intended geographic coverage, which is the whole African continent. Satellite based distance education, because of high fixed costs, needs economies of scales to be worthwhile. Also the upgrading and maintenance costs are considerably higher than terrestrial access solutions.

The multi-purpose centre, aimed at the broad public of a town includes more traditional media such as radio and video. As in the secondary schools, CD-Roms are seen as an important technological ingredient. CD-Roms have the advantage that they can provide access to a huge amount of specific information without the need to access the Internet which, in many developing countries, is still fraught with high cost and unreliability due to bad quality lines and low-speed access.

Quoted figures for Internet connectivity were at least US$ 35 per month, and computers cost more than twice what they would cost in the United States due to extremely high import tax. In a country with a GDP per capita of US$ 370 this is clearly an impediment for individuals, small businesses, and educational institutions.

Another important issue affecting technology in Ghana is climate: In most parts of the country computers seem to need air conditioning to avoid frequent breakdowns. Also, the access and reliability of electricity, as well as the lack of adequate phone lines, pose problems as faults result in slow or interrupted Internet access.

The government currently seems to favour the use of radio and TV for education. In 1997 Ghana had 27 radio stations (private and state-owned) and seven broadcasting networks.

The overview of technologies used in the projects shows that a variety of technologies is used and can be used in Ghana. The selecting factor seems to

be the appropriateness for the intended target group and specific project purpose.

3.4 Policy

3.4.1 Telecommunications and IT

Ghana's Ministry of Communications is, in principle, geared to facilitate the strategic development and application of the use of the various communications resources for effective communications throughout the country.

The telecommunications policy entitled "Accelerated Development Programme 1994-2000" (ADP 2000), introduced in 1994, deregulated the sector. A later policy is the National Communications Policy for Ghana, dated October 7, 1998. This later policy promotes government actions and funding for research and development and projects on broadband technology and the Information Superhighway.

A National Communications Authority (NCA) was established by Parliament Act in 1996 to regulate Ghana's telecommunications sector while promoting fair competition and efficiency. This was in line with best practice for a liberalised regime. However, according to recent reports in 1999 a director and adequate qualified staff for the NCA have yet to be appointed, and consequently the level of effective regulation has been minimal. This has resulted in severe difficulties with the negotiation of interconnection agreements between new entrants and the incumbent operator, with delays to the roll out of competitive network services.

Fixed basic and international services - liberalised - duopoly

There are currently two national PSTN operators, thus there is a duopoly in voice telephony (domestic and international) until 2001. Ghana Telecom Limited is the incumbent operator. The second network operator, Westel Telesystems, was licensed in early 1997 and commenced commercial service in February 1999.

Rural telecommunications in Ghana's rural northern section is excluded from the duopoly granted to the two operators, and a third entrant, Capital Telecom, is licensed to served rural areas in the south of the country. There are also four licensed cellular operators in Ghana.

Internet Service Providers (ISPs) - liberalised - nine ISPs

Three of the nine ISPs in Ghana are Network Computer Systems (NCS), Internet Ghana, and Africa Online Ghana. Africa Online has an agreement with Ghana Post Office to provide free e-mail addresses upon request for use at post offices. Over 30,000 e-mail addresses were issued in the first two months of operation.

Neither Ghana Telecom nor Westel has adopted a special policy to provide Local Call Internet Access across the whole country. With Local Call Internet Access, a telecom operator establishes a special 'area-code' for Internet access that is charged at local call tariffs. This allows Internet providers to offer greatly reduced costs to remote areas. Only 13 of 53 African countries have adopted this strategy (Burkina Faso, Chad, Ethiopia, Gabon, Malawi, Mali, Mauritius, Mauritania, Niger, Senegal, Togo, Tunisia and Zimbabwe).

Plans, programmes or policy for rural access or universal service

Ghana's 1994 telecommunications policy on the "Accelerated Development Programme 1994-2000" had addressed the country's lack of telecommunications infrastructure by proposing to narrow the gap between the rural and urban areas, and planned to increase the number of telephones lines to 500,000 by the turn of the century.

The National Communications Policy for Ghana (October 7, 1998) subsequently set a target of achieving improved access

- through the provision of payphone facilities to every village of a minimum of 250 inhabitants by 2001, and
- by raising teledensity to a minimum of 10 lines per 100 inhabitants by 2010.

However, rural telephony in Ghana is almost non-existent, even though over 60% of Ghana's population of over 18.8 million people live in rural areas. As in most sub-Saharan African countries, telephone penetration is concentrated in urban areas. Ghana's capital city Accra has 50-70% of total telephone lines. Ghana's telephone network had a capacity of over 200,000 lines at the end of 1998, with approx. 150,000 connected.

A Rural Telecom Fund which would offer subsidies to rural licensees using a 1% levy on all operators in the sector has been proposed but not, as yet, established.

Presently, Capital Telecom provides rural telecommunications in the southern and eastern part of Ghana using a multi-access radio network. The company was set up in 1994 and began operations in February 1997, but seems to have rolled out only a few hundred lines by early 1999.

Information society and information superhighway

The National Communications Policy recognised the need for immediate action for research and development and funding of projects, particularly in advanced areas of telecommunication technologies such as the Information Superhighway, broadband transmission systems, and Global Mobile Personal Communications by Satellite (GMPCS) systems.

A draft national IT policy aimed at establishing a National Information Technology Board (NITB) to formulate strategies towards the creation of a multi-media corridor in the country (a similar concept to the Multi-Media-Corridor in Malaysia), will be laid before Cabinet for approval before the close of this year. The draft policy, dubbed "IT Plan 2000," is on the government's website for experts and the general public to comment on.

The policy will set standards for IT training, examinations and certification. It will also regulate the activities of IT service providers in the country. The IT board is envisaged to assist both state-owned and private academic and business organisations to get on the IT super highway by 2020. The Deputy Minister, therefore, called on all tertiary institutions to initiate moves towards getting on the Information Superhighway and assured them of government support.

The policy will contain the freedom of access to information bill and address the issue of the importance of the media to national development. The policy will also establish a cyber village to serve as a converging point for all national resources and a springboard for national development through the extensive application of information technology in all sectors of the economy in the next millennium.

3.4.2 Media

Ghana has one state TV broadcaster, GBC, that also operates two national radio networks. There is also a private TV station (TV3 Network Ltd.) that currently covers Greater Accra, Eastern and Central regions. In addition, there are two joint ventures that retransmit satellite broadcasts to viewers.

Radio One is a Ghanaian language network which broadcasts in six main languages: Akan, Ga, Ewe, Dagbani, Hausa and Nzema. Radio Two broadcasts exclusively in English and carries commercials, advertisements, promotions and sponsored programmes.

A recent development of GBC's outreach plans is the introduction of (community) FM stations to eleven stations throughout Ghana. These stations are used to transmit educational programmes among other things.

The Non-Formal Education Division (NFED) of Ghana's Ministry of Education has entered into an agreement with GBC to make regular use of radio for the functional literacy programme, called the mass literacy programme (MASSLIP). GBC has agreed to allocate airtime on its primary services (GBC 1 and GBC 2) as well as on community FM stations.

MASSLIP is a non-formal education programme launched by the government in 1991 to significantly reduce illiteracy, especially among women. The programme uses a combination of distance education and face-to-face instructional methods.

Non-print media, namely radio, audio and video cassettes, puppets and theatre, are regarded as important components of the learning package.

According to a December 1998 report by the Commonwealth of Learning (COL), "radio is the most important medium in Ghana." The COL helped the MASSLIP programme by recommending "portable community broadcasting stations," where field-based radio programmes can be recorded instead of studio-based programmes.

In the beginning of December 1999 WorldSpace Corporation launched its digital audio broadcast service in Accra. It is the world's first satellite-based direct to person digital audio broadcast service.

WorldSpace had launched the AfriStar satellite which has three beams to cover Africa and the Middle East. The AfriStar satellite is also broadcasting educational programming. The chief executive officer for WorldSpace, Dr Noah Samara, said massive information delivery is needed for the development of Africa, and the satellite will be used for effective and efficient development of the continent.

3.4.3 Education

According to the Deputy Minister of Education Mr. Kwabena Kyere, the government has undertaken a number of reforms over the past decade to increase access to quality education and to reduce Ghana's high illiteracy rate.

As a result of educational reforms that started in 1987, public primary school enrolment had increased from 1.6 million to over 2.3 million, while secondary school enrolment had risen from 146,000 to 200,000. Many primary and junior secondary schools have been built, resulting in significantly increased enrolment in basic education.

According to Mr. Kyere, the government currently invests 35% of the national budget in the education sector, but will not be able to increase this amount. The government is therefore appealing to parents and the private sector to complement state effort, seemingly with success. For example, the Ghana Association of Bankers with its 16 members is willing to contribute to the funding of tertiary education in Ghana to demonstrate their social responsibility.

Professor George Benneh, former Vice-Chancellor of the University of Ghana, called on the government to seriously consider and take advantage of distance education programmes. According to him the government needs to move away from traditional classroom instruction into the use of technology.

In order to respond to the desperate need of tertiary education, the government had approved 5 out of about 80 applications from organisations and individuals seeking to establish private universities and training colleges. The Minister of

Education is optimistic that more private universities will be established in the next 10 years to reduce the pressure on the few government-owned tertiary institutions. This will also include churches who wish to establish private universities and participate in tertiary education to meet unmet demand for higher education in Ghana.

Other private-led initiatives come from Parent Teacher Associations (PTAs) which work together with the schools to establish school computer centres - these can cost anywhere from US$ 60,000 to US$ 128,000. The PTAs mobilise local private sector contributions. NGOs like the British Institute of Computer Technology (ICT) also make donations in kind.

Ghana has some interesting ideas for funding education. The Northern Ghana Trust Fund (NETFUND), raises money from the contribution of workers and companies to help fund tertiary education. Also, a National Education Trust Fund is proposed, into which the government, tertiary institutions, parents, students, industries, the business community, organisations and individuals would be asked to contribute. The fund may be used for the provision of infrastructure and loans to students in all public and private schools.

Thus, in regards to telecommunications, IT and media, Ghana has a relatively forward-looking policy and, with the liberalisation of telecommunications and ISPs, has created favourable conditions for the expansion of communication services. Regulatory implementation and rural telecommunications are still problems though.

Clearly, policies need to be focused on achieving more rapid roll out of service in all areas of Ghana. Whereas several organisations have shown willingness to invest or to partner with Ghana Telecom, progress has been slow and is hindered by the current lack of a development fund to finance universal access.

However, in regards to education policy, it seems that the government is still concentrating its efforts on lowering general illiteracy rather than encouraging computer literacy in schools. The government leaves it to the PTAs and schools to find funding and manage computer labs to provide for the IT education of their students.

It also seems that the government has not looked seriously beyond traditional classroom teaching to take on distance education, computer-based training, and using broadcast media as an important educational tool (beyond basic literacy programmes). There is no specific policy for ICT based distance education.

3.5 Sponsors: Interest, Key Motivations and Strategies

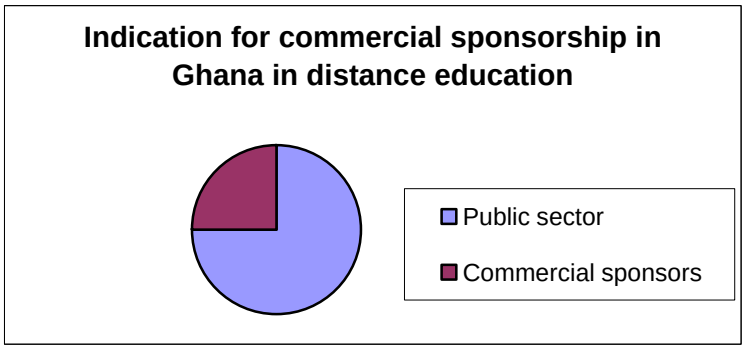
In Ghana, three major and visible ICT based distance education and learning projects were researched: the World Links for Development (WorLD) for Internet connectivity in secondary schools, the Asante Akim Multipurpose Community Telecentre (MCT), and the African Virtual University (AVU).

An interesting similarity is that none of those has been initiated by the national government, but all are initiatives from outside. Two are from projects of the World Bank and the third is initiated by the Ghana Computer Literacy and Distance Education Inc. (GhaCLAD) which is based in the US.

The WorLD programme is very successful in engaging commercial sponsors. It has managed to secure major international corporations in the IT field, such as Microsoft, Cisco and 3Com, which participate in the overall programme present in 15 countries, but it has also managed to entice participants to leverage the programme to get national and local contributions from the private sector. In Ghana this includes two banks, Ghana Telecom and Africa Online Ghana, as well as professional associations such as the Ghana Chamber of Mines and companies such as Providence Insurance Company and Tema Oil Refinery.

The GhaCLAD initiative which plans to provide a Multipurpose Community Telecentre (MCT) to the Asante Akim district in Ghana currently has no commercial donors, though negotiations are underway.

The third initiative, the African Virtual University, is region-wide, including Ghana. Its main sponsor is the World Bank, assisted by the European Union (EU) and six other governments. Its only other sponsor, INTELSAT, the International Telecommunications Satellite Organisation which is co-operatively owned by 143 member countries, has provided some free service initially.



[Based on the *number of projects* with significant private sector participation, rather than an estimate of financial contribution]

An interesting observation is that the commercial sponsorship within Ghana is much broader in type - spanning non-telecom and non-IT companies - than the international corporate participation in the overall WorLD programme, which is mainly international corporations in the IT field offering their products as in-kind contributions.

The major IT companies sponsoring the WorLD programme are interested in gaining access to new markets. Ministries of Education increasingly are purchasing information technology and represent a market for the large companies. Through their sponsorship of WorLD, these companies have access to the respective ministries in a range of countries.

Their donations assist with building credibility and a positive association and demonstrating commitment and good will. They are then more likely to secure potential future contracts. They also build relations with the World Bank which sometimes funds educational IT purchases. Hence the companies' involvement provides them with an understanding and knowledge of World Bank goals and processes for contract bidding purposes.

Beyond these key motivations, there are others such as building public relations and brand identification. Also, equipment which has outrun its competitive position in the US or EU markets can be 'written off' if donated to such a programme.

Local companies sponsoring the WorLD-Ghana programme do so also because they believe this to be a way of improving or building on corporate image. Some of these companies believe this is the best way to reach a vast number of youth, the future decision-makers, in order to promote and introduce the companies' products and services.

Another motive is that most local companies believe it is cheaper to assist in training the youth of today in the use and application of technology than to spend considerably more later to train their personnel on the use of technology. Training the youth helps them to be comfortable with technology by the time they enter the job market.

The GhaCLAD project and the AVU do not yet have commercial sponsors. GhaCLAD sees the use of IT as a means to address socio-economic needs of the people and broaden access to education. The strategy focuses more on access to infrastructure for a variety of users and uses, such as educational institutions, private businesses, NGOs in the district, medical institutions and other residents. Functions of the centre can include lifelong learning, basic literacy and basic and non-formal education.

The World Bank, the key sponsor of the AVU, uses satellite technology to address key challenges of tertiary education in Africa, which are lack of access

and insufficient quality. The objective is to cover particular areas where there are shortages, such as mathematics, science and information technology.

3.6 Country Evaluation

Ghana faces considerable challenges concerning illiteracy, secondary and tertiary education as well as in the area of IT education and capacity. The projects show a broad range of different concepts and uses of technology for distance education and learning. They also show that ICT based distance education can be used appropriately for improvements. However, all the projects are initiated from organisations outside of Ghana, rather than by government or educational institutions.

In terms of the environment for telecommunications and IT development, the Ghanaian government has broadly established the right policy conditions such as liberalisation and the focus and awareness on infrastructure development. As stated, some improvements need to be made to the effectiveness of regulation and creation of a more supportive policy to encourage rural telecommunications development.

Also on the liberalisation front, Ghana has a trend to allow private institutions to offer education.

What is missing is a dedicated view and approach from the government to take advantage of technologies for distance education. As a low-income country, Ghana has hardly any funds to equip and sustain its traditional educational institutions. But this overview shows that there seem to be considerable willingness and self-interest in the local private sector to sponsor ICT based educational projects.

Creating a national distance education policy which can channel and incentivise the private sector to place money into appropriate projects is what is needed from the government. A needs-based, clear policy on how Ghana can overcome its educational problems would also entice more international public and private sponsors to help Ghana, as the example of South Africa shows.

3.7 Project descriptions

3.7.1 Asante Akim Multipurpose Community Telecentre Project

A) Short description of purpose

The telecentre project will be located in Patriensah, a small town of about 7,000 permanent residents. It is one of 26 towns and villages within the Asante Akim

district in the Ashanti Region of Ghana and is 4 miles off the main Accra-Kumasi road. It is 36 miles from Kumasi, the largest city in Ghana. While many of the town's residents are peasant farmers, others engage in cash crops as well as micro and small scale businesses.

The project will provide a single point of access to information and services to people living in the district. It will also serve as a place for the people in the district and surrounding areas to organise town meetings, have access to national and worldwide electronic information banks, and provide information support for literacy campaigns, basic and non-formal education, human resource development, education, training, support and information on government programmes.

Additionally, it will provide facilities for the generation and exchange of community based information.

It will be a low cost method of providing a one-stop comprehensive and integrated service to address contemporary and emerging challenges of the people in this district. This project is an exercise in building a sustainable innovative telecentre. The Multipurpose Community Telecentre (MCT) will economically empower the people of Asante Akim and promote capacity building.

The centre will sell its services to local businesses. Business people can use the facility and develop new skills and services there. They can also use the infrastructure to develop products and services that add value to their products.

B) Initiator (lead agency)

Ghana Computer Literacy and Distance Education, Incorporated (GhaCLAD) is the initiator of the Asante Akim MCT project. GhaCLAD is a not-for-profit corporation in Illinois, U.S.A. It was founded as an international all-volunteer organisation.

GhaCLAD designed the structure, is creating awareness about the project, and is helping to secure both private and public sector funding for the MCT project. Additionally, GhaCLAD is identifying potential sponsors in Ghana and overseas to invest in the project.

C) Non-profit providers/ sponsors and area of sponsorship/ donation

Worldview Communications and Technology Institute will provide technical support to the project. This non-profit organisation promotes new and appropriate technologies in Africa. It also promotes innovative ideas and methods for developing small and cottage industries, marketing, processing, storage and transportation enterprises in Africa. This organisation plans to establish, operate

and promote one or more virtual classroom environments, educational radio or television broadcasting stations, or printing facilities.

The Asante Akim District Assembly is providing a percentage of the needed funding. In addition, it is overseeing the construction of the project.

Chapters of the Patriensah Citizens Association in Ghana, the U.K., and the United States will provide professional guidance in overseeing the implementation of the project.

The people of Patriensah are providing both cash and in-kind support to the project.

The Canadian International Development Agency (CIDA) has been contacted. Negotiation is ongoing.

D) Commercial providers/ sponsors and area of sponsorship/ donation

There are no commercial donors at this point. Some groups have been contacted (e.g., Ericsson International). Negotiation is ongoing.

E) General key motivation/ interest of sponsors and strategic view of developments in these areas

The goals of the project are very consistent with GhaCLAD's overall mission. GhaCLAD proposes to use computers and electronic networks to address educational challenges in Ghana. It proposes the establishment of an African Virtual Community College to make it possible for African secondary school graduates to enrol directly, without leaving their homes, in U.S. community colleges as well as universities and non-formal training agencies. Currently, only a fraction of African secondary school graduates can be accommodated in African tertiary institutions.

One major challenge in Ghana is access to Internet connectivity. The Asante Akim MCT will provide access and enable people to use the centre to further their educational objective.

F) Other participants

Messrs Konneth Enterprise is a national consulting firm hired by the Asante Akim District Assembly to oversee the construction of the project.

An agreement with Ghana Post and Telecommunications will be reached by the end of 1999 to provide telephone equipment to be used in the telecentre, and manpower for the planning, installation, and maintenance of telecommunication equipment and accessories.

G) Type of users

- Educational institutions
- Government ministries
- Private businesses
- NGOs in the district
- Medical institutions
- The people of Asante Akim

H) Function and environment of usage

- Distance education
- Telemedicine
- Community computing training programmes
- Computer repair
- Web development
- Digitization of indigenous culture
- Lifelong learning
- Basic literacy
- Basic and non-formal education

I) Technology used

- Community radio
- PC
- Video
- Multimedia CD-ROMs
- Electronic databases
- Internet (via telephone connection)

J) Evaluation of project

The project is still under construction. A needs assessment was conducted prior to the launching of the project.

The following describes how the project will be evaluated:

The preparation of monthly reports to monitor accomplishments and to enable the administrative board to initiate corrective action when necessary

A biannual report detailing the type of clients served by the facility

Informal survey/research to assess satisfaction with services

The amount of revenue generated by the MCT

The percentage of people trained (at the centre) who end up finding employment opportunities elsewhere

K) Time frame / plans

The project is expected to be completed (depending on funding availability) by December 2000.

L) Key material

http://ghaclad.org/about/index.htm
http://ghaclad.org/changes/index.htm
www.uic.edu/~darkwa/profile.htm

M) Key contacts

Dr. Osei Darkwa, President
GhaCLAD: Ghana Computer Literacy and Distance Education
University of Illinois at Chicago
1040 W. Harrison Street, Chicago, Illinois, USA 60607
Tel: (312) 996-8508 Fax: (312) 996-2770 E-mail: darkwa@uic.edu

Others:
Dr. Kwame Akosah
Hon. Kwaku Kyei, Asante Akim District Chief Executive
Mr. Edwin Asiedu, Local Project Co-ordinator

N) Financing and budget

Total cost of the project is US$ 200,000. This includes the cost of the physical infrastructure, equipment installation, and training. About 10% ($20,000) of the funding has been secured and is being used to fund the construction phase of the project. This includes money from the Asante Akim District Council and in-

kind contribution from the people of Patriensah. An annual fund raising is organised by the Local Telecentre Board for the project.

To sustain the project, the MCT will charge fees for its services. The revenue from the services, however, will not be the primary purpose of the centre.

Long-term sustainability of the centre is expected to be achieved through fees-for-service paid by NGOs, the public and the state. The latter will be able to increase the efficiency and quality of public services and make savings in delivery of, for example, education and healthcare.

In addition, it is expected that the involvement of the private sector will be encouraged at two levels - in the operation of the telecentres and in the supply of computer and telecommunication equipment by companies interested in testing and marketing their products for this type of application. NGOs, farmers and the public interested in online banking, market information, weather forecasts and promotion of their products, as well as basic office administration services such as telephone, typing, printing and faxes, will be charged a fee.

O) Last update

December, 1999

3.7.2 World Links for Development (WorLD) – Internet connectivity and training in the use of technology for secondary schools

A) Short description of purpose

The programme aims to link secondary school students and teachers around the world, implementing Internet connectivity, in order to improve education, enhance cultural understanding across nations, and help develop skills that youths need for obtaining jobs in the 21st century.

The WorLD programme has 6 components:

- Internet connectivity for secondary schools in developing countries
- computer donations
- training in the use of technology/ Internet to improve teaching and learning
- school-to-school partnerships, as well as regional and global partnerships with public, private, and non-governmental organisations
- telecommunications policy advice for the education sector
- monitoring and evaluation

The WorLD programme also stresses several other points:

- promotion of equitable gender access to the use of computers
- an emphasis on teachers, their professional development and improved pedagogical practice
- blend of infrastructure and human capacity development
- a learning approach that emphasises "constructivist learning" by encouraging collaborative computer projects with other students, other schools, and other countries

The project is currently active in 15 countries in Africa, Latin America, Eastern Europe, and the Middle East (Brazil, Cape Verde, Chile, Colombia, Lebanon, Mauritania, Mozambique, Paraguay, Peru, Senegal, South Africa, Turkey, Uganda, West Bank / Gaza, Zimbabwe).

B) Initiator (lead agency)

The World Bank Institute - World Links for Development (WorLD): The programme was launched in 1997.

C) Non-profit providers/ sponsors and area of sponsorship/ donation

The WorLD programme sponsors computers and computer networking, Internet connectivity, training for teachers and help for collaborative projects, monitoring and evaluation.

In Ghana, the WorLD sponsored a total of 154 computers, 11 for each of 14 schools. The programme also organised training sessions: 14 headmasters, 77 teachers and 14 students have been trained directly since 1997.

The WorLD programme has the governments of six countries as public partners: Canada, Finland, France, Italy, Japan and Switzerland. Their contribution is financial support and human resource support.

D) Commercial providers/ sponsors and area of sponsorship/ donation

In-country: Fan Milk Ghana Limited, Ghana Chamber of Mines, Ghana Telecom, Metropolitan and Allied Bank, The Partnership, Private Enterprise Foundation, Providence Insurance Company, Standard Chartered Bank, Tema Oil Refinery, Africa Online Ghana Ltd.

Those local companies support the programme with financial and technical assistance, equipment, office, office facilities and administrative cost of maintaining the programme's office.

The WorLD programme has the following global corporate partners:

- Security Storage – discounts on shipping of computer equipment
- Sun Microsystems – donated 80 Sun Servers and one Sun site worth US$ 50,000 per country
- 3Com – 12-port hubs for the countries
- UR Labs – copies of its content management software
- Microsoft – software licences for a number of schools
- Cisco Systems
- Lucent Technologies
- JDL Technologies

Through their joint initiative with the federal and provincial governments, Canada SchoolNet, Industry Canada provides partnership assistance, human resource and technical assistance for training and the development of training materials.

E) General key motivation/ interest of sponsors and strategic view of developments in these areas

Local companies sponsoring the WorLD-Ghana programme do so to build corporate image. Some of these companies believe this is the best way to reach a vast number of youth, the future decision-makers, in order to promote and introduce the companies' products and services.

Most local companies believe it is cheaper to assist in training the youth of today in the use and application of technology than to spend a lot of funds and resources to train their own personnel on the use of technology (as they are already doing). Training the youth provides comfort with technology by the time they enter the job market.

The international sponsors of the WorLD programme, most of them major IT companies, have the following motivations.

- The primary reason is to gain access to new markets: Ministries of education are increasingly purchasing information technology and represent a market. By sponsoring programmes such as WorLD in a specific country, the IT companies get access and contacts within the respective ministries.
- Through their donations the international companies build up credibility and a positive association, and demonstrate commitment and good will, and are thus more likely to secure potential future contracts.

- They also build relations with the World Bank which sometimes funds the educational IT purchase for governments, giving them an understanding and knowledge of World Bank goals and processes to assist in the bidding.
- Other key motivations include public relations and brand identification. Also equipment which has outrun its competitive life in the US market, EU or other developed world markets can be donated to such a programme with the benefit of tax write-offs.

F) Other participants

Partners in the programme are SchoolNets of other countries; some international non-profit organisations and foundations involved in education, research and/ or development, such as USAID, UNDP, UNESCO; and also NGOs. For a complete list, see www.worldbank.org/worldlinks/english/html/partners/html

WorLD also formed an alliance for global learning with two partners:

- I*EARN (the International Education and Resource Network) works in 60 countries and concentrates on collaborative projects of students and teachers from schools online around the world.
- Schools Online channels private sector investment and engineering talent to provide Internet connectivity for schools.

G) Types of Users

Educators and students in 14 secondary schools located in Accra, Kumasi and Cape Coast. A WorLD report[13] which does not include Ghana (but two other African countries - Senegal and Uganda - indicates that

- girls and boys were approx. equally represented as participants of the programme
- WorLD schools do not include rural schools
- some schools are offering courses to the public on computer and software usage as a way of raising funds and programme sustainability

H) Function and environment of usage

- secondary education
- educating the educators
- collaborative, project-based learning across countries with partnerships
- computer/Internet literacy

[13] "World Links for Development: Accomplishments and Challenges – Monitoring and Evaluation Annual Report, 1998-1999"

- skills preparation for employment

I) Technology used

Computers and Internet connections via telephone lines, CD-Roms

J) Evaluation of project

The WorLD evaluation report referred to in G) above, summarising results from a survey of WorLD schools indicates that in the two African countries evaluated,

- the most highly rated impact of the programme was on students' ability to get better jobs upon graduation
- the majority of interviewees agreed that teachers acquired new skills and attitudes in both technology and pedagogy. An estimated 28% of the entire teaching staff of schools has received training as part of programme participation
- 46% of the interviewed WorLD teachers said that they had, in turn, trained other teachers of their school
- the programme fostered additional resources: Modest donations from the programme were leveraged by the schools to get local or national contributions.

Challenges:

- Technological problems in the two African countries (Senegal and Uganda) were partly the lack of adequate phone lines to connect to the Internet, lack of computers in good working condition and sometimes lack of reliable electricity.
- Organisational problems were overwhelmingly the lack of time allocated to teachers within the formal curricula. Computer activities ranked low among other subjects demanded by national curricula and assessment policies. Teachers and students engaged in computer projects only in their spare time.
- Ghana reports insufficient equipment and slow Internet connectivity due to poor phone lines as technical challenges. The national co-ordinator also confirms the problem of finding time within schools' curricula and reports the inability of some students to pay their fees.

Recommendations:

- Key recommendations of the report are that the WorLD programme works with education ministries and local staff to align national policy and local practice to integrate the programme into the school day.

- Teachers need training on how to integrate computers into the curriculum.
- The report recommends that strategies be developed which assist schools to reach out to the community to increase local impact and sustainability.

K) Time frame / plans

Ongoing (started October 13-24, 1997)

L) Key material

WorLD - Ghana: Annual report for Fiscal Year 1999 (July 1998 - June 1999)

WorLD: Accomplishments and Challenges Monitoring and Evaluation Annual Report 1998-1999

WorLD – Ghana, Internal Report prepared by Samuel Eshun, National Co-ordinator, November 1999

www.worldbank.org/worldlinks/english/html/ghana.htm
www.world-links.org/ghana/about.html

M) Key contacts

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Sam Carlson
WorLD Programme Co-ordinator
scarlson@worldbank.org
Tel: 1-202-473 75 61

N) Financing and Budget

Some cost data for the 14 secondary schools in Ghana are as follows:

14 schools, average monthly cost (in US$)	
Telephone/ Internet dial up bill	$ 859
Internet subscription	$1,200
Other recurrent expenses	$1,708

WorLD schools are directly responsible for financing a fully furnished computer lab for the WorLD programme and the recurring cost in running the programme in their schools.

The current average annual recurring expenditure for each WorLD school is US$ 6,000. (This cost is for schools in Ghana only and not for the overall WorLD programme). The aim is to cover the recurring cost by special student fees and special fund-raising efforts from the schools.

Recurring costs include

- Telephone bills
- Electricity bills
- Internet monthly subscription fees
- Web site hosting
- Maintenance and repair of equipment
- Teachers' allowances

O) Last update

December 1999

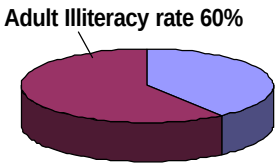
4. MOZAMBIQUE

Country Characteristics

Government type	Republic
Territory	784,000 Km^2
Population (1997)	16.6 Million
Annual population growth (1998)	1.8%
Urban population	480,000 (36%)
Population density	21 People/Km^2
Major villages and towns	NA
Average village size	NA

- *Administrative divisions:* 10 provinces: Cabo Delgado, Gaza, Inhambane, Manhica, Maputo, Nampula, Niassa, Sofala, Tete, and Zambezia
- *Culture:* Similar ethnicity with a large number of tribal groups. Shangaan, Chokwe, Manyika, Sena, Makua groups represent 99.7%; Europeans, Euro-Africans 0.2%; and Indians 0.1%. Languages: Portuguese (official), indigenous dialects
- *Topography:* 80% Prairie, Steppe and Savannah, and 20% Jungle and Forest.
  - *Climate*: Tropical to subtropical

Education

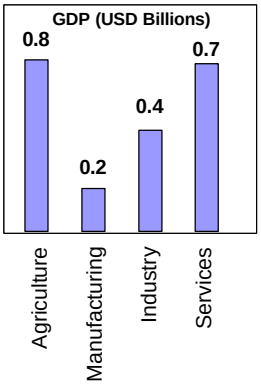


Illiteracy rate (1997)	60%
Public spending on education (GNP share)	NA
Universities	5

- *Gross enrolment ratio* (% of relevant age group)[1], 1996: Primary 60% and Secondary 7%, Tertiary 1%

[1]Enrolment includes repeaters and over-aged. Tertiary enrolment includes non-university diploma studies and programmes requiring secondary-education certificates.

Economy



GNP, 1997	US$ 1.7 Billion
GNP/Cap, 1997	US$ 90
GNP/Cap PPP, 1997	US$ 520
GDP Growth, 1998	4.9%
Output (Share of GDP[2]), 1997	
Agriculture	39%
Manufacturing	10%
Industry	23%
Services[3]	38%

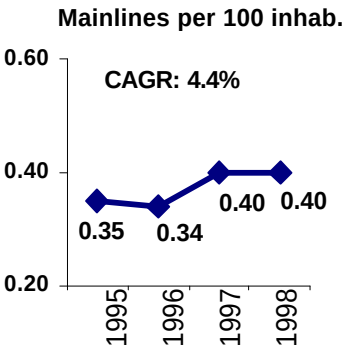
[2]Sum of shares may surpass 100% due to output overlaps

[3]Services Output includes Public Services

- *Government Revenues: (Share of GDP), 1996:* NA
- *Industries:* food, beverages, chemicals (fertiliser, soap, paints), petroleum products, textiles, cement, glass, asbestos and tobacco.
- *Agriculture products:* cotton, cashew nuts, sugarcane, tea, cassava (tapioca), corn, rice, tropical fruits, beef and poultry.

Information and Communications Technology

Telephony

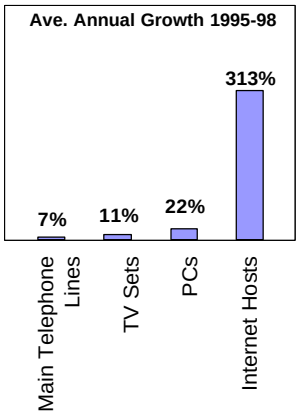


Main telephone lines:	
existing, 1998	75,400
expected, 2000	86,000
Compound Average Growth Rate, 1995-98:	7%
Main telephone lines per 100 inhab:	
existing, 1998:	0.40
expected, 2000:	0.43
in urban areas, 1995:	0.89
in rural areas, 1995:	0.04
Compound Average Growth Rate, 1995-98:	4.4%

Telecoms Quality and Investment

Digitalisation, 1998	99%
Telecom Investment, 1998	US$ 22.2 Million
Telecom Revenue, 1998	US$ 63.8 Million
Reinvestment Ratio (Investment/Revenues):	35%

Internet and Media



PCs, 1998	30,000
PCs per 100 inhab, 1998	0.16
PCs per 100 CAGR[4], 1995-98	22%
Internet Users, 1998	3,500
Internet Users per 100 inhab, 1998	0.02
Internet Users CAGR[4], 1995-98	758%
Internet Hosts, 1998	141
Internet Hosts per 100 inhab 1998	0.001
Internet Hosts CAGR[4]	313%
ISPs, 1998	6
TVs, 1998	70,000
TVs per 100 inhab, 1998	0.4
TVs CAGR[4], 1995-98	11%
TV Broadcast Stations, 1997 (repeaters not incl.):	2
Radios, 1996	700,000
Radios per 100 inhab, 1997	3.7
Radio Broadcast Stations, 1997	33

[4]CAGR = Compound Average Growth Rate

4.1 Mozambique: General Context

Mozambique faces serious challenges in the development of Distance Education (DE). The country has few resources and the lowest income per capita in the Commonwealth. After a war that destroyed most of its infrastructure, Mozambique needs to restore its infrastructure and improve its education system including the teacher base and training. Furthermore, the characteristics of the country, a relatively low population density, and an atomised tribal social structure add to the challenges in the development of telecommunications and DE.

While the government of Mozambique has made progress in restoring its primary-level educational system, most of the DE development has just recently taken place and has been a result of mainly international initiatives and management. Following is a description of the projects that seek to improve education in Mozambique.

4.2 Environment and Function of ICT-Based Distance Education

In its educational framework, Mozambique is confronted with an insufficient infrastructure for secondary and tertiary education, extreme adult illiteracy and lack of properly prepared educators. By 1992, over half of its primary schools were destroyed due to the war, thus it is not surprising that adult illiteracy had reached 60% by 1997. This rate is the third highest among the African Commonwealth countries, after Sierra Leone and The Gambia, which also have been affected by strong disturbances.

The Mozambican educational system shows the following features:

- A considerable growth of primary education. In 1994, the country had 188 schools and 113,700 pupils. By 1998, the country had an estimated 6,600 schools and 2.1 million pupils.
- Gross enrolment ratios were 60% for primary, 7% for secondary and 1% for tertiary in 1996. It is estimated that enrolment in primary schools increased to 71% in 1998.
- About 24% of primary-level teachers have no formal training at all, and 52% have completed one year of training sometime after completing primary school.

It can be observed that the efforts of the Mozambican government have progressed in the reconstruction of its primary educational system. However, Mozambique still faces a bottleneck in education, as it has a shortage in its

capacity to provide secondary and tertiary education. For instance, there are only 440 secondary-level schools to serve192,600 pupils.
Furthermore, Mozambique faces problems in the formation of human resources capacity for IT, as trained information technology specialists are scarce. There is a very small 'elite' of PC-users who have been exposed to basic software systems.

DE then, provides means to alleviate the bottleneck and basic and technical illiteracy problems by targeting students and teachers in secondary and tertiary education, as well as the population in need of basic technical training and literacy.

The following major projects were identified and used to gain an appreciation of the situation in Mozambique:

- University Eduardo Mondlane Distance Education (EMU)
- SchoolNet, Mozambique, by the World Bank's WorLD
- Multipurpose Community Telecentres (MCTs), by the EMU
- Learning Without Frontiers - Reaching Unreached Learners in Mozambique (LWF), by the UNESCO

The following table describes the main purposes of the projects analysed:

	EMU	SchoolNet	Telecentres	LWF
Function of DE				
Primary (literacy and numeracy)				v
Secondary		v		
Tertiary	v			
Postgraduate research	v			
Profession oriented				
Teacher training	v			
Continuing education				v
Computer training		v	v	
Health education	v			
Environment of DE				
Community			v	v
Rural/ remote			v	v
Content production	v	v		
Access to education	v	v		v
Access to technology	v	v	v	

The Eduardo Mondlane University (EMU) is the most important tertiary institution in Mozambique with about 11 faculties, seven centres and an institution for scientific development. In 1997, the EMU delivered education to 7,000 students which represented about 0.5% of the country's relevant age group. EMU's Computer Science Centre (CIUEM) plays a leading role in the development of Distance Education (DE) and Internet in the country. For instance, the CIUEM is preparing a distance education support strategy that would involve many sub-Saharan African countries, in association with Mozambique's media company Radio Televisao Klint (RTK), Telecommunications Foundation of Africa (Kenya), and CSIR (Pretoria - South Africa).

The CIUEM has also set up a teleconferencing centre equipped with a video conferencing room, televisions and cameras, as well as satellite transmission equipment for the broadcast of courses and seminars to its faculties, centres and other universities across the country. The first transmission was completed in 1997 and currently CIUEM seeks to connect EMU to a regional DE network with universities in South Africa and Tanzania. CIUEM's projects target mainly university students and faculty. However, the CIUEM also provides Internet access to half of the total Mozambican demand for this service, including a number of government and other educational and research institutions in the country.

SchoolNet is a project that aims to build a network to provide ICTs to secondary, technical and teacher training colleges in a number of developing countries. Currently, there are 15 other developing countries involved: Brazil, Cape Verde, Chile, Colombia, Ghana, Lebanon, Mauritania, Paraguay, Peru, Senegal, South Africa, Turkey, Uganda, West Bank/ Gaza, and Zimbabwe. The project is an initiative of The World Bank Group through its World Links for Development (WorLD) Programme.

The World Links for Development (WorLD) programme is an initiative of the World Bank. Its aim is to establish educational on-line communities for secondary school students and teachers around the world in order to expand distance learning opportunities, improve educational outcomes, enhance cultural understanding across nations, and build broad support for economic and social development.

SchoolNet Mozambique is being developed in coordination with the EMU and the Institute of Development Research Centre (IDRC) through the Mozambique Acacia Advisory Committee (MAAC). The IDRC is a public corporation of the Canadian government which helps communities in the developing world find solutions to social, economic, and environmental problems through research. SchoolNet Mozambique is set to benefit students and teachers from 24 secondary (pre-university), technical and teacher training colleges in Maputo, Beira, Nampula, Quelimane and Matola.

Multipurpose Community Telecentres (MCTs), are strategically located units equipped to provide rural and remote communities with access to ICTs. While the characteristics of these facilities vary, some of them have telecommunications equipment including telephone and fax devices, access beyond the Internet (dial-up, ISDN), PCs, printers, photocopiers, TV, CD ROM, audio and video devices, and multi-media. MCTs are intended to deliver DE through teaching rooms and small libraries equipped with audio and video material. The purpose of MCTs is two-fold: they aim to expand access to ICTs (ranging from simple telephone calls to use of Internet and the multi-media), and train local residents in the use of ICT equipment. By achieving this, MCTs seek to provide DE to accelerate local socio-economic development.

The development of MCTs in Mozambique is carried out by the EMU, in coordination with the IDRC, through the MAAC. Currently, there is one pilot project in Manhica and another in Namaacha, both towns located within a three-hour drive from Maputo. Pilot projects are conducted to assess the MCT approach in small communities in general, and their impact on target groups. If pilots are successful, MCTs are expected to expand nationally.

Like MCTs, LWF's Reaching the Unreached Learners is a programme that includes the strategic allocation of specialised facilities called Learning Centres. The main difference between this programme and MCTs is the strong focus that LWF has on learning and the broad variety of means it uses to deliver DE. Unlike MCTs, LWF uses broadcasting media such as TV and radio as well as multi-media, arts and interactive workshops to disseminate educational programmes. In Mozambique, this project also intends to link remote communities and thus hopes to benefit, although not exclusively, the inhabitants of rural and remote areas, especially those who do not speak Portuguese. LWF is an initiative developed by UNESCO and is still in its early stages and not yet fully operational.

4.3 Infrastructure and Technologies

The Internet appears to be playing a key role in the future development of DE in Mozambique, as it is described in DE delivery by the four projects mentioned previously. However at this stage, Mozambique's infrastructure is still limited and thus DE is mainly delivered by print materials and, to a lesser degree, radio.

Basic telephony has shown low teledensity rates and has grown rather modestly. The 7% yearly increase in mainlines in the 1995-98 period has led to a teledensity of 0.4% in 1998.

In Mozambique, media is not serving 87% of the rural population who face financial constraints in purchasing power to buy radios and batteries. Few houses have electricity.

Radio, the electronic media with the widest penetration (there are 10 times as many radios as TV sets in the country) still has a low penetration of fewer than 4 radios per 100 inhabitants and there are no established radio programmes that provide services like distance education.

This lack of infrastructure has hindered extensive use of high technology in the delivery of DE in Mozambique.

There have been efforts to introduce ICT to the delivery of DE. The CIUEM, SchoolNet, MCT and LWF projects consider the Internet a crucial element in their development. The CIUEM has seen satellite communications as a key tool to deliver DE as it started the installation of a 64 kbps VSAT and a parabolic antenna in 1997. Currently, CIUEM plans to upgrade the capacity of its equipment and expand its operations by installing a VSAT with 512 kbps input and 128 kbps output. The use of satellite has allowed interconnection between EMU and educational and research institutions in Portugal, Brazil, USA and Canada. TV is also an element in the CIUEM's plans as the CIUEM has reached an agreement with Mozambique TV to share transmission equipment in the delivery of DE.

The following chart describes the use of technology in the projects studied:

	CIUEM DE	SchoolNet	Tele-centres	LWF
End-user equipment				
PC	v	v	v (in some)	v
LAN	v	v		
Telephone	v		v	
Internet connection	v	v	v	v
E-mail	v	v	v	v
Touch screen info- kiosk				
Transmission technology				
Satellite broadcasting	v			
Wireless	v			
Fixed networks	v	v	v	v
Content platform	v			
Web-page hosting	v			
CD-ROMs	v			v
Electronic DB				

Despite the growth in the number of Internet hosts, the Internet hardly has a presence in Mozambique. In 1998, there were only 0.16 PCs per 100 inhabitants and only 0.02% of the inhabitants were Internet users.

Another issue is the lack of trained IT professionals and institutions dedicated to high-technology development. Professional systems - i.e., local area network environments, client-server environments - are very rare. The training facility at CIUEM (the University) still has to start producing graduates. As a result, local human resources for creating media content which includes electronic media will be very limited.

Consequently, DE is carried out mainly by printed material, although printed media also has challenges such as small publishing, graphics and audiovisual industries and few major newspapers.

4.4 Policy

At first glance, telecom investment figures do not necessarily suggest that there is a good investment climate in Mozambique. The country's investment/revenue ratio of 0.35 is close to the median within Commonwealth sub-Saharan countries and Commonwealth countries in general. However, comparable countries that have experienced war, like Sierra Leone and Zimbabwe, show ratios of almost 3.95 and 0.96 respectively.

The following section will seek to address Mozambique's policy issues related to this analysis.

4.4.1 Telecommunications and IT

Fixed basic services including international - not liberalised

National PSTN operator Telecomunicações de Moçambique (TDM) is the sole supplier of public basic telecommunications services and infrastructure in Mozambique. In 1992, TDM was to be restructured as a corporate entity with financial autonomy, responsible for planning, installing and operating the national and international network[14]. To date, TDM is 100% government-owned, has a legal monopoly on voice telephony (fixed basic and international services), and retains monopolistic control of switching, transmission, and cellular services as well.

TDM is a likely candidate for a partial privatisation which would help to alleviate the excessive debt burden of the country. In addition, privatisation and liberalisation have previously been suggested to promote investment, fulfilment of social obligations, strong rollout performances, and local shareholding.

However, independent (foreign) telecommunications operators in markets including cellular mobile independent from TDM are unlikely to be licensed for

[14] Decree No. 23/92, September 10, 1992.

the time being. The government does not seem to find an incentive to relinquish control of the telecommunications sector which brings in significant tax revenues of US$ 20 million per annum.

The current legal framework represents an obstacle to telecom investment and growth. The existing telecommunications law needs to undergo several changes to accommodate foreign or even national private investment. Currently, foreign ownership is not allowed in a substantial share of TDM. In addition, foreign companies cannot buy a cellular company if it is the only one in the country and current law only allows the existence of one cellular company.

As a result, no new licences for basic and cellular services are envisaged, and liberalisation dates have not been set. Furthermore, the Mozambican government is still developing a policy for telecommunications, a process that is perceived by some as slow. This situation creates ambiguity in the regulatory climate of the country and seems to hinder investment in the development of telecommunications.

Telecommunications law needs, then, to be changed to accommodate foreign ownership of TDM to the tune of 20% of stock value, to allow new licences for cellular services, and to allow foreign ownership in a monopolistic cellular operator.

There is a regulatory body, the National Communications Institute of Mozambique (INCM), which belongs to the Ministry of Transport and Communications. The INCM was established in 1992 and undertakes several responsibilities, including tariff approval. In this process, INCM advises the government on operator proposed tariff changes for monopoly services, which the government must approve. Other responsibilities of INCM include licensing, spectrum management, formulation and interpretation of sector policy, international relations, and defining and monitoring compliance with the performance targets set for TDM.

The regulation of 'complementary services' such as private VSAT data networking, 'value added data services,' mobile radio, paging and electronic messaging and Low Earth Orbit satellites seems to be more relaxed than that ruling the provision of basic services. The EMU in Maputo is allowed by the Institute and confirmed by government to make use of international VSAT for Internet access. Two other organisations have obtained exceptional permission to use private VSAT for their international data communications in southern Africa. Licence fees are computed on the basis of traffic and bandwidth and not on loss of traffic for TDM.

Internet Service Providers (ISPs) - liberalised

Internet services in Mozambique have been deregulated. Complementary and value-added services as well as data communications are open to competition subject to licensing by the INCM. There is no restriction on resale of TDM circuits as long as they are not used for voice traffic. The ISPs in Mozambique are not dependent on the incumbent telecommunications operator TDM for their international bandwidth. TDM has established an international Internet backbone but is not the sole Internet operator, as it operates a gateway in competition with the private sector.

In 1998, there were six ISPs in Mozambique providing access to 3,500 users, mostly located in the provincial capitals. Centro de Informatica at the Universidade Eduardo Mondlane (CIEUM) and Teledata - a joint venture between TDM and Marconi Portugal (Telecom of Portugal) - are major providers of national and international connectivity in Mozambique. The other Internet Service Providers (ISPs) are connected to the gateway through leased lines at 64 and 128 Kbps.

Plans, programmes or policy for rural access or universal access

Mozambique's policy framework has yet to address universal access provisions to foster telecommunications development in Mozambique's rural areas. TDM is managed under a performance contract with the government, which contains stipulations relating to universal service, financial self-sufficiency and new investments which are subject to criteria of profitability. However, TDM is not required as part of its licence condition to fulfil any social obligations such as rollout, fixed line community telephones, or cellular community telephone. In addition, there is no rural telecommunications fund in existence in Mozambique.

The government, through the Ministry of Transport and Communications in consultation with the Ministry of Finance must approve capital expenditure by TDM which otherwise enjoys autonomy within the framework of its universal coverage obligation.

Information society initiatives or information superhighway policies

Precise information society initiatives have not been developed yet. Mozambique's civil strife reduced the economy to a low level and limited the penetration of information and communications technologies (ICTs) in the country. However the government has seemed to be aware of the development potential of ICTs and has been discussing the possible formulation of ICT policies following the launching of the African Information Society Initiative (AISI).

4.4.2 Media

With regard to broadcasting, the INCM deals with the technical aspects of radio-frequency allocation and testing of transmission equipment. Broadcasting licences are issued by the Direccao Nacional de Informacao, a division of the office of the Prime Minister.

In Mozambique, two broadcasting organisations have been identified, one state-owned and the other private. While the latter takes an interest in the provision services for the public interest, school television does not exist in Mozambique.

With regards to radio as a means to deliver DE, there are current talks for the creation of such programmes. These include the creation of a small pilot by the Ministry of Education (MINED) and Radio Mozambique, in which a number of hours would be devoted to DE on a second channel for Radio Mozambique. There are also plans to set up a Telescola for higher education in co-ordination with the envisaged High Polytechnic Institute and University and Radio Televisao Klint (RTK).

4.4.3 Education

Mozambique's Ministry of Education (MINED) seems to view teacher training as a priority, as many teachers lack adequate training. In September 1997, MINED launched "The Education Sector Strategic Plan 1997-2001: Reviving Schools and Expanding Opportunities." Overall, the Plan is meant to set the grounds to provide primary education to more than three million children in 2004 and achieve 100% primary-level enrolment in 2006-07.

Among other things, the Plan seeks to train educators in order to expand education, including the operation of an Institute for training teachers (Instituto de Aperfeccionamento Profesores - IAP).

The plan also addresses distance education. MINED is conducting a programme to train primary-level teachers via DE, mainly using print material. In 1996, 3,000 teachers were enrolled in the programme. By April 1999, 1,000 graduated and by 1999-2000 the remaining 2,000 are expected to complete the course. MINED plans to expand the programme and expects it to benefit up to12,000 trainees in 2002. MINED seems to be preparing to conduct a pilot to use DE to deliver secondary education, although this pilot still seems to be in its early stages. So far, the government does not seem to have plans to make substantial use of ICT to deliver DE.

4.4.4 Policy Conclusion

The regulatory framework in the education sector has shown an effort to provide policies to foster progress in the development of education, especially at the primary level. This progress could be well complemented with the stimulation of a gradual development in secondary, tertiary and technical education.

So far, the government has no specific plans to improve ICT skills in schools or to use ICT-based DE to overcome their lack of resources in education.

With regards to telecommunications, the laws ruling the telecommunication sector seem to fall short of providing a reliable investment climate that contributes to the development of the country. Telecommunications in Mozambique show an extremely low teledensity rate and a low investment/revenue ratio for a country that is restoring its infrastructure from the devastation of a war. Furthermore, the telecommunications authorities have yet to proceed with the legal paperwork that would allow the setting of grounds for an attractive investment climate for future development. Current telecommunications law still seems incompatible with a scheme that allows a privatisation or liberalisation scheme, especially in basic and cellular services. Thus, evidence in this analysis not only suggests that laws have not provided an optimal legal framework for the development of telecommunications so far, but more importantly, they fail to recognise the importance of making changes in the future which would allow telecommunication progress, especially in a country with a strong need to foster infrastructure to accelerate its development.

4.5 Sponsors: Interests, Key Motivations and Strategies

The EMU and international institutions like the World Bank's WorLD, IDRC's MAAC and UNESCO have led the development of DE in Mozambique by providing initiatives, funds and managing their projects.

We have also identified the intervention of other organisations including international education-related institutions, international and national governments, the national PTT, and private companies.

International education-related institutions include the following:

- The British Council, an organisation that promotes education and the use of the English Language, although not exclusively, in the Commonwealth countries. The British Council is a sponsor for the development of CIUEM's DE programmes.

- London School of Economics (LSE), a well-known higher education institution, which concentrates on social, political and economic sciences. LSE is one of the largest colleges within the University of London and has a special focus on international studies. Its programmes on social, economic and political problems cover countries in every continent. The LSE provides training and support to the CIUEM.
- The Manchester Metropolitan University (MMU), one of the most extensive education centres in Europe. MMU is the largest non-federal university in the UK with over 30,000 students studying on seven campuses. The MMU has a DE partnership with the CIUEM to help staff obtain Masters and PhD degrees.
- The University of Twente in Netherlands, an institution that offers both technological and social study programmes. The university seeks to foster the use of entrepreneurial approaches for the adaptation of technology to the benefit of society in general. The University of Twente has provided funding for the SchoolNet programme.
- The United Nations Children's Fund (UNICEF), the UN's programme to advocate the protection of children's rights globally. UNICEF has provided funds for the development of LWF.

Governmental institutions include these:

- Mozambique's Ministry of Education (MINED), as mentioned before, launched "The Education Sector Strategic Plan 1997-2001: Reviving Schools and Expanding Opportunities." MINED also provides policy assistance for the development of SchoolNet and LWF.

- The Government of Netherlands, through its Embassy in Maputo, has contributed funds to the development of LWF.

- TDM, the national PTT, has provided technical assistance to the development of SchoolNet in Mozambique.

Finally, some private institutions have also been involved, directly and indirectly, in the development of DE in Mozambique:

Gestetner is an international company focused on the production and commercialisation of office products, including photocopiers, printers, and fax machines, among other equipment. The company also provides technical support with a staff of 10,000 and resale operations worldwide. Gestetner has provided equipment and technical assistance to the MCTs.

ICL Mozambique Ltd. is a company that supplies PCs, notebooks, servers and other networking products. ICL Mozambique Ltd. has provided equipment and technical assistance during the development of SchoolNet.

The main motivations to sponsor and carry out DE projects in Mozambique include

- the increase in access to technology, mainly PCs for Internet connection, as a means to promote its use, integrate Mozambique into the global community and accelerate the technological development of the country. (CIUEM, WorLD, IDRC's MAAC, LSE, MMU, University of Twente, Gestetner, ICL Mozambique Ltd. and TDM)
- the improvement of education in order to achieve a sustained socio-economic development of the country (UNESCO's LWF, MINED, the British Council, UNICEF, LSE, MMU and the University of Twente)

It can be observed that institutions like the EMU, LSE, WorLD and the University of Twente have envisioned the need to establish a global network that eases the flow of knowledge and improves quality in research and learning. By improving Mozambique's network, these institutions seek, among other things, to integrate Mozambique into the global network.

Participants like Gestetner and ICL Mozambique Ltd. Are looking at the potential that rural markets have for use of ICTs. By sponsoring projects such as MCTs and SchoolNet, these organisations both promote and assess the demand.

4.6 Country Evaluation

DE projects in Mozambique are just beginning and thus it is difficult to assess their success at this stage. The CIEUM started its upgrade in video-teleconference facilities in 1997, while SchoolNet and MCTs were launched in 1998. The LWF is not in full operation yet. While the Educational Plan launched by the government in 1997 recognises the need for DE in Mozambique, it has yet to recognise the importance that ICT may have in the effective and efficient delivery of DE.

4.7 Project descriptions

4.7.1 Eduardo Mondlane University's (EMU) Distance Education

A) Short description of purpose

The Distance Education (DE) unit of Eduardo Mondlane University broadcasts university courses and seminars to its national campuses and other universities

across the provinces to enhance education and research. The project is intended to connect EMU to a regional DE network with universities of South Africa and Tanzania.

B) Initiator (lead agency)

University Eduardo Mondlane - Centro de Informatica, (CIUEM) - Initiator, lead, project management, technical management

C) Non-profit providers/ sponsors and area of sponsorship/ donation

The following institutions provide support for the project:

- The World Bank (funding)
- Portuguese National Institute for Administration (funding)
- The British Council (funding)
- London School of Economics (LSE) (training and support)
- Manchester Metropolitan University - (distance education partnership to help staff obtain Masters and PhD degrees)

D) Commercial providers/ sponsors and area of sponsorship/ donation

None identified so far

E) General key motivation/ interest of sponsors and strategic view of developments in these areas

Priority is interconnection of campuses to enhance university education and research.

F) Other participants

The project seeks to involve government institutions and private sector players in the funding of the project's operations and expansion, in exchange for making the system available to these partners:

- South African Council for Scientific and Industrial Research (CSIR) - (partner in distance education, training, and supporting technologies)
- University of Dar Es Salaam, Tanzania - (which is establishing a similar centre)
- University of Pretoria - (partner in computer-based learning)
- University of Durban - (staff exchanges and visits)

G) Type of users

University students and faculty

H) Function and environment of usage

University and post-graduate studies; research

I) Technology used

Broadcasting (videoconferences) involving the use of satellite

J) Evaluation of project

NA

K) Timeframe/ plans

1997- Installation of a 64 kbps VSAT and a parabolic antenna. A link was completed between Maputo and Toronto.

1998- Teleconference room became available; a second VSAT has been installed for the university's distance education training facility with a 384 kbps link to Washington. An agreement was reached between CIUEM and Mozambique TV to share infrastructure for distance education.

1999-2000 - Currently, CIUEM plans to upgrade the capacity of its equipment and expand its operations by installing a VSAT with 512 kbps input and 128 kbps output. It is also installing 30 telephone lines for Internet access for a total of 70 lines for this service.

2000 - Future plans are to provide services to users outside the national university, including foreign universities, and the Mozambique government.

L) Key material

University Eduardo Mondlane web page: http://www.ci.uem.mz (in Portuguese)

M) Key contacts

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Eduardo Mondlane University, P.O. Box 1329, Maputo, Mozambique
Tel. 258-1-49 33 13 (office) 258-1-49 45 38 (home) mouzinho@zebra.uem.mz

Francisco Mabila, Facility supervisor, Computer Science Centre (CIUEM)
Eduardo Mondlane University, P.O. Box 1329, Maputo, Mozambique
mabila@nambu.uem.mz

N) Financing and budget

NA

O) Last update

November, 1999

4.7.2 SchoolNet

A) Short description of purpose

This programme seeks to connect all secondary, technical and teacher training colleges to the Internet by providing funding, equipment and training to them. Initially, this programme is set to benefit 24 secondary (pre-university), technical and teacher training colleges in Maputo, Beira, Nampula, Quelimane and Matola.

Currently there are 15 other developing countries involved: Brazil, Cape Verde, Chile, Colombia, Ghana, Lebanon, Mauritania, Paraguay, Peru, Senegal, South Africa, Turkey, Uganda, West Bank / Gaza, Zimbabwe. Canada is also involved.

B) Initiator (lead agency)

The World Bank Group, World Links for Development (WorLD) - Initiator, lead

C) Non-profit providers/ sponsors and area of sponsorship/ donation

Other donor agencies/ outside participants:

- IDRC Acacia Initiative (funding)
- World Bank (funding)
- Informatics Intergovernmental programme, IIP
- University of Twente (Netherlands) (funding)

In-country participants:

- University Eduardo Mondlane (technical assistance)
- Ministry of Education (MINED) (funding, policy assistance)

D) Commercial providers/ sponsors and area of sponsorship/ donation

- ICL Mozambique Ltd.

- Telecomunicacoes de Mozambique (technical assistance)

E) General key motivation/ interest of sponsors and strategic view of developments in these areas

The project aims to provide basic skills, reduce reluctance to changes, and make use of technology applications, especially among teachers.

F) Other participants

As an international project, SchoolNet Mozambique relies indirectly on the following sponsors and supporters of SchoolNet: Foundation for Research Development (Uninet Office), SchoolNet Canada - collaboration, ISPA - project facilitation, CSSA (ThinkQuest), CSIR - strategic planning. The CSIR (formerly known as the Council for Scientific and Industrial Research) is Africa's largest scientific and technological research, development and implementation organisation.

G) Type of users

- Secondary school students
- Communities - in certain communities, schools have been performing telecentre / Multi-Purpose Communications Centre functions

H) Function and environment of usage

Secondary school and technical education; teacher training

I) Technology used

- Personal Computers and the Internet
- Radio, broadcasting/video, PC, Internet, Multimedia CD-ROMs, electronic databases, satellite, wireless, etc.

J) Evaluation of project

NA

K) Timeframe / plans

Project is ongoing.

- June 1998 – Project began with four educators from each school participating in a computer literacy training workshop.

- August 1998 - A representative from the secondary schools was sent to Zimbabwe to be educated on Network Design and UNIX.
- September 1998 - First WorLD and Acacia pedagogical training module.
- 1998 - Began research on "Internet-Based Learning Activities in Secondary Schools," in association with the University of Pretoria.
- 1999 – Two more representatives are to be sent to a relevant conference in South-Africa; 10 secondary schools will be connected to the first phase secondary (pre-university), technical and teacher training colleges in Maputo, Beira, Nampula, Quelimane and Matola.
- Future Plans - The programme seeks to expand to a number of institutions and include all the teachers in each, to a short term total of 24 institutions.

L) Key material

WorLD: Mozambique Country Report, July 1999. Co-ordinator internal report. www.worldbank.org/worldlinks/english/html/mozam.htm

M) Key contacts

Innocente Vasco Mutimucuio, WorLD Mozambique Coordinator, inno@buscep.uem.mz

Dr. Generosa Cossa, Project coordinator – MAAC, generosa@nambu.uem.mz

N) Financing and budget

The Mozambican government's contribution to the project: Meticais $513 million (US$ 41,390)

O) Last update

October, 1999

4.7.3 Multipurpose Community Telecentres (MCTs)

A) Short description of purpose

MCTs are strategically located facilities providing communities with access to ICTs to accelerate rural development. They aim to introduce ICTs into small communities for multiple purposes, including training people to use office equipment, providing them with access to the Internet, or solely allowing them to send faxes and make telephone calls. MCTs also provide the local population with access to a library.

Currently, there are pilot projects in the towns of Manhica and Namaacha to assess the approach of MTCs in small communities in general and their impact on target groups. If pilots are successful, MCTs are expected to expand nationally.

B) Initiator (lead agency)

Centro de Informatica, Universidade Eduardo Mondlane (CIUEM) - Lead, project management.

C) Non-profit providers/ sponsors and area of sponsorship/ donation

International:

- International Development Research Centre, Canada (IDRC) - Acacia Programme: Mozambique Acacia Advisory Committee (MAAC) (funding, equipment)
- UNESCO - (funding)

In-country:

- local governments (policy support)
- local business organizations

D) Commercial providers/ sponsors and area of sponsorship/ donation

International:

- Gestetner - Office Equipment Company (equipment)

In-country:

- Telecomunicacoes de Mozambique (TDM) (technical assistance)

E) General key motivation/ interest of sponsors and strategic view of developments in these areas

- To train rural population in the use of ICTs and to accelerate rural development and reduce urban-rural imbalance
- TDM and Gestetner: To assess local demand for information and communication services, to boost use of office equipment and telecoms in small but progressive communities, and to test equipment, systems, programmes and other material from the user's point of view, and for quality and durability.

F) Other participants

None identified so far. However, more local, national and international participants are expected if the two pilot tele-centres are successful.

G) Type of users

Residents of small towns in general, including teachers, students, farmers, professionals, business owners. People from marginalized groups will be given priority to receive training in computer use.

H) Function and environment of usage

Basic literacy, office administration training

I) Technology used

Internet and e-mail on PCs. Typically MCTs provide e-mail and Internet access, computers, telephones, fax, photocopiers, scanners and audio-visual equipment (TV, video player, projector).

J) Evaluation of project

Currently, MCT pilots are in operation and are undergoing evaluation.

K) Timeframe / plans

Began in 1998. In August 1999, two pilot MCTs were inaugurated, each located about two hours' drive from the capital Maputo and both currently in operation:

- Telecentro de Manhiça
- Telecentro de Namaacha

L) Key material

- MCTs Website: www.telecentros.org.mz
- EMU information on MCTs: www.ci.uem.mz/telecentros/index.htm, www.ci.uem.mz choose "Pesquisa e Desenvolvimento" link for one paragraph announcement of MCTs, and a brief description about two MCTs "Pilot Telecentres in Manhiça and Namaacha".
- MAAC's description on MCTs: http://www.iscd.mz/maacs/projtele.htm
- Global Knowledge Information on MCTs: gkaims.globalknowledge.org (choose projects and search by country) - one page abstract about project from the GK-AIM database.

M) Key contacts

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IDRC members involved:
Kate Wild kwild@idrc.ca and Ronald Archer rarcher@idrc.org.sn

Pilot sites:
Telecentro de Manhiça e-mail: telemanh@telec.org.mz
Telecentro de Namaacha e-mail: telenam@telec.org.mz

N) Financing and budget

Pilot MCTs:
US$ 91,384 approximately - Feasibility Study
US$ 80,000 - Establishment of Pilot Centres

O) Last Update

September, 1999

4.7.4 Learning Without Frontiers - Reaching Unreached Learners

A) Short description of purpose

The project disseminates educational programmes through radio, TV, and the Internet, and has implemented Learning Centres where multi-media workshops take place for educational purposes.

The project is aimed at promoting and facilitating learning processes, improving access to technology, and linking unreached communities to formal education. Its purpose is to increase knowledge and the practical skills of those in unreached communities to achieve sustained socio-economic development.

The programme is currently developed in the Province of Nampula and may gradually spread to other provinces.

B) Initiator (lead agency)

UNESCO - Learning Without Frontiers (LWF) - Lead, project management and technical assistance

C) Non-profit providers/ sponsors and area of sponsorship/ donation

International donor agencies/participants:

- UNICEF (funding agency)
- The Netherlands government (funding agency)

In-country participants:

- Ministry of Education (assistance in policy/ regulation)
- Several NGOs have already indicated their interest in becoming involved in aspects of the project.

D) Commercial providers/ sponsors and area of sponsorship/ donation

- At this point, no commercial providers have been identified. However, this may change in the future.

E) General key motivation/ interest of sponsors and strategic view of developments in these areas

- To promote open and flexible learning communities with the capacity for responding to a variety of learning needs, using all available resources and technologies. This method is used as a means of overcoming learning barriers to achieve educational and social development.
- ICTs are viewed as a tool for learning, among other uses - ICT literacy is not the primary purpose of the project.

F) Other participants

The project is designed to capitalise on local initiative, which is expected to result in the mobilisation of local partners, particularly among the NGO community and religious communities, as well as governmental entities and media organisations. It is premature to list such participants, as their identification is expected to result from local initiatives. In addition, they may vary in different locations.

Participants include Osuwela (which envisages setting up the Learning Resource Centres), UDEBA (experience with local partnerships), Matahuanha Centre's Institutional Project, The Community Radio Project (under preparation and to be

financed by the Netherlands Embassy), and INDE's curriculum reform project, to which LWF will provide relevant information.

G) Type of users

The project emphasizes inclusion of those people who are currently excluded from education. The project targets a broad variety of learners: people of all ages, genders, ethnic backgrounds, economic status, and those living in rural environments (although it does not exclude urban and peri-urban). Users are expected to be local people, not necessarily conversant with the official language Portuguese, and to a large extent the illiterate and the poor.

H) Function and environment of usage

- Main fields: health, agriculture, education, literacy, numeracy, and skill training (which includes vocational skills as well as the ability to runs an independent business)

I) Technology used

The project is designed to work with scattered Learning Resource Centres using radio, television, VCRs, audio-cassettes, computers, Internet and print materials. At this stage, it is difficult to specify which media will be used for ICT-based distance learning, as it has not been specified to what extent multimedia CD-Roms, electronic databases, satellite and wireless technology will be used.

J) Evaluation of project

No evaluation has taken place as the project is in an early stage.

K) Timeframe / plans

- November 1997 - An initiative is presented to the Ministry of Education.
- May 1999 - Project preparation phase successfully concluded.
- Current Status - Awaiting decisions of Mozambican authorities regarding the modalities of implementation proposed to them.
- Years 1-2 after start - Develop local resources (material and human).
- Years 3-5 - Activities will begin in Nampula (production of packages, establishment of Learning Centres, creation of partnerships and training).
- Years 6 and on - Upon evaluation, expansion to other areas of Mozambique.

L) Key material

Ahmed Z. et al. "Learning Without Frontiers - Project Proposal." February, 1999. http://www.unesco.org/education/educprog/lwf/dl/mozproposal.pdf

Ahmed Z. et al. "Quadro Operacional Para Um Projecto De Aprender Sem Fronteiras em Moçambique (proposta)." April, 1998. www.unesco.org/education/educprog/lwf/dl/moz98_06p.pdf

Klees S., et al. "A Report to the Minister of Education on Learning Needs and Alternative Pathways to Learning in the Perspective of an Integrated Response to the Needs of a Rapidly Developing Society in a Complex World." November, 1997. www.unesco.org/education/educprog/lwf/dl/moz97_11.pdf

Programme and other materials are all listed at: http://www.learndev.org and http://www.unesco.org/education/educprog/lwf/lwf_docs.html

M) Key contacts

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N) Financing and budget

The figures include the cost of the Nampula project, missions, production of instructional packages, components and consultancy.

US$ Thousands:
Year 1: $284.3
Year 2: $839.7
Year 3: $737.0
Year 4: $646.0
Year 5: $561.0

O) Last update

November, 1999

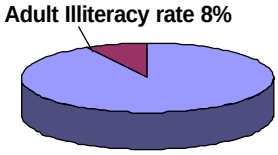
5. FIJI

Country Characteristics

Government type	Republic
Territory	18,300 Km^2
Population (1997)	813,000
Annual population growth (Average 1980-96)	1.4%
Urban population	480,000 (41%)
Population density	44 People/Km^2
Major villages and towns	NA
Average village size:	NA

- *Administrative divisions:* 4 divisions and 1 dependency*: Central Fiji, Eastern Fiji, Northern Fiji, Rotuma*, Western Fiji
- *Culture:* Heterogeneous, with 5 main ethnic groups: Fijian 51%, Indian 44%, European, other Pacific Islanders, overseas Chinese, and other 5%; and 3 languages: English (official), Fijian, Hindustani
- *Topography:* 90% Jungle/Forest and 10% Mountain.
    - *Climate*: Tropical marine; only slight seasonal temperature variation.

Education

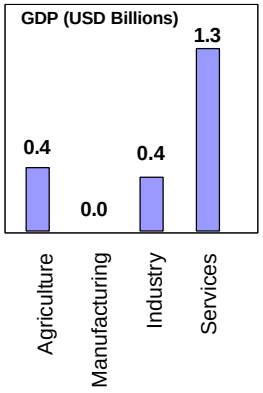


Illiteracy rate (1997)	8%
Public spending on education (GNP Share):	6.1%
Universities	NA

- *Gross enrolment ratio* (% of relevant age group)[1], 1990-95: Primary 128% and Secondary 64%, Tertiary NA

[1]Percentages may exceed 100% since enrolment includes repeaters and over-aged. Tertiary enrolment includes non-university diploma studies and programmes requiring secondary-education certificates.

Economy



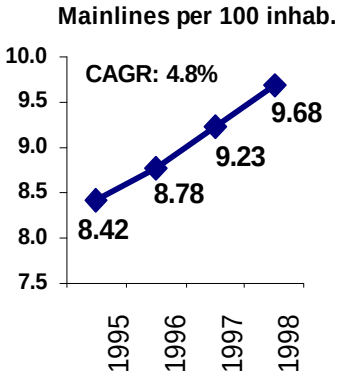
GNP, 1997	US$ 2 Billion
GNP/Cap, 1997	US$ 2,470
GNP/Cap PPP, 1997	US$ 4,040
GDP Growth, 1998	2.4%
Output (share of GDP), 1997	
Agriculture	21%
Manufacturing	0%
Industry	18%
Services output[2]	61%

[2]Services output includes Public Services

- *Government Revenues: (Share of GDP), 1996* NA
- *Industries:* sugar, tourism, gold, silver, clothing and lumber.
- *Agriculture products:* sugarcane, coconuts, cassava (tapioca), rice, bananas; cattle, pigs, horses, goats and fish

Information and Communications Technology

Telephony

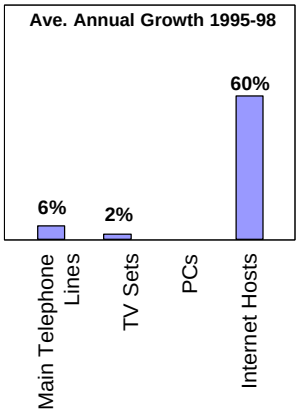


Main Telephone lines	
existing, 1998	77,100
expected. 2000	88,000
Compound Average Growth Rate, 1995-98	6%
Main Telephone lines per 100 inhab	
existing, 1998	9.7
exp. 2000	10.8
in urban areas, 1995	NA
in rural area, 1995	NA
Compound Average Growth Rate, 1995-98	4.8%

Quality and Investment

Digitalisation, 1998	99.7%
Telecom investment, 1998	US$ 10.8 Million
Telecom revenue, 1998	US$ 61.9 Million
Reinvestment ratio (Investment/Revenues):	17%

Internet and Media



PCs, 1998	NA
PCs per 100 inhab, 1998	NA
PCs per 100 CAGR[4], 1995-98	NA
Internet users, 1998	5,000
Internet users per 100 inhab, 1998	0.61
Internet users CAGR[3], 1995-98	315%
Internet hosts, 1998	21
Internet hosts per 100 inhab 1998	0.027
Internet hosts CAGR[4]	60%
ISPs, 1998	2
TVs, 1998	75,000
TVs per 100 inhab, 1998	9.7
TVs CAGR[4], 1995-98	2.3%
TV Broadcast stations, 1997 (repeaters not incl.):	3
Radios, 1996	500,000
Radios per 100 inhab, 1997	61.2
Radio Broadcast stations, 1997	8

[3]CAGR = Compound Average Growth Rate

5.1 Fiji: General Context

Fiji has a population of 813,000, which is half a million less than Trinidad & Tobago. With an area more than three times the size, it has a much lower population density. As well, Fiji has a much lower urbanization rate, at 41% compared to 73% in Trinidad & Tobago.

With a per-capita GNP of US$ 2,470, which is only slightly above half of Trinidad and Tobago's, the delivery of education in Fiji is relatively challenging.

According to the statistics, Fiji's education system has the following features:

- 8% illiteracy, which is well below the three African countries in the study (South Africa has the lowest at 18%), but high compared to Trinidad & Tobago's 2%
- secondary enrolment is relatively high at 64%, but lower than Trinidad & Tobago's 74%
- there is no published figure for tertiary education enrolment, which is believed to be relatively low

5.2 Environment & Function of ICT-Based Distance Education

For Fiji, only one project was looked at in detail: the distance education unit of the University of the South Pacific (USP). The Small Island Developing States Network (SIDSnet), a project initiated by the United Nations, is providing e-mail access and has web-pages, but is only at the end of this year planning a workshop to discuss distance education issues; it is therefore not discussed in detail here.

The USP's University Extension unit is focusing on the undergraduate level and has only limited postgraduate instruction. In addition to tertiary education, the Extension unit also has community outreach programmes and offers selected courses for continuing education.

Similar to the initiatives in Trinidad & Tobago, the Extension University is a regional project involving countries of the South Pacific.

5.3 Infrastructure and Technologies

Fiji had a teledensity of 9.7 per 100 inhabitants in 1998 which is close to South Africa's 11.5 per 100 inhabitants. There are only 0.61 Internet users per 100 inhabitants in Fiji compared to 1.54 in Trinidad & Tobago and 3.31 in South

Africa. With Trinidad & Tobago's higher per-capita GNP than South Africa but lower Internet penetration, it seems that Internet usage is not necessarily related to per capita income. The level of market liberalisation, particularly the number of ISPs and the rates they charge as well as the cost of telephone access obviously plays a large role in the early take-up of private Internet usage.

The university is using a satellite network, called USPNet, to provide two-way communications enabling teleconferencing. Currently five islands are hooked up to the system. A major upgrade of the satellite system is planned for the year 2000.

Satellite is the most appropriate transmission technology between islands. However, feasibility obviously increases with level of usage and economies of scale.

Other technologies used are PCs, Internet, CD-Roms, audio and video material.

5.4 Policy

5.4.1 Telecommunications & IT

The telecommunications sector in Fiji is not yet liberalized, although the government does plan to open the sector to competition. Telecom Fiji provides domestic telecommunications in Fiji while Fiji International Telecommunications Limited (FINTEL) is the international service provider.

FINTEL is 51% owned by the government and 49% by Cable and Wireless. Telecom Fiji is 51% owned by the government and 49% by the Fiji National Provident Fund (FNPF), the Fiji government's retirement benefit statutory body which all registered Fiji workers must join by law (100,000 members). The FNPF successfully bid for its 49% stake in Fiji Telecom Limited at the end of November 1999, outbidding foreign investors.

There are two ISPs. One is Telecom Fiji Internet Services, a business unit of incumbent operator Telecom Fiji Limited. Currently, connectivity in the Pacific has been hampered by the cost and slow speed of dial-up connections, and the lack of efficient service providers, a situation which is somewhat due to the small size of the markets.

There are no special plans for rural access or universal service in Fiji and no particular policy on the information society or information superhighways.

5.4.2 Media

Fiji Television Limited (FijiTV) is a commercial network that has one free and two pay channels (including Sky channel). Fiji One (TV channel) is 85% owned by the government of Fiji.

In October 1999, the government began setting up a TV service for Fiji, Western Samoa and Tonga via satellite from a ground station to be built in Fiji. The government also indicated that it is not interested in more licence applications for commercial television stations but will continue looking at applications for community television.

Radio is the main source of information and entertainment in Fiji - research shows that 90% of the population rely on radio and listen from five to seven hours a day. Fiji has seven AM radio broadcast stations, one FM and no shortwave stations.

There are two major radio stations, Island Network Corporation Limited and Communications Fiji Ltd. Although both are commercially run, the government of Fiji owns the Island Networks Corporation, formerly a fully government-funded body known as the Fiji Broadcasting Commission.

No information was found to indicate that Fiji is using radio and TV in any major way for educational purposes.

5.4.3 Education

Government policy on education is embedded in the Fiji 2020 plan that was approved in May 1999. The plan places emphasis on technical and vocational training which will enable students to find employment.

Like other countries in the South Pacific, Fiji has a large number of out-of-school youth, with a high proportion of its population under the age of 20 and high end educational capacity limited. The majority are not able to complete secondary school education but the Ministry of Education plans to introduce compulsory education for Forms Three and Four over a four year period, beginning in 2000.

In general, the cost of providing full access to senior secondary and tertiary education for a minority, at the expense of quality in basic education, is seen as a region-wide challenge throughout the Pacific Islands. Within post-secondary and higher education, the region's six largest countries - Fiji, Tonga, Solomon Islands, Kiribati, Vanuatu and Samoa - had capacity for only 4% of the 18-25 age group in 1995.

A particular problem for Fiji is that it has a high rate of failure among indigenous Fijian students. The government of Fiji will set aside an annual fund of US$ 45 million for special education needs of indigenous Fijians.

Another concern relates to rural schools. Education Minister Pratap Chand promised that rural schools will receive special attention to boost the academic performance. One solution is seen in twinning schools to produce better academic results even if it means sharing teachers.
The government has plans to ensure that all schools in Fiji have access to computers. Citing Singapore as an example, the Minister for Information and Communications, Mr. Ratu Inoke Kubuabola, said that Fiji should work to develop a highly educated workforce. However, to date the role of distance education in government priorities for higher education has not radically changed since the University of the South Pacific (USP) was planned in the 1960s as the South Pacific region's premier institution for higher education. Funding for distance education resides in USP's core budget.

Besides the University of the South Pacific (USP), Fiji also has a college of agriculture, school of medicine and nursing (Fiji School of Medicine), an institute of technology (Fiji Institute of Technology), a primary school teacher training college and an advanced college of education. Education Minister Pratap Chand announced in December 1999 that there are plans for the Fiji Institute of Technology (FIT) to become a fully-fledged technical university.

5.5 Sponsors: Interest, Key Motivations & Strategies

The USP does not have a wide range of sponsors. Approximately 80% of its funding comes from the twelve South Pacific Island governments. In the course of general development aid the donor agencies from the governments of Canada, Australia, Japan and the UK contribute between 10-20%, varying from year to year.

5.6 Country Evaluation

The geographic and demographic characteristics of the Fiji islands, with low population density on dispersed islands, make Fiji an ideal candidate for distance education.

While as yet Fiji has only initiated distance education for tertiary education, it has similar capacity problems in secondary education as well. One of the main deterrents to distance education is cost. The challenging geography favours satellite as the appropriate technology, though it also comes at high cost.

The solution could be twofold: first regional co-operation, which shares fixed costs and maximises usage should be advantageous. But also, ways of involving

and attracting the private sector for distance education projects should also be found. Currently, there are hardly any commercial sponsors involved.

One important step is liberalisation of the telecom sector, which would also likely attract more ISPs. This could boost the Internet usage, which is at present comparatively low. Another step would be a national education policy outlining government led initiatives and inviting and incentivising private sector partnership e.g., for school computers as well as satellite equipment.

5.7 Project Descriptions

5.7.1 Distance and continuing education at the University of the South Pacific (USP)

A) Short description of purpose

The University of the South Pacific has an autonomous unit called University Extension which allows students to study at the university without travelling to any of the three campuses. This unit provides distance education and continuing education to its 12 member countries and territories. It also includes community outreach programmes.

The university has established University Centres in all 12 countries, with a range of resources to support the programme at national levels. The resources include classrooms, a library, audio and video facilities, and some computer and science laboratories. The Extension unit offers courses and programmes which are equivalent to those offered on campus. It also offers continuing education with three courses offered by distance education, namely Pacific Preschool Teachers Certificate, Community Nutrition Certificate and Certificate in Disability studies.

Courses are conducted by a local tutor or by teleconferencing through the satellite link by the on-campus lecturer. Course materials comprise a multi-media package of books, audiotapes and videotapes.

Besides traditional methods, the University Extension unit uses a two-way satellite communications network called USPNET to deliver distance education. USPNet links 5 centres: Fiji, Vanuatu, Samoa, Tonga, and the Cook Islands.

B) Initiator (lead agency)

The University of the South Pacific (USP) is owned and partly funded by 12 member countries in the South Pacific region: Cook Islands, Fiji, Kiribati, Nauru, Niue, Marshall Islands, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu and Western Samoa. Already prior to its establishment in 1966/67 the USP was designed as a distance education institution.

The Extension Unit of the USP is based in Suva, Fiji.

C) Non-profit providers/ sponsors and area of sponsorship/ donation

- The 12 governments fund approx. 80% of the USP. Other income is from student fees.
- Donor agencies from Canada, Australia, Japan and the UK contribute approx. 10-20% to the annual budget of the USP, varying from year to year.

D) Commercial providers/ sponsors and area of sponsorship/ donation

No commercial sponsors, except occasionally small computer donations.

E) General key motivation/ interest of sponsors & strategic view of developments in these areas

The USP is committed to provide the governments and the people of its member countries with high quality, internationally recognised and cost-effective higher education and training, research, publications, and consultancy services.

F) Other participants

None found.

G) Type of users

Approximately 5,100 students per semester out of 9,500 in 12 Pacific nations and territories will get instruction through the satellite system. Two hundred individuals per semester are taking continuing education by distance education.

There is no record of the breakdown in female versus male students, and percentages are known to vary from island to island. However, there has been a report on women and distance education in the South Pacific[15].

[15] "South Pacific women in distance education: studies from countries of the University of the South Pacific", edited by Cema Bolabola and Richard Wah. Published by The University Extension of the South Pacific and The Commonwealth of Learning, 1995.

H) Function & environment of usage

The focus of teaching at the university is at the undergraduate level, with limited postgraduate instruction. Where feasible and in line with the requirements of member states, postgraduate teaching will be expanded.

I) Technology used

The project uses satellite tutorials and teleconferencing using a two-way satellite communications network. Currently five islands are hooked up to the system. The project also uses computer, Internet, CD-Rom, print, audio and video materials. In February 2000 a major upgrade of the satellite connection is planned.

J) Evaluation of project

N/A

K) Timeframe / plans

The USP was established in 1968.

L) Key material

The University of the South Pacific's University Extension - Distance & Continuing Education www.usp.ac.fj/ext

News articles 1999, and two brief 1-page descriptions by ICDL (International Centre for Distance Learning) and COL at www.usp.ac.fj

M) Key contacts

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University of the South Pacific, Fiji
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Tel. (679) 313 900 ext. 2515 Fax. (679) 302 556

N) Financing & budget

In the USP's Income and Expenditure Statements, income for 1998 is stated to be:

Government Contributions	$30,546,000
Student Fees	$7,250,000
Development Co-operation	$3,700,000
Other Income	$1,154,000
Total Income	$42,650,000

O) Last update

December, 1999

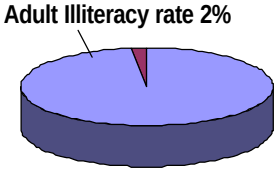
6. TRINIDAD & TOBAGO

Country Characteristics

Government type	Parliamentary Democratic
Territory	5,000 Km^2
Population (1997)	1.3 Million
Annual population growth (1998)	0.9%
Urban population	949,000 (73%)
Population density	260 People/Km^2
Major villages and towns	N/A
Average village size	N/A

- *Administrative divisions:* 8 counties, 3 municipalities, and 1 ward**: Arima*, Caroni, Mayaro, Nariva, Port-of-Spain*, Saint Andrew, Saint David, Saint George, Saint Patrick, San Fernando*, Tobago** and Victoria.
- *Culture:* Heterogeneous. Ethnic Groups: African-Caribbean 40%, Indian 40.3%, Afro-Indian14%, Caucasian 1%, Chinese 1%, and other 3.7%
- *Topography:* 75% Jungle and Forest, and 25% Mountain.
- *Climate*: Tropical; rainy season (June to December).

Education

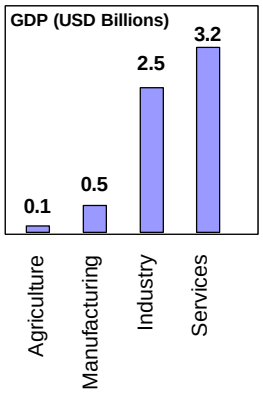


Illiteracy rate (1997)	2%
Public spending on education (GNP Share)	9.7%
Universities	N/A

- *Gross enrolment ratio* (% of relevant age group)[1], 1996: Primary 98% and Secondary 74%, Tertiary 8%

[1]Percentages may exceed 100% since enrolment includes repeaters and over-aged. Also, tertiary education includes non-full-time diploma courses that require secondary certificate.

Economy



GNP, 1997	US$ 5.5 Billion
GNP/Cap, 1997	US$ 4,230
GNP/Cap PPP, 1997	US$ 4,410
GDP Growth, 1998	3.2%

Share of GDP[2] ,1997:

Agriculture	2%
Manufacturing	8%
Industry	43%
Services[3]	55%

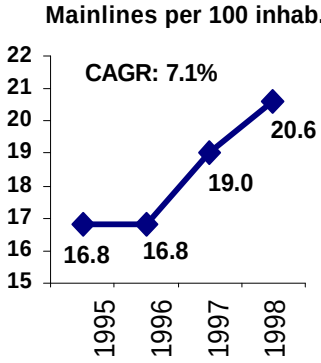
[2]Sum of shares may surpass 100% due to output overlaps

[3]Services output includes public services

- *Government Revenues: (Share of GDP), 1996:* 27.3%
- *Industries:* Petroleum, chemicals, tourism, food processing, cements, beverage and cotton textiles.
- *Agriculture products:* cocoa, sugarcane, rice, citrus, coffee, vegetables and poultry.

Information and Communications Technology

Telephony

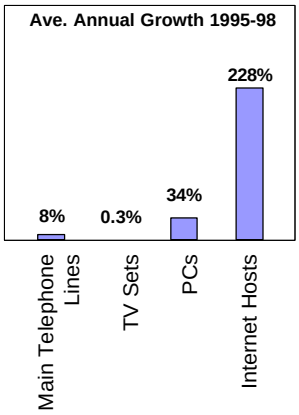


Main telephone lines:	
existing, 1998	264,100
expected, 2000:	301,000
Compounded average growth rate, 1995-98:	8.1%

Teledensity (main telephone lines per 100 inhab):	
existing 1998	20.6
expected 2000	22.7
in urban areas, 1995	21.1
In rural areas, 1995	4.3
Compounded Average Growth Rate, 1995-98:	7.1%

Telecoms Quality and Investment

Digitalization, 1998	100%
Telecom investment, 1998	US$ 34.4 Million
Telecom revenue, 1998	US$ 212.6 Million
Reinvestment ratio (investment/revenues):	16%



Internet and Media

PCs, 1998	60,000
PCs per 100 inhab, 1998	4.7
PCs per 100 CAGR[4], 1995-98	34%
Internet users, 1998	20,000
Internet users per 100 inhab, 1998	1.54
Internet users CAGR[4], 1995-98	117%
Internet hosts, 1998	1,944
Internet hosts per 100 inhab 1998	0.152
Internet hosts CAGR[4]	228%
ISPs, 1998	2
TVs, 1998	70,000
TVs per 100 inhab, 1998	33
TVs CAGR[4], 1995-98	0.3%
TV Broadcast stations, 1997 (repeaters not incl.):	5
Radios, 1996	700,000
Radios per 100 inhab, 1997	53.8
Radio Broadcast stations, 1997	11

[4]CAGR = Compound Average Growth Rate

6.1 Trinidad & Tobago – General context

Distance Education (DE) seems particularly suitable for Trinidad & Tobago, an archipelago whose geographical characteristics make communications particularly important. But the application of suitable technologies has been slow since it requires heavier investment and more users, for feasibility, than a country with Trinidad & Tobago's population can muster. This of course presents a large challenge for small countries in general, to which the natural response so far has been to act regionally. Thus DE in Trinidad & Tobago, as in many other small Caribbean countries, has been relying heavily on initiatives originated and led by regional organisations.

Since diverse regional players have taken the lead in DE in Trinidad & Tobago, projects are ambitious but co-ordination among them has become one of the main issues for success. Commitment and efficiency in co-ordination have implications for the time required to finish a project. Small countries thus have to organise themselves for relatively large projects, which may be a factor in their timeliness. In fact, the lack of good co-ordination seems to be one of the main reasons for slow progress. Part of this is because government did not foster policy and involvement in the process of telelearning and distance education until one year ago.

6.2 Environment and function of ICT-based distance education

Overall, Trinidad & Tobago has been relatively successful in the provision of basic education, although tertiary education remains an issue. The baseline data show the following features:

- Illiteracy is almost nil with about a 2% index.
- With gross enrolment ratios of 98% for primary and 74% for secondary education respectively, Trinidad & Tobago seems successful in providing education to these age groups.
- Tertiary education is reported to have an 8% enrolment ratio, which implies that university education needs to be fostered.

Professors and students in secondary and tertiary institutions seem to be the group that have taken the most advantage of distance education in the country, although DE initiatives are not aimed exclusively at these groups.

The following major projects were identified and used to gain an appreciation for the use of ICTs in Trinidad & Tobago:

- University of West Indies Distance Education Centres (UWI DEC)
- Caribbean University Network (CUNet)

- Edsat Americas Education and Health-Care Network (Edsat) - this project is still in its early phases.

	UWI DEC	CUNet	Edsat
Function of DE			
Primary (literacy, numeracy)			v
Secondary		v	v
Tertiary	v	v	v
Postgraduate research	v	v	v
Profession oriented			
Teacher training	v		
Continuing education	v		
Computer literacy		v	
Health education	v		v
Environment of DE			
Community			
Rural/ remote			v
Content production	v	v	
Access to education	v		v
Access to technology	v	v	v

The University of the West Indies (UWI) is a decentralised post-secondary institution with operations throughout the Caribbean. The UWI is one of the most active educational institutions in the region in terms of DE, and provides distance education to 15 countries throughout the Caribbean. It has more than 25 distance education centres (DECs), some of them equipped with audio-graphic teleconference facilities.

The UWI DEC system is headquartered in Cave Hill, Barbados. Among its main priorities are the expansion of its reach and number of courses throughout the Caribbean, especially to countries where it has no campus. In order to achieve this expansion, the institution has entered into agreements with other educational and governmental institutions and it is upgrading its technological infrastructure. The UWI DEC in Trinidad & Tobago is responsible for providing distance education in a number of areas including Education, Technology, Medicine and Agriculture among others. It also provides teleconferencing and library services to tertiary and continuing studies as well as to local secondary and health institutions.

CUNet is an Internet-based network linking academic, scientific, technology and research institutions in 16 countries of the region. Its benefits are not exclusive to these institutions, as connectivity is also intended to reach governmental organisations and others. But CUNet, like the UWI DEC, has universities and colleges as its main targets, and aims to enhance research and the quality of education in institutions of the Caribbean region.

This project started in September 1991 with the first communications node via dial-up in Puerto Rico. Since then, Trinidad & Tobago has obtained funds, equipment and technical assistance from OAS and UPR to set up ongoing e-mail services. In the mid 1990s however, CUNet suffered a setback with the turnover of some key participants and thus its original goals have been delayed. The project has achieved a greater success in Puerto Rico and Jamaica, where full Internet services have expanded widely and are readily available.

Edsat Americas is the most ambitious of the projects although not yet in operation. This planned project is a hemisphere-wide satellite-based network intended to provide equitable and affordable distance education, health services and training to citizens of the Americas, to promote growth and stability. The network involves almost all of the countries in the Americas hemisphere. Its main purpose is to provide distance education and training at all levels and in all areas, as well as health services, emphasizing women and rural and remote areas. In early 1999, the government of Trinidad & Tobago assumed a leading role in the development of the project.

6.3 Infrastructure and technologies

Satellite and the Internet are key elements in the future development of DE in Trinidad & Tobago, but given the country's current infrastructure, the most used means of DE in the country is still printed material. The pace of Internet development in Trinidad & Tobago, at 1.54 per 100 inhabitants, has to date been insufficient to make a large impact on learning and education. Nevertheless it should be noted that the telecommunications network is 100% digitalised and the number of Internet hosts more than tripled between 1995-98, to almost 2,000.

The UWI DEC in Trinidad & Tobago has been in operation in its current form for over two years. The DEC uses dedicated leased lines and dial access as its main telecommunications infrastructure for purposes of audio teleconferences. Presently, the DEC is replacing its analogue system with a digital one and there are plans to build a VSAT network. CUNet, the Caribbean University Network, is relying on the services of the incumbent provider in Trinidad & Tobago, which in turn uses satellite for part of its network.

The following chart describes the use of technology in the projects studied:

	UWIDEC	CUNet	Edsat*
End-user equipment			
PC	v	v	v
LAN	v	v	v
Telephone	v	v	v
Internet connection	v	v	v
E-mail	v	v	v
Touch screen info- kiosk			
Transmission technology			
Satellite broadcasting	v		v
Wireless	v		v
Fixed networks	v	v	
Content platform			
Web-page hosting	v	v	
CD-Roms	v		
Electronic DB	v	v	

Neither the UWI nor CUNet has yet been able to extend their reach to rural and remote locations, in part due to a lack of infrastructure in the country. The UWI delivers education mainly by printed study material, distributed by postal services. The UWI maintains that the student base is still not large enough to support on-going use of satellite for the delivery of ongoing courses. CUNet services in Trinidad & Tobago are mostly limited to e-mail.

Limitations in technology use in the DECs are partly due to a lack of infrastructure and the resulting low ICT penetration in the country as a whole. A teledensity of 20.6% puts Trinidad & Tobago among the lowest of the Caribbean Commonwealth countries, just above Jamaica, St. Vincent & the Grenadines, but lower than Grenada, Dominica and St. Lucia, which have lower per-capita income. Furthermore, Trinidad & Tobago has the second lowest density of Internet users, at 1.54%, in the Caribbean Commonwealth countries and is more than 1% below four countries which are lower income.

The current development of Edsat Americas illustrates the importance that satellite has in the future delivery of DE in the region. Yet satellite technology requires large investments and a large student base in order to be feasible, thus

it can be expected that Trinidad & Tobago will require partnerships to build and set up a wide area network.

6.4 Policy

In Trinidad & Tobago, the investment/revenue ratio of 0.16 is high relative to the Caribbean but below average for Commonwealth countries. An improvement (reform) in telecom policies could contribute to the development of a better investment environment.

6.4.1 Telecommunications & IT

Fixed basic services including international - not liberalised

Telecommunications Services of Trinidad & Tobago Ltd. (TSTT) has a monopoly on all telecommunications services in Trinidad & Tobago, including cellular service. TSTT is 51% state-owned and 49% owned by UK's Cable and Wireless (C&W), which has also controlled services in eight English-speaking Caribbean countries for many years. In October 1999, the government expressed interest in transferring its 51% stake in TSTT to a new holding company, which would eventually be sold to institutional and individual investors. C&W on the other hand, could either increase or divest its interests in the company.

By March 1999, the government of Trinidad & Tobago was in the process of amending the country's Telecommunications Act to end TSTT's monopoly and liberalise telephone operations in Trinidad & Tobago.

With regards to cellular services, the Government announced in September 1998 that it would open its market to competition. The government offered two licences, for which it received two bids.

There have also been changes in the structure of the governmental bodies ruling the telecommunications scene. On October 1999, the responsibilities of the leadership of the Ministry of Information, Communications, Training and Distance Learning were split between its current minister and Trinidad & Tobago's Prime Minister. The government also proposed to replace the regulatory body, the Public Utilities Commission (PUC), with the Regulatory Industries Commission (RIC). Policy formulation for the new regulatory body would rest with the Public Utilities Ministry. The establishment of a telecommunications authority has also been suggested.

Internet Service Providers (ISPs) - not fully liberalised

The ISP market does not seem to have reached a competitive status. Only two ISPs were identified in the Internet arena and one player, the Open Telecom Limited, a Trinidad & Tobago-based subsidiary of Computers & Controls

Holdings Limited, seems to have some degree of control of the market. The company also provides paging services and is one of the largest computer and wireless companies in the country.

Plans, programme or policy for rural access / universal access.

There is no evidence of a significant policy or regulations to support development of universal access.

Information society initiatives

No evidence of initiatives that specifically foster the use of ICT were identified, except that the government has agreed to spearhead the Edsat Americas project, in partnership with regional organisations (see Section 6.5).

6.4.2 Media

There are at least three private and two state-owned TV broadcasters. One of these state-owned networks, the Trinidad & Tobago Television (TTT), is a corporate enterprise in the hands of the state. The resources of the two state-owned broadcasters comprise the National Broadcasting Network (NBN). The government has recently appointed a new board for the NBN to have more influence over content, though this has generated some opposition. There are 11 radio stations, with at least one of these state-owned and part of NBN.

The Ministry of Education's Education Television Unit produces educational programmes. This unit produced educational programmes from the late 1970s and was absorbed by the Ministry in 1980.

6.4.3 Education

Overall, education in Trinidad & Tobago seems accessible and is one of the most important items in the national item (9.7% out of the total of US$2 billion). As a result, Trinidad & Tobago has a healthy 2% illiteracy rate. Secondary education is supported by funds from the World Bank.

The education system in Trinidad & Tobago includes both government and private schools owned and managed by various religious bodies and providing free education at the primary and secondary levels. Currently, the government has prioritised programmes to train educators and to establish primary, secondary and adult education centres.

However, despite the wide support for primary education in general, there is still need to foster ICT training, secondary and tertiary education. The education system has been criticised for not advocating quantity rather than quality, and for neglect of ICT. For instance, computers were not among the government's priorities for the 1999-2000 fiscal year. Computer literacy, the Internet and similar

technologies do not seem part of the national curricula and there is no evidence of plans to educate the educator on ICT.

The education system also faces a bottleneck at the tertiary level with enrolment at just 8% compared to 74% in secondary education. It is necessary to emphasise the importance of policies that encourage tertiary education in order to improve quality in the professional base of the country. DE with the use of ICT, could be a key element in the developing professionals more qualified to ultimately lead and promote telelearning methods.

The government does seem to envision the use of ICT in the long run since it is spearheading the Edsat Americas project, in partnership with the Organization of American States (OAS) and the National Education Telecommunications Organization Educational Satellite Institute (NETO/EDSAT).

In the short run, DE is expected to grow given the government's support. In December 1998, the government launched a DE programme and created a secretariat in charge of co-ordinating the different participants in the delivery of DE (such as the UWI) and managing DE projects in the country. However, most of DE will still be delivered in print material. Hence ICT is not expected to play an important role in the immediate future.

6.5 Sponsors: key motivations & strategies

Regional organisations committed to the country's development, education and technology have been particularly active in the creation, funding and management of DE initiatives. These include:

- The University of the West Indies, which has promoted DE development throughout the Caribbean. Support from the UWI to its Distance Education Centres includes US$276,600 for operations in Trinidad & Tobago during the 1998-99 term.

The Organisation of American States (OAS) has contributed to DE projects through the Hemisphere Wide Inter-University Scientific and Technological Information Network (RedHUCyt) and NETO/Edsat. RedHUCyt specialises in science and technology assistance. NETO/Edsat is a voluntary group that advocates use of satellites to promote development in the Americas.

The University of Puerto Rico (UPR), one of the most advanced universities in the Caribbean in terms of use of technologies and Internet, has been leading the development of CUNet throughout the Caribbean.

Other regional organisations contributing to the funding of regional DE include the Canadian International Development Agency (CIDA), which contributed in the funding of teleconferencing sites; the Caribbean Development Bank (CDB); the Inter American Development Bank (IADB); and the U.S. Agency for International Development (USAID).

The following national organisations are the main contributors to development of DE in Trinidad & Tobago:

The National Institute of Higher Education, Research, Science and Technology (NIHERST) is a research institute that is in charge of promoting research and development in technology. NIHERST has taken over the development of CUNet in Trinidad & Tobago and is currently in the process of acquiring equipment to connect 11 local institutions.

The Government is currently involved in the promotion of DE and is co-ordinating the activities of participants. The government has also assumed a leading role in the co-ordination and development of Edsat Americas.

Private institutions that have been involved, directly and indirectly, in DE development in the Caribbean are as follows:

Nortel Networks provided technical assistance in development of University of Puerto Rico's Internet network and, indirectly, the development of CUNet.

Lockheed Martin, Hughes Communications, BellCore International, Intelsat, AT&T Skynet Satellite Services, Westinghouse Communications and Arel Communications and Software Ltd. of Israel, among others, have supported NETO/Edsat.

The main motivation of the commercial sponsors clearly is to promote the use of specific satellite and Internet technologies. There appears to be an increasing level of private participation in Caribbean DE development, reflecting interest in the market worldwide. Edsat Americas represents a sufficiently large hemispheric network to attract the major companies. The participation of private companies also provides evidence for the eventual sustainability of the DE technology market, thus minimising the subsidies required in the long run.

6.6 Country Evaluation

The future for distance education holds some promise but timely development in the large regional projects will depend in part on the efficiency of co-ordination. CUNet, which began in 1991, has yet to provide full Internet services in Trinidad

& Tobago. Thus progress in the use of ICT has been rather slow. In part this is because the projects require a large amount of investment, which in turn demands participation of several organisations, whose activities need co-ordination by a national organisation.

The national government has finally involved itself in the creation of a secretariat to foster, co-ordinate and administer distance education. The UWI has also reached agreements with other institutions to extend the reach of its courses. Once the pieces come together, the number of users should justify the use of satellites, which already play a key role in other Caribbean countries such as Jamaica and Puerto Rico.

More participation by the national government, through the ministries of education (e.g., in training of educators) and telecommunication as well as Telecom Services of Trinidad & Tobago Ltd. (TSTT), is crucial to reduce delays in the development of projects resulting from member turnovers. However, more rapid liberalisation of markets would surely also contribute more energy and investment, as well as a universal access mechanism to promote rural network expansion.

It is also important to emphasise that DE, like other endeavours, requires the participation of education and telecommunication areas and thus, depends strongly on a good policy that encourages investment in technology. Telecommunication policies in the government of Trinidad & Tobago should foster a good investment climate by encouraging competition in all its areas.

6.7 Project Descriptions

6.7.1 University of West Indies Distance Education Centres (UWI DEC), Trinidad & Tobago

A) Short description of purpose

The UWI DECs in Trinidad & Tobago are headquartered in St. Augustine and are responsible for providing teleconferencing and electronic library services to a number of institutions in the country, including the local UWI School of Continuing Studies (SCS), 13 centres in secondary schools, hospitals and other locations.

Trinidad & Tobago DEC belongs to the UWI DEC System, which provides distance education to 15 countries in the Caribbean, including Anguilla, Antigua & Barbuda, Bahamas, Barbados, Belize, British Virgin Islands, Cayman Islands, Dominica, Grenada, Jamaica, Montserrat, St. Kitts & Nevis, St. Lucia, and St. Vincent & the Grenadines.

The UWI DEC Caribbean headquarters are in Barbados (Cave Hill) with an additional branch in Jamaica (Mona). More than 25 DECs have audio-graphic teleconference facilities. Total enrolment at UWI was 18,000 students in 1997.

B) Initiator (lead agency)

University of West Indies - Cave Hill Campus, Barbados.

C) Non-profit providers/ sponsors and area of sponsorship/ donation

International:

Canadian International Development Agency (CIDA)

Caribbean Development Bank (CDB)

Inter American Development Bank (IDB)

USAID (U.S. Agency for International Development)

D) Commercial providers/ sponsors and area of sponsorship/ donation

No commercial participants were identified.

E) General key motivation/ interest of sponsors & strategic view of developments in these areas

The UWI seeks to expand the number of institutions located in countries where there is no UWI campus, especially through its Schools for Continuing Studies. This goal is congruent with UWI's Strategic Plan 'Outreach to the Non-Campus Countries 1998-2002'. The plan helps UWI and other sponsors improve education and continuing studies, health care and rural development to promote sustainable socio-economic growth in the regions.

F) Other participants

Some non-UWI institutions, such as the Institute of International Relations, and the Caribbean Agricultural Research and Development Institute, have entered into affiliation agreements with the UWI and may benefit from its DECs.

Private tutors finance some of the students' tuition in non-campus countries.

G) Type of users

The users are secondary and university students, adults wishing to continue their education regardless of whether there is a UWI campus or not, and health institutions (e.g., hospitals associated with the University's Faculty of Medical Studies).

H) Function & environment of usage

The purpose of the DEC is to expand the reach of a number of courses from the UWI, and other universities and secondary institutions affiliated with them. These courses include Agriculture and Fisheries, Business (Accounting, Business Administration), Applied Science, Technology, Education, Languages, Law, Medicine and Social Sciences, among others.

I) Technology used

Printed material is by far the means most utilised for delivery of DE, in part due to lack of infrastructure available to reach remote areas. However, some technological innovations are taking place for a few activities. Teleconferencing, e-mail and electronic file transfer, video and audio-tapes complement print material and face-to-face lectures. Currently, the UWI uses dedicated leased lines and telephone dial access as its main telecommunications facilities.

At present, the UWI is digitalising its system. UWI is also integrating into its system the use of satellite (VSAT), ISDN links, routers, multi-plexers, switches and bridges capable of carrying voice and data traffic. There are plans to make Internet versions of some physics courses and its upgrade to videoconferencing. The university is upgrading its technological infrastructure, computers, and connectivity as part of a shared effort throughout the eastern Caribbean.

J) Evaluation of project

The upgrade of UWI DEC facilities is experiencing teething troubles and thus UWI DEC has yet to provide fully integrate technological innovations to most of its users.

K) Timeframe / Plans

1983-84: The UWI Distance Teaching Experiment (UWIDITE) started to provide a telephone-based system that combined print and teleconferencing to deliver lectures.

1993: UWIDITE evolved into DEC. UWI became a dual mode (DE and face-to-face lectures) university. DE thus became an ongoing function of the university.

1998-2002: Currently focused on upgrading technology in two phases:

- Phase I: Replacing analogue lines by digitalized 64K lines to link computer labs, installation of a tele-writer system. It also entails establishing a second teleconference room at many of the sites to increase the capacity.
- Phase II: Establishment of a 384 kbps compressed video capability using VSAT to achieve enough capability to transmit from any of the three

campuses to all the countries. Return audio will be carried over the existing landline network.

L) Key Material

UWI's web-site: www.uwichill.edu.bb

DECs directory: http://www.uwichill.edu.bb/bnccde/dec.htm

Website of the university's Board for Non-Campus Countries and Distance Education: www.uwichill.edu.bb/bnccde

"Towards a Strategic Plan for Outreach to the Non-Campus Countries, 1998-2002". Draft Document for the Board of Non-Campus Countries and Distance Education, May 1998. www.uwichill.edu.bb/bnccde/docs/spon.html

"Policies on Distance Education and Outreach Activity" in the Commonwealth of Learning report, "The Development of Virtual Education: A global Perspective", June 1999, pp 50-57. www.uwichill.edu.bb/bnccde/docs/depolicy.html

M) Key Contacts

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Tel: (868) 645 2995; Fax: (868) 645 2424, disted@tstt.net.tt

Prof. Badri N Koul, Director
Distance Education Centre, Cave Hill Campus, University of West Indies
P.O. Box 64, Bridgetown, Barbados
Tel: (246) 417 4496/4497/4498 Fax (246) 421 6753 bkoul@uwichill.edu.bb

N) Financing & budget

US$ 3.75 million for UWI DEC's over-all operations (1998-99); of those, US$ 276,600 were allocated to the operations of the DEC in Trinidad & Tobago.

O) Last Update

December, 1999

Caribbean University Network (CUNet), Trinidad & Tobago

A) Short description of purpose

CUNet is an Internet-based network that seeks to link academic, scientific, technological and research institutions in the Caribbean region in order to provide higher quality education in the region. The network intends to interconnect institutions from the following countries:

Puerto Rico, Antigua, Bahamas, Barbados, Belize, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, St. Kitts & Nevis, St. Lucia, St. Vincent & the Grenadines, Suriname and Trinidad & Tobago.

In Trinidad & Tobago, the network has sought also to interconnect project participants, the Ministry of Education, and other institutions to the Internet.

B) Initiator (lead agencies)

- University of Puerto Rico (UPR) (co-initiator, lead, technical support, funding).
- Organization of American States (OAS) through the Hemisphere Wide Inter-University Scientific and Technological Information Network (RedHUCyt) (co-initiator, technical assistance and funding).

C) Non-profit providers/ sponsors and area of sponsorship/ donation

University of the West Indies (UWI) (Initial local project management).

In-country:

- National Institute of Higher Education (NIHERST) - Current local project management.

D) Commercial providers/ sponsors and area of sponsorship/ donation

International: Nortel Networks (supplier of hubs and routers to UPR).
In-country: No commercial supporters identified.

E) General key motivation/ interest of sponsors & strategic view of developments in these areas

To improve the information flow of research material and increase the quality of research and education in the countries involved.

Commercially, to upgrade Internet technology in the region and boost the use of the Internet, not only in academia but also among other public and private users.

F) Other participants

There are current negotiations to secure more involvement by the government of Trinidad & Tobago.

G) Type of users

Students and faculty members in universities and colleges.

H) Function & environment of usage

College and university research.

I) Technology used

The Internet is the main technology. The system in Trinidad & Tobago includes the use of routers and servers to access the Internet through the national PTT, Telecom Services of Trinidad & Tobago Ltd. (TSTT). Currently, most of the ICT activity is limited to e-mail.

J) Evaluation of project

CUNet has had mixed results. While the local project manager (NIHERST) has arranged enough funding for basic equipment, CUNet in Trinidad & Tobago has seen slow progress in the development of its Internet-based university network for academic purposes, in part due to the turnover of personnel / institutions involved in the project, which hindered its continuity. CUNet has been more successful in Jamaica and Puerto Rico, where substantial developments have taken place, including a satellite connection to the U.S.

K) Timeframe/ plans

Phase I: Commenced in September 1991 with the first electronic node for communications via dial-up in Puerto Rico. During this phase, Trinidad & Tobago has obtained funds, equipment and technical assistance from OAS and UPR to set-up ongoing e-mail services.

Phase II: NIHERST take over project management from UWI in Trinidad & Tobago. Currently, NIHERST is in the process of acquiring equipment and seeks to connect 11 local institutions.

Intended future plans are for NIHERST to upgrade equipment to access full Internet services.

L) Key material

Description of CUNet in RedHUCyT site:
www.redhucyt.oas.org/webing/cunet.htm

Nortel's case study on the University of Puerto Rico Educational Network: www.nortelnetworks.com/products/02/studies/2727.html, www.nortelnetworks.com/solutions/education

M) Key contacts

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Office of Science and Technology, Organization of American States
1889 F Street NW, Washington, DC 20006
Phone: (202) 458-3340/53, Fax: (202) 458-3167
E-mail: shahn@umd5.umd.edu or Hahn_Saul@oas.org

Jocelyn Lee Young, Acting Registrar
National Institute of Higher Education, Research, Science and Technology (NIHERST), 20 Victoria Avenue. Port of Spain, Trinidad & Tobago
Tel (868) 625-2110/4145, Fax (868) 625-4161/5201
E-mail: niherst@opus.co.tt

N) Financing & budget

The annual budget from OAS-RedHUCyT for the development of CUNet in Trinidad & Tobago amounts to about US$45,000. The budget was originally higher during UWI management, but has been reduced since its hand-over to NIHERST.

O) Last update

December, 1999

Satellite-based Education and Health-Care Network for the Americas, Trinidad & Tobago

A) Short description of purpose

This planned project is a hemisphere-wide satellite-based network intended to provide equitable and affordable distance education, health services and training to citizens of the Americas to promote growth and stability. The network involves almost all of the countries in the American continent.

B) Initiator (lead agencies)

- National Education Telecommunications Organization /Education Satellite (NETO/Edsat) is a Washington-based private volunteer group (Initiator, co-management, funding)
- Government of Trinidad & Tobago - Department of Information, Communications, Training & Distance Learning (Lead)

C) Non-profit providers/ sponsors and area of sponsorship/ donation

International:
The Organization of American States (OAS) – Funding.

In-country:
Other universities (Not-specified).

D) Commercial providers/ sponsors and area of sponsorship/ donation

International:

Lockheed Martin (equipment, technical assistance).

Supporters of NETO/Edsat: Contributions and grants from Hughes Communications, BellCore International, Intelsat, AT&T Skynet Satellite Services, Westinghouse Communications and Arel Communications and Software Ltd. of Israel, among others (funding through NETO/Edsat).

In-country:

Unidentified private institutions

E) General key motivation/ interest of sponsors & strategic view of developments in these areas

- To take full advantage of satellite technology to provide wide-coverage education and health services to the Americas and achieve socio-economic development.
- To foster the use of satellite equipment in the Americas.

F) Other participants

The Inter-American Development Bank and other Multi-lateral institutions have been approached for support. NETO/Edsat members include schools, colleges, government agencies, industry and public officials from the US and other countries.

G) Type of users

Users are students of all levels and workers, regardless of wealth. Special attention is given to women and hard-to-reach populations.

H) Function & environment of usage

Education levels ranging from basic to post-graduate, continuing studies and training for blue-collar workers; research and health.

I) Technology used

Includes multimedia, broadcasting/video (including cable and one-way video), two-way audio, Internet, Point-to-multipoint connections, and telephone. Most of the information is delivered via satellite. Main hub sites are located in the USA, Chile and Brazil.

J) Evaluation of project

The project has not begun. Evaluation may be done by observing the funding already raised; problems, obstacles etc.

K) Enabling policy

Mandate from 'The Declaration of Santiago' and the related Plan of Action signed during the II Summit of the Americas, Santiago, Chile, April 18-19, 1998. The summit's main focus was education. The documents, although not legally binding, are strong political commitments by the democratic governments of the Americas.

L) Timeframe/ plans

- 1996-98 - Phase I: Project conceptualisation and planning by NETO/Edsat. The project finally became mandated in April, 1998.
- April 1999 - Phase II: The OAS, Government of Trinidad & Tobago, and Lockheed Martin, among others, agree to collaborate. They set the groundwork for the project at its inauguration. The project members are establishing a structure, including members of all the Americas.
- 3-5 years after start: The system intends to deliver teaching and educational resources and connect 2,000 cities, towns and villages with 20,000 integrated multi-technology receiver sites. Initial sites in 11 countries include Trinidad & Tobago.
- 5-7 years after start: The system intends to serve about 50,000 schools, community and health centers throughout the hemisphere.

M) Key material

Summit of the Americas, Santiago, Chile, April 18-19, 1998
http://www.asil.org/peay.htm

Satellite-based Education and Health-Care Network for the Americas project description, background and mission: http://www.ybiz.com/edsatamericas

'Trinidad & Tobago: Plans for Satellite-based Education Project' in Reuters, March 29, 1999.

N) Key contacts

Shelly Weinstein, President and Chief Executive Officer
National Education Telecommunications Organization/Education Satellite (NETO/Edsat), 1899 L Street, NW, Suite 600, Washington, DC 20036 USA
Phone: 202-293-4211, 458 6412/3794 Fax: 202-293-4210, 458-3538
Email: neto-edsat@mindspring.com, neto-edsat@oas.org
Website: http://www.ybiz.com/edsatamericas, http://www.netoedsat.org

Roy Thomasson, Organization of American States RThomasson@oas.org

O) Financing & budget

Total estimated costs for the project are US $600 to $800 million, which includes: satellites, uplinks and full broadcast quality production centres, operating costs, and classroom/ end user equipment. The infrastructure and operating costs, estimated at $400 to $500 million, is being set up with funding from the World Bank, the IADB (Inter-American Development Bank), countries involved, the private sector and institutions.

Costs for classroom/ end user equipment and operation, estimated at $200 to $250 million, would be funded by the World Bank, the IADB, the country, and the institution.

Costs per student over a five year period are estimated at $12 to $20, depending on the number of students. Per student costs should drop dramatically per year thereafter, following the initial outlays for hardware and software. Curriculum, programme and instructional content costs are borne by higher education institutions, schools, cultural and other participating institutions.

P) Last update

December, 1999

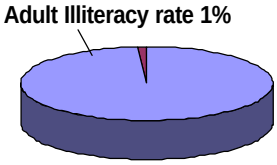
7. CANADA

Country Characteristics

Government type	Federation with Parliamentary Democracy
Territory	9.22 Million Km^2
Population (1997)	30.3 Millions
Annual population growth (expected 1997-2015)	0.5%
Urban population	23.3 Million (77%)
Population density	3.3 People/Km^2
Major villages and towns	N/A
Average village size	N/A

- *Administrative divisions:* 10 provinces and 3 territories*; Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland, Northwest Territories*, Nova Scotia, Nunavut*, Ontario, Prince Edward Island, Quebec, Saskatchewan and Yukon Territory*.
- *Culture:* Heterogeneous, with 5 main ethnic groups (British Isles origin 40%, French origin 27%, other European 20%, Asian 11.5%, and Amerindian 1.5%, among others. Two official languages: English and French
- *Topography:* 50% Forest, 15% Mountain, 15% Prairie, and 20% Tundra.
  - *Climate*: Mild/cool in the south; sub-arctic and arctic in the north.

Education

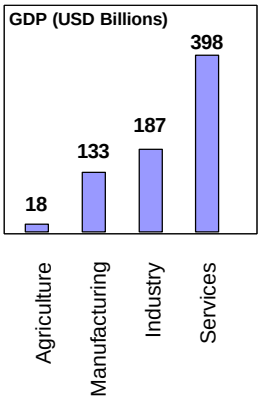


Illiteracy rate, 1997	1%
Public spending on education (GNP Share)	7.0%
Universities	N/A

- *Gross enrolment ratio* (% of relevant age group)[1], 1996: Primary 102%, Secondary 105% and Tertiary 90% (including non full-time)

[1]Percentages may exceed 100% since enrolment includes repeaters and over-aged. Tertiary enrolment includes non-university diploma studies and programmes requiring secondary-education certificates.

Economy



GNP, 1997	US$ 583.9 Billion
GNP/Cap, 1997	US$ 19,290
GNP/Cap PPP, 1997	US$ 21,860
GDP Growth, 1998	2.2%

Output (share of GDP[2]), 1997	
Agriculture	3%
Manufacturing,	22%
Industry	31%
Services[3]	66%

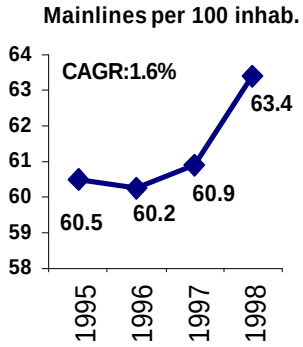
[2]Sum of shares may surpass 100% due to output overlaps

[3]Services Output includes Public Services

- *Government Revenues: (Share of GDP), 1996:* 21%
- *Industries:* Processed and unprocessed minerals, wood and paper products, food products, transportation equipment, chemicals, fish products, petroleum and natural gas.
- *Agriculture products:* corn, wheat, beef, poultry and dairy products, among others.

Information and Communications Technology

Telephony



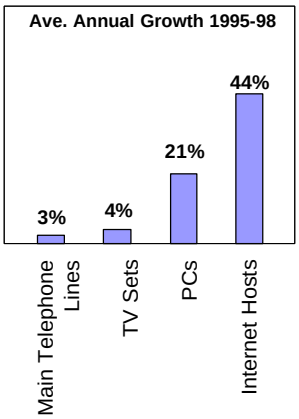
Main telephone lines	
existing, 1998	19.2 Million
expected. 2000	20.3 Million
Compound average growth rate, 1995-98:	2.6%

Main Telephone lines per 100 inhab	
existing, 1998	63.4
expected, 2000	67.6
in urban areas, 1995	N/A
in rural areas rural, 1995	N/A
Compound Average Growth Rate, 1995-98	1.6%

Quality and Investment

Digitalization, 1998	99%
Telecom investment, 1998	US$ 4.0 Billion
Telecom revenue, 1998	US$ 16.9 Billion
Reinvestment ratio (Investment/Revenues):	23%

Internet and Media



PCs, 1998	10 million
PCs per 100 inhab, 1998	33.0
PCs per 100 CAGR[4], 1995-98	21%
Internet users, 1998	7.5 Million
Internet users per 100 inhab, 1998	24.8
Internet users CAGR[4], 1995-98	83%
Internet hosts, 1998	1.12 Million
Internet hosts per 100 inhab 1998	3.694
Internet hosts CAGR[4]	44%
ISPs, 1998	210
TVs, 1998	21.5 Million
TVs per 100 inhab, 1998	71.5
TVs CAGR[4], 1995-98	4%
TV Broadcast stations, 1997 (repeaters not incl.):	80
Radios, 1996	32.3 Million
Radios per 100 inhab, 1997	106.6
Radio Broadcast stations, 1997	376

[4]CAGR = Compound Average Growth Rate

7.1 Canada - General context

With a 1997 per-capita GNP of US$ 19,290, Canada is the fifth highest income country in the Commonwealth, after Singapore, Brunei Darussalam, the United Kingdom and Australia. It is by far the highest income country in the study group, with the next highest, Trinidad & Tobago, at US$ 4,230.

The population is approximately 30 million. Geographically it is the second largest country in the world after Russia, and only Australia, Namibia and Botswana have lower population densities. The country is 77% urbanised, hence 7 million people live in rural or dispersed communities.

Canada's illiteracy rate, as expected, is low at 1%. Primary and secondary educational enrolment is about 100% of the respective age groups (higher when remedial students are included). Recorded tertiary enrolment, at 90%, is the highest in the Commonwealth but is inflated by the fact that all post-secondary education is accounted for, including people in part-time attendance and those taking short-term individual courses. This reflects the trend in Canada for many people to be taking courses that interest them or upgrading themselves continually, which is a very important factor in the demand ICT-based learning and distance education.

7.2 Environment & function of ICT-based distance education

As a vast and recently settled country with a highly resourceful populace, Canada has a communications tradition and has recorded many 'firsts' in the design and deployment of telecommunications technology and networks, not least of which was Telesat, the world's first nationally owned and operated domestic satellite system. Canada's use of satellite technology to reach out to rural and remote communities with basic telephone as well as distance education services is therefore well established. Almost all of its major Universities have distance education departments, and British Columbia's Open Learning Agency is a world leader in the field of open learning.

Telecommunications, computing and software development are also large industries, with some of the world's leading firms such as Nortel being Canadian based or headquartered. With the nation's geographic size, its leading role in the telecommunications industry and its status as an advanced economy, it is not surprising that Canada is also in the forefront of the use of ICTs for learning and distance education. It also follows that many Canadian companies consider educational technology to represent a large market opportunity.

Canada has many hundreds of ICT initiatives in learning and distance education. These can be broadly categorised as being addressed or targeted towards the following communities of interest:

- 'Kindergarten to Grade 12' (K-12) elementary and secondary school networks
- Post-secondary education programmes including 'Open Universities'
- Professional/workplace training and skills
- Lifelong learning
- 'Educating the educators'
- Health education
- Rural and remote communities
- Language minorities and native ('First Nations')
- Post-graduate research

As a Federal country, with 13 provinces and territories, a feature of the ICT landscape is that both the Federal and Provincial Governments have played a major role in promoting, scoping and 'seed financing' a range of ICT-based learning and education initiatives. The Federal programmes include, but are not limited to, the following 'flagship' projects and programmes:

- The Canadian Network for the Advancement of Research, Industry and Education (CANARIE) is both an operational network which forms a high speed backbone to many regional educational and research networks, and a funding programme for development of educational, research and commercial development projects
- The Learning Technologies and Community Learning Networks (CLN) initiatives of the Office of Learning Technologies (OLT), within a department of Government 'Human Resources Canada,' are geared towards the 'lifelong learning' needs of the Canadian populace in adapting to the demands of the information economy. The programmes fund ICT-based learning projects and have a database of 111 funded projects in which it has partnered with Universities, colleges, labour unions, school teacher associations, industry and business associations, community groups, etc.

In addition and as an illustrative set of initiatives and programmes at the federal and provincial level, we have summarised the following in this report:

1. *SchoolNet,* a Federal 'flagship' programme which has achieved the objective of connecting all of Canada's K-12 schools (16,500) and public libraries (3,400) to the Internet and providing or funding development of a wide range of web–based resources. Telecommunications facilities range from affordably priced dial-access to 'DirecPC' satellite links to First Nations schools.
2. *Community Access Programme (CAP),* another Federal programme enabling small and remote communities to obtain affordable access to the Internet at

'Community Access Centres.' The beneficiaries of CAP are general citizens, small businesses and community groups who also assist the centres to become financially self-sufficient through user charges and other means.

3. *Telemedicine and Educational Technology Resources Agency (TETRA),* an initiative of Memorial University, Newfoundland, which facilitates ICT - satellite video-conferencing, audio-conferencing, and a range of other tools - for health, telemedicine, professional development and distance education purposes in non-urban, remote and isolated areas of Newfoundland and to some developing country communities.
4. *Vista District Digital Intranet,* another Memorial University, Newfoundland initiative offering advanced placement courses (e.g., Chemistry, Physics, Mathematics and Biology) via 'DirecPC' satellite and other means to young adult learners in rural community high schools.
5. *Athabasca University, Canada's Open University,* one of Canada's leading distance education institutions, which offers full Bachelor Degree programmes predominantly through home study using a combination of ICT - Internet, CD-ROM, cassettes, videotapes, audio and video conferences - and print materials.

The above are illustrative only, and there are many other programmes and initiatives in each category which could have been described. They all appear to be successful, with broad impact and usefulness, although their historical record varies from pilot phase (Vista) to very well established (Athabasca). The following table summarises how extensively the Federal programmes and case studies address interest group categories cited earlier.

	CANARIE	OLT	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5
K-12 SCHOOLS	v		v			v	
POST-SECONDARY	v					v	v
PROFESSIONAL & SKILLS TRAINING	v	v			v		
LIFELONG LEARNING	v	v		v			
COMMUNITY DEVELOPMENT		v		v	v		
EDUCATING THE EDUCATORS	v	v					
HEALTH EDUCATION					v		
RURAL AND REMOTE COMMUNITIES			v	v		v	
LANGUAGE MINORITIES & 1ST NATIONS			v	v			
POSTGRADUATE RESEARCH	v						

Canada's activities in the ICT field offer a rich array of opportunities for virtually all interest groups, and on the back of the government and institutional initiatives there is now a wide range of private players and commercial programmes

available through the Internet. A huge market for technology based learning and education is thus emerging.

No single study or report can provide an exhaustive overview of this market and none have been identified that attempt to do so.

7.3 Infrastructure and Technologies

Canada's telephone penetration (more than 63 lines per 100 people), Internet penetration (25 users per 100 population) and the quality of service offered place it ahead of all other Commonwealth countries and near to the top of the world list. It also enjoys a level of liberalisation, competition and pricing structure which make it among the world's most favourable markets from the customer perspective.

As noted previously also, Canada has experimented with and used satellite systems for as long as the technology has been around. In addition, Canada was one of the first to use multi-access radio for rural telephony, and one of its companies (SR Telecom) is a world leader in rural telecommunications systems.

Nevertheless, low costs and affordable access to high quality conventional telephone lines or higher speed facilities have been a burning issue for many rural communities and regions across the country. Many 'First Nations' communities have also been without service adequate for them to make full use of modern Internet services. It is these challenges which have given birth to initiatives such as SchoolNet, Community Access Programme, TETRA, Vista, etc.

Most initiatives make use of the broadest possible range of ICT products. In the case of Canada, it is impossible to summarise the use of technology easily, since the market openness, degree of entrepreneurial energy, and Government 'seed funding' resources focused onto distance education have created an almost limitless supply of technology.

However, it is possible to identify that traditional tools such as written materials, audio cassettes and videotapes, which have proven their worth in open learning environments (and should still be used wherever appropriate in some distance education environments around the world), are irreversibly giving way to more interactive, Internet-based techniques. These techniques will fit better with the new information society modes of operation – independent, home based, PC-oriented – and the lifestyles of the new millennium.

Since these techniques are becoming more and more 'enriched' and require ever-faster access circuits, the important telecommunications technologies will increasingly be those which offer high-speed access, namely:

- cable Internet, ADSL and LMDS radio in the urban environment (these will be supplied respectively by Cable TV, local telephone and new media wireless operators)
- 'DirecPC' and other fast-access VSAT techniques in remote areas, combining satellite technology with the same access-media-transparent software as used in urban environments.

On the user interface level, the case of Canada shows that there will be a large and rapidly growing market for advanced education-related web based servers and enriched learning software.

7.4 Policy

7.4.1 Telecommunications

Until the early 1990s the Canadian telecommunications was dominated by a family of monopoly telecom operators, mostly constituted provincially but organised into a co-operative alliance called Stentor, which had the mandate to organise national interconnection, harmonise standards and tariffs, and administer long-distance revenue sharing between the operators. Telesat, the national satellite operator, and Teleglobe, which retained a monopoly over international public service until 1999, were also part of the alliance.

Commencing with long distance liberalisation in 1993, the market has been progressively opened up to competition such that customers now have a full choice of services, although the physical connections for basic telephone services are still predominantly provided by the incumbent local operating companies. Internet services are also predominantly accessed over incumbent operators' facilities – with the latest digital subscriber line (DSL) technology offering high speed access over copper wires – while a new generation of local service providers is also now competing in the small and home-based business and eventually the higher end residential markets. The latter is only in key urban centres to date.

7.4.2 Universal service and rural areas

The liberalisation of Canada's telecommunications market is enshrined in the recently enacted Telecommunications Act, which also outlines the Canadian Government's policy of ensuring that reliable and affordable telecommunications services of high quality be accessible to Canadians in both urban and rural areas in all regions of the country. This 'universal service' obligation, which includes some very high cost areas, is currently the responsibility of the incumbent operator. The national regulator – the Canadian Radio-television and Telecommunications Commission (CRTC) – has reviewed the issues surrounding the fulfilment of this obligation in high cost areas in a competitive

environment and confirmed the incumbents' responsibility until such time as effective local service is a reality.

Whereas the costs of universal service provision are, in principle, met through a special fund generated by contributions from all long distance service providers, the quality of telephone service in some rural and remote areas is inferior to that enjoyed by urban customers. As well, most have very limited local calling areas, hence the need for auxiliary initiatives such as CAP (described in Section 7.2) to assist with defraying the cost of accessing or creating Internet and related information services.

7.4.3 Information Technology Policies

A number of policy initiatives, which are evidenced by the programmes described in Section 7.2, have been developed to enhance Canadians' access to the essential tools of the information economy. These include both funding for hardware and software developers as well as users, and infrastructure projects such as CANARIE.

Canada's policies, outlined in a range of fora such as Parliamentary speeches, party platforms and departmental (e.g., Industry Canada or Human Resources Canada) strategies, have variously been labelled 'Information Highway' or 'Information Society' initiatives. Many separate programmes, including the Federal ones noted previously (e.g., SchoolNet, CAP, and one entitled 'Canadian TeleLearning Network of Centres of Excellence' or TL-NCE), come under the Information Highway umbrella, in which Industry Canada has been the government's nominated lead agency.

The Federal Government of Canada's Information Highway Advisory Council made 224 recommendations calling on provincial governments, the private sector and individual Canadians to take action to advance the Information Highway in Canada. These recommendations addressed a wide range of issues, including a need to establish a lifelong learning culture in Canada.

One of Industry Canada's goals was to help Canadian educational institutions keep up with other leading institutions worldwide, which are increasingly adopting distance learning and on-line learningware to improve their education and lifelong learning systems. Thus it began funding and initiating programmes such as SchoolNet and the many projects which fall under it, to ensure the information highway reaches every K-12 school classroom and virtually every student has an opportunity to make effective use of on-line services for learning purposes.

Industry Canada's larger goals include restructuring education to use IT as a means of promoting the development of Canadian high-technology businesses and encouraging the growth of an export-oriented distance learning industry in Canada, and having all Canadians connected to the Internet by 2000.

A policy paper entitled *Building the Information Society* in 1996 also put forward a "national access strategy," stating that universal access to essential network services is now widely regarded as a principal policy objective of the information society. All Canadians everywhere should have ready and affordable access to a wide range of communication and information services to enable them to participate fully in all aspects of Canadian economic, social, cultural and democratic life.

In practice government initiatives have typically drawn together federal and provincial departments to match one another's contributions and/or to help bring private and public sector partnerships together. However, another feature of the Canadian scene is that the federal initiatives have also lead to some "policy competition" between provincial governments intent on attracting major IT industrial players to locate plants in their province and/or to establish and contribute to key networking projects. Many of these projects are related to learning and distance education. Measures can include the establishment of special hi-tech industrial parks with subsidised rents or facilities (or with the government assuming part of the property development risk), special corporate fiscal incentives and tax benefits for individuals investing in provincial research and development projects. Such strategies are all essentially aimed at creating skills, products, high-tech sectors, relevant employment, and transformation of the provincial economy to be competitive in the global information society.

Such government-inspired regional pro-information industry policies are a common feature of many advanced countries, including the United States, the United Kingdom and other members of the European Union.

7.4.4 Media

Canada's broadcasting and media sectors are also highly developed and pro-competitive. One unique feature of the Canadian scene is the very high penetration of cable and common antenna television networks. Historically, this springs from the close proximity of most urban centres in Canada to the US border and the much larger number of television channels (most of them from the US) available to subscribers of cable TV companies.

Over the last few years, the offerings of both the TV broadcasters and cable TV companies have been developed and enriched as a result of cultural policies and pro-Canadian legislation, which have both forced and encouraged media companies to improve and broaden the quality and quantity of Canadian content available. Some of these are directly or indirectly learning and education oriented, and are associated with supporting Internet web sites. For example, in British Colombia, courses from the Open Learning Agency are continually available to viewers on the 'Knowledge Network', with supporting Internet-based technology available to signed-up learners. Also, broadcasters (in Canada as

elsewhere) are offering increasingly rich news information web sites, while agencies such as science centres and museums also play a role in both broadening and enriching the style and quality of Canadian and international material available to developers of multi-media related learning programmes.

Canada thus has a wide range of small and growing software development companies which are enhancing the capabilities of web browsers, educational user interfaces, and other components useful to learning and distance education packages. These enable and become part of the emergent private sector ICT education industry.

7.4.5 Education

Positive and visionary educational policies have played a significant though complementary role, in concert with other interests, in the development of telelearning in distance education. As already noted, the existence of a strong set of initiatives and programmes affecting the K-12, post-secondary, professional skills and lifelong learning interests indicates the presence of a supportive policy environment involving the relevant federal and provincial departments of government.

Covering the post-secondary, skills and lifelong learning areas, the Federal Government's Office of Learning Technologies (OLT) carried out a detailed review of relevant educational policies in 1999. This was published in a report entitled *Telelearning Policy Initiative: A Framework for Socio-economic Studies of Telelearning Initiatives.* The report identified an 'education revolution' as a part of the overall information revolution, but also determined that a number of complex issues that are pedagogical and institutional are emerging. These also highlight the fact that many of the changes taking place in the method of delivering education are open to debate as to their full educational and societal impact. However, the pace of change is not necessarily slowed by these issues, which are only one element in a wide range of influencing factors driving the take-up of ICTs in education.

It can be ascertained from the above and other related reports that the pace and diversity of development in telelearning is being led by a blend of policies that involve not just education, but industry, economic and regional development, and human resource development (led by labour market needs). Two impacts of this are 1) that schools and colleges are paying much more attention to the needs of the labour market than before, and 2) that the University is undergoing profound transformation which is being encouraged by government policy at several levels. This leads also to the understanding that a greater degree of consultation and policy integration is required if the educators' insights and expertise are to be fully utilised in the process and if the fast changing demands of the populace are to be met effectively and in timely manner.

In summary, educational policy makers have largely been co-opted into a broader inter-sectoral process under which industry, employment and regional development imperatives have played the major role. Federal and provincial policy makers have all been part of this process and the concepts of 'adapting to change' and 'access for all' have been prominent in creating the motivation for the rapid development of technological infrastructures for education and telelearning in virtually every province. These activities have generally also spawned extended systems, using special technologies such as satellite, to include schools, colleges and other places in the northern territories and 'First Nations' communities.

7.5 Sponsors: Interests, key motivations & strategies

The vast majority of the ICT initiatives in Canada combine government, institutional and commercial sponsorship. Government and institutional interests and objectives have already been alluded to in previous sections. In summary they are broadly as follows:

- *Government:* To provide access for all to the highest quality learning resources possible in such as way as to allow all Canadians to prepare themselves well for productive and fulfilling lives in the information society.
- *Government and institutions (including educational):* To deliver basic educational, health and other public services, especially to people in non-urban and remote communities in the most efficient and cost-effective way. In some cases, the use of ICTs both improves the quality and reduces the cost of those services.
- *Universities and colleges:* To expand the market for education as a means of self-funding.
- *Science Centres and Museums:* To participate and play an intended social role in education and learning processes.

In Canada, commercial sponsors are much in evidence in those initiatives where identification with solutions and new developments would create one of the following conditions:

- New markets for ICT products and services

  e.g., Several key computer, IT software, communications router, and service providers who stand to gain from identifying with and growing the DE market (which is becoming very significantly sized) have donated equipment. Many of the same companies have also been beneficiaries of government funded 'information highway' projects, as noted in Section 7.4.2.

- Parallel advertising benefits

  e.g., banks, insurance groups, entertainment groups, retailers, airlines and community agencies also find it worthwhile to sponsor and be associated with

initiatives, through cash or in-kind products or contributions. In this way they establish themselves as participants or even leaders in the new economy.

7.6 Country evaluation

Policy, wealth, geography, public and private finance, and the North American entrepreneurial mindset have all played a key role in making Canada's experience of ICT development a positive and expansive one.

It should also be noted that much of the activity has accelerated and gained momentum in the past five years. This has been a time of increasing market liberalisation and massive Internet development. However, government finance and partnership programmes have seemed to play a very important role in bringing institutional and commercial players together to address the concerns regarding staying competitive with other advanced countries, geographical equality and 'universal access.'

It is out of this coalition of players and interests that the current explosion of activity and growth has taken place. The lesson should not be lost on developing nations where policy, liberalisation, community action and institutional support need to come together.

Canada also illustrates well the trend noted in the Overview Report that, with the growth and commercialisation of the Internet and WWW, and the educational needs of its population, a very large private sector educational market is developing, which will offer a wide range of telelearning packages and services.

7.7 Project descriptions

7.7.1 Community Access Programme (CAP)

A) Short description of purpose

The Community Access Programme (CAP) was created to help provide all Canadians, especially small, rural and remote areas, with affordable public access to the Internet, and skill training to use it effectively. Local schools, libraries and community centres provide the access sites, computers, and support. CAP is an extension of the SchoolNet programme from schools to the community.

Access to the Information Highway is seen as crucial to help create new opportunities for growth and jobs by providing communities with the ability to communicate, conduct business, enhance job skills or simply exchange information and ideas.

B) Initiator (lead agency)

Industry Canada (a department of the Federal Government of Canada)
CAP is a joint venture of federal, provincial and territorial governments.

C) Non-profit providers/ sponsors and area of sponsorship/ donation

Main funder and manager: Industry Canada (Federal Government)

CAP receives funding under 'Connecting Canadians' and the 'Youth Employment Strategy' (YES) with which it co-operates. Both are federal government initiatives.

Provincially, New Brunswick, Prince Edward Island and Saskatchewan have created frameworks for cooperation to implement CAP jointly. All CAP sites are community based in schools, libraries and community centres with the support of provincial education ministries, and municipal funds.

D) Commercial providers/ sponsors and area of sponsorship/ donation

There are no major commercial providers for CAP.

E) General key motivation/ interest of sponsors & strategic view of developments in these areas

In 1995, the Federal Government of Canada's Information Highway Advisory Council made 224 recommendations calling on governments, the private sector and individual Canadians to take action to advance the Information Highway in Canada. The lead agency is Industry Canada, which funds and supports Information Highway initiatives and projects such as CAP, to help all Canadians access the Internet.

Students may use CAP Internet access sites outside of school hours for distance education. As well, CAP was used by more than 400 young people to convert heritage collections into digital form for access on SchoolNet.

F) Other participants

There are 41 partners of CAP, most of which are federal, provincial and municipal government, non-profit associations and organisations (such as the Office of Learning Technologies and the Canadian Association of Municipal Administrators). A few private sector agencies participate, such as St. John's Ambulance across Canada and the Joy of Framing in New Brunswick.

G) Type of users

All Canadians may use CAP sites, especially those in rural and remote areas who would otherwise not have access to or may not be able to afford Internet access. This includes schools, colleges, universities, libraries, village communities and other educational associations.

CAP sites are publicly accessible at community centres, schools, and libraries.

H) Function & environment of usage

CAP Internet access sites can be used for many areas of education, such as:

- linking from CAP's Virtual Library to the health education site Canadian Wellness
- students using the Online Books and Periodicals, Canadian Reference Desk, International Libraries and Archives to conduct research. and
- adults accessing DE courses through the Education Opportunities link to DE institutions.

Programmes with associations to CAP include SchoolNet, Computers for Schools, Digital Collections, LibraryNet, Provincial Learning Network (PLNet), SchoolNet Support Parents (SSP).

I) Technology used

Existing telecommunication networks of provincial telecom companies, educational and government networks (such as CANARIE's third generation fibre optic Internet network, CA*net3, which provides broadband access) and some satellite links (such as Telesat).

Existing, purchased or donated computers and modems for schools, community centres and libraries are also used.

J) Evaluation of project and milestones

- March 1999 - CAP increased the national rural network by connecting 1,000 communities in 1998-99, for a multi-year total of 3,200 communities and 4,000 public access sites.
- As of October 1998, the CAP Youth Employment component had hired 1,133 young people to assist and promote the CAP sites within their communities.
- Under the federal Youth Employment Strategy, Community Access Programme's Youth Internship Programme hired 3,000 youths to work with their communities on Internet training.

K) Timeframe/ plans

February 1995 - Community Access Programme approved and launched by Industry Minister Manley.

March 1998 – CAP expanded to help create a National Access System to:

- bring on-line an additional 5,000 community access centres in urban areas by 2000;
- make all 10,000 CAP sites self-sustaining within four years;
- upgrade the CAP site bandwidth and technological infrastructure to provide greater transmission integrity, more powerful learning tools and content and rapid exchange of electronic goods and services;
- implement a Francophone Intranet that would serve Francophone communities throughout Canada, especially those outside Quebec;
- accelerate the development of new educational products and services by the private sector and domestic firms.

July 1999 – Plan for up to 10,000 public access centres to be established by March 31, 2001. Urban communities and all remote and rural communities with populations of more than 400 will be connected.

L) Key Material

CAP website http://cap.ic.gc.ca **includes links to partners, all the CAP sites currently operating in Canada, CAP online discussion groups, and virtual library links to many other groups and services.**

Industry Canada http://strategis.gc.ca **for status reports and press releases**

M) Key contacts

Regional Managers:
David Reid (ON, SK) 613-991-1256 reid.david@ic.gc.ca
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National Advisory Committee: Includes representatives from national organisations involved in education, libraries, tourism, municipal and community development, and IT and telecommunications.

N) Financing & budget

February 1998 - Federal Budget allocated more than $200 million to expand Information Highway programmes, such as Community Access, SchoolNet, and Connecting Canadians. Funding was allocated for more than 1000 CAP sites in over 830 rural and remote communities across Canada.

March 1999 - Industry Canada's 1998-99 total budget for SchoolNet and the Community Access Programme is $58.5 million. Under the federal Youth Employment Strategy, extended programme funding of $19.8 million for projects supported by Industry Canada provided 3,000 youth for CAP to work with their communities on Internet training.

O) Last Update

December, 1999

SchoolNet

A) Short description of purpose

SchoolNet's main objective was to connect all of Canada's K-12 schools (16,500) and public libraries (3,400) to the Internet, which it achieved on March 31, 1999, making it the first country in the world to reach this milestone.

SchoolNet gives students access to courses, online encyclopaedias, library indices, newspaper databases and discussion groups and other Internet resources. Educators use SchoolNet to collaborate on projects, and to share and access resources across Canada and throughout the world.

SchoolNet's mission is to prepare learners for the knowledge-based economy, champion life-long learning, and stimulate the creation of world-class educational resources through information technology. SchoolNet will extend connectivity from schools to the classroom by 2001. It currently has 25 programmes and 150 partners / sponsors.

B) Initiator (lead agency)

Industry Canada (a department of the Federal Government of Canada). SchoolNet is the flagship programme for promoting the development of high technology use in education.

SchoolNet is directed by a National Advisory Board of provincial and territorial governments, universities and colleges, educational associations, the

telecommunications industry and other private sector representatives, such as financial institutions.

C) Non-profit providers/ sponsors and area of sponsorship/ donation

Main funder: Industry Canada (Federal Government)
Partial funding: Federal Youth Employment Strategy (Federal Government)

SchoolNet is a collaborative initiative between provincial and territorial governments, ministries of education, universities and colleges, educational associations, non-profit technology and networking organisations, and First Nations groups. A full list of all partners is available on SchoolNet's website www.schoolnet.ca.

D) Commercial providers/ sponsors and area of sponsorship/ donation

A great deal of SchoolNet's equipment is provided by private industry (see the Computers in Schools project for details). SchoolNet's commercial partners are from the telecommunication industry (incumbent provincial telecommunication operators), the IT sector (Apple Canada, Sun Microsystems, Worldlinx), and other private business sectors such as financial institutions (Royal Bank) and communications companies (Globe and Mail, Southam News, CTV). A full list of partners is available at SchoolNet's website.

SchoolNet also has special programmes to encourage sponsorship:

- CanConnect aims to mobilise thousands of private companies, organisations and volunteers to help link schools and public libraries within their community, develop on-line activities and offer Internet information sessions. It involves companies who sign on as "signatories". They pool their resources and share information about the activities they are currently undertaking, and the ICT resources they provide. Their endorsement to CanConnect demonstrates their interest and commitment to working together to help Canadian youth develop ICT skills. Of the 44 organizations involved, some of the private "signatories" are: Bank Of Montreal Institute For Learning, Hewlett-Packard Canada Ltd., Nortel, and On-Site- Energy Pathways Inc.
- Network to Savings - is a programme that offers schools and libraries that register with SchoolNet discounted prices on a number of computer and software products offered by many vendors across the country.
- Computers for Schools - has provided 125,000 computers for Canadian elementary and secondary schools from surplus equipment which is donated by communities, businesses and government. Providers include computer manufacturers (Hewlett Packard), airlines (Canadian), financial and investment institutions (CIBC and Investors Group), software companies (Microsoft), transportation companies (CN), insurance groups (Halifax

Insurance), retailers (Canadian Tire), entertainment groups (Famous Players) and telecom companies (Newbridge, Nortel, Telus).

E) General key motivation/ interest of sponsors & strategic view of developments in these areas

One of Industry Canada's goals in funding and promoting SchoolNet is to help Canadian educational institutions keep up with other leading institutions worldwide, which are increasingly adopting distance learning and on-line learningware to improve their education and lifelong learning systems.

Industry Canada's larger goals include restructuring education to use IT as a means of promoting the development of Canadian high-technology businesses and encouraging the growth of an export-oriented distance learning industry in Canada, and having all Canadians connected to the Internet by 2000.

F) Other Participants

SchoolNet's participants include:

- other government programmes such as Connecting Canadians and the Youth Employment Strategy
- various educational institutions and associations, such as Open Learning Agency and Canadian Library Association
- technology and networking organisations, such as Nova Scotia Technology Network
- First Nations groups such as Assembly of First Nations
- volunteers
- libraries
- francocommuniautes
- financial institutions such as CIBC and the Bank of Montreal, and
- other private sector businesses with an interest in the educational sector, such as Apple Canada, Science World BC and Sun Microsystems of Canada Inc.

Commercial sponsors provide funding support for teachers to develop on-line projects, technical support for schools and libraries, and reduced prices or free equipment/software to schools and libraries.

G) Type of users

Main users: All of Canada's K-12 school students (aged 5 – 18), teachers, and libraries in urban and rural areas, in both official languages.

Secondary: all Canadians through SchoolNet's participation in 'Connecting Canadians', a federal government programme which provides public Internet access sites in 5,000 rural and remote communities and 5,000 urban areas, with a goal of connecting all Canadians to the Internet.

Parents: SchoolNet Support Parents (SSP) programme offers free Internet training to parents across Prince Edward Island.

H) Function & environment of usage

SchoolNet's primary function is a network to connect all Canadian K-12 schools and libraries to the Internet and learning resources.

SchoolNet is currently used in schools, but will extend connectivity to classrooms by 2001, and to rural and urban Canadian communities after that, to provide lifelong learning opportunities and world class educational resources.

SchoolNet is also used by post-secondary students, businesses, rural residents, and others, through the following programmes linked to SchoolNet:

- Campus WorkLink
- NGR
- CanConnect
- Community Access Programme
- Computers for Schools
- Digital Collections, First Nations
- Global Learning Consortium
- GrassRoots Programme
- LibraryNet
- Network to Savings
- Office of International Partnerships
- Prime Minister's Awards for Teaching Excellence
- SchoolNet News Network
- Virtual Products.

The SchoolNet Youth Employment Initiative is part of the Youth Employment Strategy (YES). This programme helps high school, college and university graduates with proficiency in information and communication technology (ICT), acquire valuable employability skills by training students and the community on how to use ICTs and the Internet.

I) Technology used

SchoolNet uses:

- telecommunication networks of incumbent telecom companies (Telus, Bell Canada, Island Tel, Maritime Tel, Manitoba Telecom, NBTel, NewTel Communications, NorthwesTel, Quebec Tel, SaskTel)
- AT&T Canada Long Distance Services
- Telus and Telesat's satellite services
- CANARIE's NA*III
- educational institutions and government networks in each province
- existing, purchased or donated computers for access to the Internet.

Technologies specific to projects:

- First Nations schools use Telesat's DirecPC Internet services and long-term loans of DirecPC satellite terminals and Pentium computers, to connect to the Internet. First Nations' homepages include information on indigenous languages on their sites.
- Computer training lab in a van – This is a new mobile training unit which uses a van equipped with satellite technology, a dedicated computer network server, eight multimedia laptops connected by wireless to a server, and a data projector. The van will provide accessible, convenient and cost-effective technology training as it travels to schools throughout Saskatchewan.
- The summer interactive webcast pilot series can be accessed from SchoolNet's Internet web site without special software. It will run 24 15-minute learning episodes, 12 in French and 12 in English for elementary students.
- SchoolNet Support Parents Project in Manitoba - uses Websurfer Internet set-top boxes placed in 15 student homes/schools in Manitoba school divisions to make the Internet more accessible to Manitoba schools, students and parents.
- CANARIE's third generation fibre optic internet network, the National Optical Internet, or CA*net3, launched in August 1998, provides network services to SchoolNet.

J) Evaluation of project and milestones

SchoolNet has connected all 16,500 Canadian K-12 schools and 3,400 public libraries to the Internet and is proceeding to achieve on-line networking in every classroom. The project appears to have been very successful to date, judging by the activities and outputs generated. Achievements or milestones include the following:

- Under the Federal Youth Employment Strategy, 188 youths have been hired to develop on-line courseware used with SchoolNet's Notemakers. SchoolNet's Youth Internship Programme hired 836 youths to help connect schools and libraries. SchoolNet Digital Collections hired 1,570 youths to produce Canadian multimedia products for display on SchoolNet, including the display of Aboriginal digital collections.
- SchoolNet GrassRoots Project has nearly 2,000 on-line projects developed by Canadian teachers and students, involving over 500,000 students.
- As of October 1998, 366 of 460 First Nations schools under federal jurisdiction were connected through SchoolNet using DirecPC.
- As of February 1998, research on effective integration of information technology into the learning process has been disseminated to educators in partnership with the Council of Ministers of Education Canada (CMEC).
- SchoolNet has developed new teacher training models which have been adopted by various provinces for pre-service and in-service teacher training.
- SchoolNet Digital Collections is the largest on-line heritage site in Canada and the National Atlas, Special Needs Network and Media Awareness Network are internationally acclaimed.
- The National Graduate Register, Canada's largest placement service, has generated more than 100,000 employment matches.

K) Timeframe/ plans

- 1993 - SchoolNet was established as part of Federal Government's Jobs & Growth Strategy.
- March 31, 1999 - SchoolNet connected all Canadian K-12's 16,500 schools and 3,400 public libraries to the internet.

Future:

- SchoolNet will extend connection from schools to classrooms by March 31, 2001.
- Will work with 'Connecting Canadians' to help bring access to ICTs to all Canadians, to help fulfil Industry Canada's goal of having all Canadians connected to the Internet by 2000.
- Support classroom learning projects, on-line learning products and services that help students to acquire new skills, and teachers and courseware producers to develop new media materials.
- Challenge Canadian businesses and governments through the Computers for Schools programme, to provide 250,000 used or refurbished computers for use in classrooms across the country.

L) Key material

SchoolNet's website: www.schoolnet.ca
Connecting Canadians website: www.connect.gc.ca
Industry Canada –http://strategis.gc.ca (for status report on SchoolNet and project press releases)

M) Key contacts

SchoolNet National Office
Industry Canada, Ottawa ON K1A 0H5
Phone: 613-993-5452 Toll-free: 1-800-268-6608 / 1-800-575-9200
Email: schoolnet@ic.gc.ca website http://www.schoolnet.ca

Each programme also has a separate contact person.

N) Financing & budget

The following are an assortment of expenditures identified:

March 1999 - Industry Canada's 1998-99 total budget for SchoolNet and the Community Access Programme was $58.5 million. The Federal Youth Employment Strategy 1999 budget extended programme funding for projects supported by Industry Canada by $19.8 million annually, including some SchoolNet projects, such as Digital Collections and Notemakers. The federal government invested $15 million in on-line classroom projects to be developed by Canadian teachers and students, directed to Industry Canada's SchoolNet GrassRoots project.

February 1998 Federal Budget - allocated more than $200 million to expand Information Highway programmes, one of which was SchoolNet.

June 1998 – Industry Canada funded a total of $500,000 to Notemakers (a project to develop online university and college credit courses by youth), based on budgets of:

- $12,500 per on-line course, to $25,000 for two or more courses, for proposals from individual institutions
- $50,000 per on-line course, to a ceiling of $100,000 for two or more courses, for proposals from groups of institutions or for proposals involving a private sector firm.

March 1996 - SchoolNet Community Access Initiatives - $13 million

1996-97 - Digital Collections $1 million four-year programme starting in 1996-97 funded 30 projects up to $30,000 each Grassroots project

O) Last update

December, 1999

Vista District Digital Intranet, Newfoundland

A) Short description of purpose

This pilot project delivers internet-based advanced placement courses (equal to first year courses at Memorial University in Newfoundland) in Chemistry, Physics, Math and Biology, to young adult learners in rural community high schools in Newfoundland.

In the 1998-99 school year, the first project (Alpha) created an Intranet, course content and delivery modules, trained 4 teachers to administer the courses, and provided online support for the Vista School District (Newfoundland) in four centres. Three were located in high schools and one in the Faculty of Education at Memorial University. Courses are received via satellite to computers in the Vista District schools on alternating days.

In 1999-2000 school year, the second (Beta) project added three more districts and five schools outside of the Vista District, but still within Newfoundland and Labrador, offering the same courses via the same modes with the same teachers.

B) Initiator (lead agency)

Centre for TeleLearning and Rural Education, Faculty of Education, Memorial University of Newfoundland (researches and develops courses), in partnership with Vista School District. This unit does research, course development, provides professional development programmes (educate educators) in online education. It is one of the Telelearning National Network of Centres of Excellence (TL-NCE) sites.

Industry Canada is the main funder and national initiator with TL-NCE and STEM-Net, which provides network use, access and resources for K-12 schools in Newfoundland and Labrador.

C) Non-profit providers/ sponsors and area of sponsorship/ donation

Supporting Partners (non-profit):

- Ministry of Education of Newfoundland – helped fund computers for project.
- Vista School District – helped fund equipment for project.

- Canada-Newfoundland Co-operation Agreement on Human Resource Development – national programme which funds STEM-Net.
- Financial assistance was also provided to STEM~Net for the purchase of some of the DirecPC satellite dishes under the Canada-Newfoundland Cooperation Agreement on Human Resource Development.

D) Commercial providers/ sponsors and area of sponsorship/ donation

Supporting Partners (private):

- Newtel Communications Inc. (private national telecommunication consortium) - helped fund telecom equipment with Industry Canada.
- DirecPC - provided satellite dishes - through the partnership with NewTel Communications Inc. (partially funded with Vista School District, STEM~Net/ SchoolNet/ Industry Canada).
- Addison Wesley Longman (Canadian publisher), Prentice Hall Ginn Canada (Canadian publisher) provided multi-media workstation financial assistance.
- Prentice Hall – gave copyright permission to use textbooks without charge.

E) General key motivation/ interest of sponsors & strategic view of developments in these areas

The mission of the lead agency, Memorial University's Centre for TeleLearning and Rural Education, is to facilitate research and development in K-12 distance education, with a special focus on effective utilisation of ICTs. It also promotes excellence in teaching and learning in small rural K-12 schools in Newfoundland and Labrador. The Centre's goals being tested in the Vista District project are:

- to conduct research in the areas of telelearning and rural education in Newfoundland and Labrador;
- to conduct research related to the instructional design of senior high school courses for delivery by telecommunications technologies in Newfoundland and Labrador;
- to facilitate the design and delivery of professional development for teachers in small rural schools throughout Newfoundland and Labrador.

Network Centres of Excellence/ TL-NCE (Canadian national organisation) - encourages, tracks and evaluates K-12 and post-secondary telelearning research advances, and develops software, as well as providing funding, and resources. The Vista District Project is a TL-NCE project.

Industry Canada (funding through SchoolNet) - national strategy is to connect all Canadians to the 'Information Highway' including K-12 Schools.

Stem-Net – (educational network in Newfoundland and Labrador) has been set up to help enhance the DE opportunities for K-12 schools through Internet and educational resources, research and development in networking for students and educators in Newfoundland and Labrador. It is funded by the Canada/ Newfoundland Cooperation Agreement on Human Resource Development.

Support by commercial sponsors is only a small part of the project. It helps in community development and serves as a form of advertising.

F) Other participants

- Government endorsement by The Programme Development Division of the Department of Education, Government of Newfoundland and Labrador (provincial).
- SchoolNet - national programme for networking all K-12 schools funded by Industry Canada (federal government of Canada)
- Memorial University (provincial post-secondary institute) – equipment, network interconnection

G) Type of users

Projected End users: all young adult learners (ages 16-18) who want to study Advanced Placement (university entrance level) courses online at secondary high schools in participating rural Newfoundland and Labrador schools.

Pilot Project users: Vista School District secondary students aiming for university admittance.

Educators: will learn how to develop courses for online delivery, use associated technology and teach online. Currently only four teachers are involved in the pilot project – this number should grow as the number of subjects increases.

H) Function & environment of usage

Use: secondary (9-12) Advanced Placement (university entrance level) courses at Memorial University in Newfoundland.

Environment: asynchronous online courses in WebCT on PC computers in Vista School District secondary schools.

I) Technology used

Delivery: Intranet from DirecPC satellite dish

Mode: audio-graphic technology and web pages

Platform: Windows NT on PCs

Courseware: WebCT asynchronous courses online (FrontPage for development)

Discussion software: Net Meeting and Meeting Point (1-way at present)

J) Evaluation of project

The Alpha pilot project ran during the 1998-99 school year, and the Beta project is currently running during the 1999-2000 school year. The Physics and Math courses have been evaluated to be the most successful. Industry Canada will help evaluate the pilot project and determine marketing potential to other countries.

K) Timeframe/ plans

- The prototype Alpha pilot project was for the 1998–99 school year. It was launched May 1, 1998, as part of a five year strategic plan 1997 – 2002 for Vista School District's goals for using technology in education.
- The Beta Project is for the 1999 – 2000 school year and added three more school districts (1, 5, 6, 7 and 8) outside of the Vista District.
- There are plans to offer Advanced Placement courses in this mode for more subjects in Newfoundland / Labrador school districts, based on the lessons learned from the Alpha and Beta pilot projects.
- This mode of course delivery may also be expanded to teacher training for University students in Education.

L) Key material

Vista Project Website: www.k12.nf.ca/vista/specialprojects/ddintranet.html and three information pages linked from homepage.

Information on the Centre for Telelearning and Rural Education, Faculty of Education, Memorial University is at http://www.tellearn.mun.ca/fhome.html.

Vista School District website – school area covered and schools:
http://www.k12.nf.ca/vista

M) Key contacts

Vista District Intranet Advisory Committee:
Mr. Wilbert Boone, Director, Centre for Telelearning and Rural Education, Faculty of Education, MUN 709-737-8616

Telelearning and Rural Education Centre, Memorial University:
Dr. Ken Stevens, Chair, Telelearning and Rural Education Centre, MUN Kstevens@morgan.ucs.mun.ca

N) Financing & budget

Information not available.

O) Last update

December, 1999

Athabasca University – Canada's Open University, Alberta

A) Short description of purpose

Athabasca University (AU) is Canada's leading distance education university. It aims to provide a university education to Canadians regardless of geographical location, or other commitments such as career or family.

AU's focus is on removing accessibility barriers that traditionally restricted adult learners: location, availability, prior academic credentials, past educational experience, level of income, etc., to improve equality of educational opportunity for all adult Canadians.

AU's programmes are predominantly home study using ICTs and print-based materials: 435 courses use some form of ICT delivery method and four areas use internet-enhanced course delivery: Computing Information Systems and Mathematics, Nursing, Psychology and Business.

AU offers full university bachelor degree programmes in Arts, General Studies, Science, Administrative Studies, Commerce and Nursing. Masters programmes are offered in Business Administration (MBA), Distance Education (MDE) and Health Studies. A number of Certificate programmes (non-degree credit) are offered: Accounting, Administration, Computers & Management, Information Systems, Counselling Women, English Language Studies, French Language Proficiency, Health Development, Home Health Nursing, Computing & Information Systems, Labour Studies, Public Administration, Rehabilitation Practice.

B) Initiator (lead agency)

Alberta Learning (Alberta Provincial Government's ministry for K-12 Education, Advanced Education, Apprenticeship and Industry Training)

C) Non-profit providers/ sponsors and area of sponsorship/ donation

AU receives funding grants from the Government of Alberta, which receives transfers for educational funding from the Canadian federal government. Funding amounts are listed in section (O) Financing and Budget.

D) Commercial providers/ sponsors and area of sponsorship/ donation

AU also obtains funds from tuition and related fees, sales and services, investments, donations, and a small percentage from other unidentified sources. These funding amounts are also listed in section (N) Financing and Budget.

E) General key motivation/ interest of sponsors & strategic view of developments in these areas

Post-secondary educational institutions in Canada fall under provincial jurisdiction and, as such, receive grants for operating and capital costs. In Alberta, the Alberta Advanced Education Department (now Alberta Learning) covers funding not obtained from tuition, services, donations or other sources.

F) Other participants

AU has collaborative agreements with 76 provincial and national organizations:

- broadcasters (such as ACCESS TV, CKUA radio network),
- other educational institutes (such as Northern Alberta Institute of Technology, Labour College of Canada, Télé-université du Quebec),
- educational associations and societies (such as Alberta Distance Ed & Training Association (ADETA), Society for Engineering Technologists (ASET), Canadian Association for Distance Education(CADE)),
- municipal and governmental service providers (such as Canadian Police Service, Canadian Hospitals Association, Canadian International Development Agency (CIDA)),
- first nations groups (such as Yellowhead Tribal Council),
- finance, industry and the private sector (such as the Credit Union Institute of Canada, Certified General Accountants, Syncrude, Nortel Corporation).

See Athabasca University's site http://www.athabascau.ca/html/collab/collab.htm for a complete list of all the organisations.

G) Type of users (description of users)

Main users: Adults wishing to take university credit and non-credit courses at a distance, specifically those in Alberta's rural and remote northern areas.

AU had 16,081 students in 1998-99 and 33,620 individual course registrations, from all provinces and territories. Alberta students represented 57.5% of total. Educational level of undergraduate students on entry was: high school or less -

14%; post-secondary - 67%; university degree - 18.9%. The student gender balance was 64.3% female, 35.7% male. The age profile of undergraduate students was: under 25 - 31%; 25 to 34 - 35%; 35-44 - 24%; 45+ -10%.

H) Function & environment of usage

Athabasca University's 450 courses are mostly home study, although some courses may be taken in classrooms at other collaborating institutions (AU's provides a listing of current courses and the institutes they are offered at online).

For undergraduate home-study courses, there are no admissions deadlines; students may enrol year-round. University graduate and non-degree University Certificate Programmes are also offered.

AU also provides student services by phone (toll-free), email and internet, comprising: academic advising (course and programme) and counselling; study skills development, financial aid information, registration services, exam supervision, computing help desk, audio-visual equipment and course audio- and video-tapes reference and self-help material, liaison with groups and communities, procedural information, assistance from the Athabasca University Students' Association, online academic journals, library services (at AU for students, staff, faculty, tutors, and external borrowers, or associated libraries).

I) Technology used

In addition to home-study packages (student manual, study guide, textbook(s), the following ICTs are used:

- CD-ROM, audiocassettes and videotapes
- seminars (home study materials plus teleconference or videoconference sessions)
- Internet - AU has a Virtual Teaching & Learning (ViTAL) electronic classroom.

J) Evaluation of Project

Since it was created by the Government of Alberta in 1972, more than 140,000 students have taken AU's individualised courses and programmes. No evaluation was identified.

K) Timeframe/ Plans

1972 – Government of Alberta created Athabasca University.

Future: continuance dependent on government financing to meet full funding requirements.

L) Key material

Athabasca University's website: www.athabascau.ca
Alberta Advanced Education (now Alberta Learning) Annual Report: www.aecd.gov.ab.ca/learning/publications/annual_reports/1998/index.htm#topofpage

M) Key contacts

Jon Baggaley, Chair and Director of Educational Technology
Athabasca University, 1 University Drive, Athabasca, Alberta T9S 3A3
Tel.: (780) 675-6334 Fax: (780) 675-6338 baggaley@athabascau.ca
(Baggaley has been responsible for the development of new media technologies and policy for the distance-based delivery of the University's programmes)

Peter Holt, Associate Professor, Computing Science
Centre for Computing Information Systems and Mathematics
Athabasca University, 1 University Drive, Athabasca, Alberta T9S 3A3
Tel: (780) 675-6225 or (800) 788-9041 ext. 6225 holt@athabascau.ca

N) Financing & Budget

The Ministry of Advanced Education and Career Development (now Alberta Learning) provided $923 million in grants for adult learning institutions in the province in 1998-99. Of this, AU received $15.2 million for operational and conditional funding, access, learning enhancement, research, intellectual infra-structure partner-ships, infrastructure renewal and performance.

Outside of its government grants AU obtained a total of $19.6 million from other sources: $14.5 million from tuition and related fees, $2.6 million from sales and services, and another $2.5 million from investments, donations and other private sources (private source information is confidential).

In total, AU received approximately $34.8 million in finances ($783,000 short of its costs).

O) Last Update

December, 1999

Telemedicine and Educational Technology Resources Agency of Memorial University (TETRA), Newfoundland

A) Short description of purpose

Telemedicine and Educational Technology Resources Agency (TETRA) at Memorial University is a provincial communications resource and research and development facility. It was established to facilitate the use of Information Technology (IT) and telecommunications in the delivery of health services and education to non-urban, remote and isolated areas in Newfoundland and some developing countries. It also specialises in the development of distance education courses.

The teleconference network has many contributing institutions and agencies. The network is divided into 11 separate teleconferencing circuits with over 200 sites in approximately 150 communities throughout the province. In addition to audioconference capabilities there are also tele-writer workstations in over 140 of the communities providing a remote blackboarding function to the user.

B) Initiator (lead agency)

Telemedicine and Educational Technology Resources Agency (TETRA) and the Memorial University of Newfoundland's Faculty of Medicine and Health Science Centre – all broadcasting facilities are located at Memorial.

C) Providers/ sponsors and area of sponsorship/ donation

TETRA has received a series of significant grants. International project funding is from the following sources:

- Project SHARE, East Africa (1981) – funded by the Canadian International Development Agency (CIDA) Child Health and Medical Education Programme CHAMP), Teleglobe Canada and Intelesat – to provide assistance and teaching sessions to the Pediatric Dept. of Makerere University in Kampala, Uganda.
- Project SHARE, University of the West Indies (1986) – funded by CIDA, with the help of Newfoundland Telephone Company – a telemedicine science course offered by teleconferencing.
- Intra-Jamaican Project (1987) – funded by CIDA with the help of Newfoundland Telephone Company – distance education science programmes for teacher upgrading were offered.
- SatelLife (1990) – funded by IDRC (International Development Research Centre, Canada) and a number of granting agencies – this international organisation is devoted to improving health information for developing

countries and provides access to an email link for information transfer via satellite in North America, Europe and developing countries.

- Philippines Project (1991) – funded by Memorial University and TETRA – provides a teleconference system to help develop the College of Public Health at the University of the Philippines distance education and outreach programmes for health professionals.

D) Commercial providers/ sponsors and area of sponsorship/ donation

The day-to-day operating expenses of Telemedicine are entirely recovered from user fees. Specific projects have both non-profit and commercial funders.

E) General key motivation/ interest of sponsors & strategic view of developments in these areas

TETRA has been established to make the distance education resources and online health services of Newfoundland's Memorial University, Faculty of Medicine and Health Sciences, available to physicians and health workers in rural and remote locations in Newfoundland.

It also allows the Centre to conduct research and interact with other health practitioners through the network, and to participate in health projects in rural communities or other countries.

By allowing the Centre to be used by other interested groups, such as schools, government departments, medical associations and communication projects, at a specified fee, it is able to recover its costs.

F) Other participants

TETRA works with many provincial institutions and agencies to provide a teleconferencing network for secondary and post-secondary students, rural communities, government offices, non-profit health and social organizations, and some private agencies. See H) for a description of participants' use of the network.

G) Type of users

Main users: provincial health workers and medical practitioners, medical students and researchers within Newfoundland, and some developing countries

Secondary: students at secondary and post-secondary schools and communities in Newfoundland, government offices, non-profit health and social organisations, and some private agencies.

H) Function & environment of usage

- Medical practitioners use TETRA for a range of services and education - testing hearts, nuclear medicine and radiology, clinical consultations and continuing medical education. A new DE programme is aimed at rural doctors using the combined technologies of CD-ROM and the Internet.
- University courses (such as medicine, science and engineering) are offered by Memorial to students and health practitioners in remote communities in Newfoundland and in other countries through interactive teleconferencing.
- Students from small schools in Newfoundland attend some of their classes via teleconference. Forty classes each day are delivered on the network using both the audio and audiographic capabilities. Subjects include French, physics, mathematics and chemistry.
- Government sector use includes training, meetings and dissemination of information, such as training of volunteers for Revenue Canada.
- Non-profit organisations use teleconferencing to hold meetings and deliver training programmes, such as the Women's Enterprise Bureau training programme, and the Association of Registered Nurses of Newfoundland continuing education programme.
- Private sector use for the general public includes educational packages, such as the Diabetes Management Programme for public participants.

The Virtual Design Centre (VDC) - This Centre will enable the instructional designers and media specialists at Memorial University to DE programmes, training for health workers, distributed learning programmes for financial companies, and other applications. They will work collaboratively with the College of the North Atlantic, and with writers, graphic artists and designers from private multimedia and design firms in St. John's.

I) Technology used

- Audio teleconferencing (regional, national and international applications). Each location is equipped with an audio conference kit, (a specially designed speaker and microphones) for participation by several people at each place.
- Electronic whiteboard – Audio-conference participants can draw on a electronic whiteboard tablet and the information is simultaneously displayed on a monitor at all locations. Using standard, PC-based graphics packages, diagrams or charts can be displayed on the electronic whiteboard throughout the session. Applications include: listing information during brainstorming, problem-solving and other group activities presentations that rely on numbers, charts, diagrams or text for clarification sessions that benefit from immediate written responses from participants.
- Video production - for broadcast or distribution on video cassette

- Training manuals and workbooks - created and put onto CDROM
- Interactive video teleconferencing by satellite - a presentation is broadcast, live by satellite, from one main centre. Other locations receive the broadcast on a monitor. Attendees interact with the presenters by telephone during the presentation, either by calling the broadcast site periodically or by maintaining a telephone connection throughout the programme. Applications include: training and education programmes; information dissemination; conferences and seminars.

The Telemedicine Centre provides users with the ability to teleconference to any location in the world through the use of standard telephone lines or localities with a satellite receiver. The current network capabilities include audioconferencing, medical data transfer, interactive audiographics and videoconferencing.

The current audio teleconference platform utilises 'voice grade' facilities and end equipment that supports the real time exchange of audio and graphic information within a normal telephone circuit bandwidth. Network configurations include 4-wire multi-point and 2-wire dial-up connections over standard telephony service. End equipment consists of audio conference units, PC workstations, interface devices and software packages. These systems allow users to share written text, annotated computer graphics and medical imagery.

Telemedicine/TETRA also provides slow speed video conference services, using compression technology over 56 Kbit facilities. This system provides users with the ability to see each other and exchange visual materials in either point to point or multi-point configurations. Access to this type of service is limited to areas supported to digital telecommunications systems.

J) Evaluation of project

- TETRA is now one of the most sophisticated medical networks in North America, using state-of-the-art satellite technology.
- The network has 11 separate teleconferencing circuits with over 250 sites in approximately 160 communities throughout Newfoundland and Labrador.
- Telewriter workstations are in over 160 of the communities providing remote blackboarding functions, and 75 sites have multimedia workstations.
- Receiver sites include all provincial hospitals, community colleges, university campuses, 50 small rural high schools, a number of nursing clinics on the coast of Labrador, and a variety of government offices. A user consortium, consisting of health, education, government, and community groups participates in approximately 5,500 programmes per year.
- As of 1997, approximately 70% of all programming was distant high school and university education, 20% health education, 5% clinical activities, and 5% other uses. Approximately 4900 hours of DE for high school and college

students was delivered over the TCS network, making the Telemedicine Centre the most active distance education provider in Canada at that time.

- The Telemedicine Centre has been involved in over 30 telemedicine projects, many of which became ongoing services.
- TETRA also facilitates application trials for new compressed video applications and high-speed diagnostic medical data transmissions. A variety of single-purpose remote testing units are used in some patient care. Occasionally, TETRA uses the "original" format of one-way video or two-way audio satellite conferencing for a large audience. This was used, for example, for the recent Women in Business and the 'Alternatives to Fisheries' conventions.

K) Timeframe/ plans

- 1975 – Telemedicine activities began at Memorial University
- 1979 – MUN's Telemedicine programme added an audio teleconference network serving 9 communities in Newfoundland and Labrador to create an ongoing and self-sufficient Telemedicine Centre.
- Future: TETRA is a self sufficient, expanding and in-demand network which has a multitude of applications for medicine and education delivery to remote locations, which can be used throughout Canada and in other countries.

L) Key material

TETRA's website: www.med.mun.ca/med/telemed
Telemedicine Activities at MUN: www.med.mun.ca/telemed/telehist/telemulti.htm
Industry Canada –http://strategis.ic.gc.ca/SSG/in02200e.html
– project description

M) Key contacts

Ms. Andrea Battcock,
Faculty of Medicine, Memorial University of Newfoundland
Health Sciences Complex, Prince Philip Drive, St. John's, NFLD A1B 3V6
Phone 709-737-6654 Fax 790-737-7054 email: tcs@morgan.ucs.mun.ca

Rod Elford, M.D., CCFP, M.Sc., Associate Director Research and Development
Telemedicine Centre, Faculty of Medicine, Memorial University of Newfoundland
300 Prince Philip Drive, St. John's, NF, Canada AIB 3V6

N) Financing & budget

- TETRA began out of Memorial University's Faculty of Medicine 1975 Telemedicine Programme, which was funded by grants.

- The Centre's operating budget for 1997 was approximately $850,000 (excluding research grants).
- The Centre's entire day-to-day operating expenses are recovered from user fees. No money is received from the government or from the university to assist in operations; however, the Faculty of Medicine does provide the physical space in kind. All employees' salaries are paid by the Centre with the exception of the Chair and the Associate Director-Research and Development, whose salaries are funded entirely or in part by the Faculty of Medicine. Individuals involved in research activities are funded by grants.
- To recover the network running costs of the TCS network and maintain the teleconference equipment, each site on the network pays an annual fee and an hourly rate for network use. Sites not on the dedicated TCS network pay a port fee to access the audioconference bridge plus long distance costs. Billing for videoconferencing is variable and depends on the facility, the user (e.g., hospital employee or not), and the number of lines used.

O) Last Update

December, 1999

ANNEX A

BASELINE DATA ON COMMONWEALTH COUNTRIES

Commonwealth Countries – Geography & population

Country	Land Area (000's Km2) CW	Total Population ('000s) 1997, Derived CW	Population growth (%p.a.) 1980-96, CW	Population Growth (%p.a.) 1997-2015, WB/CW	Urban Population (%) 1996-97, CW	Population Density (ppl/sqkm) 1997, Derived Intelecon	Villages (000's)	Village Size (Inhab.)
Antigua & Barbuda	0.40	66	0.5		36%	165.7		
Australia	7,682.30	18,500	1.3	0.7	85%	2.4		
Bahamas	13.90	278	1.9		87%	20.0		
Bangladesh	148.40	122,963	1.9	1.4	19%	828.6	68	1,465
Barbados	0.40	264	0.3		48%	660.5		
Belize	23.00	228	2.5		47%	9.9		
Botswana	582.00	1,510	3.1	1.2	63%	2.6		
Brunei Darussalam	5.80	285	2.8		70%	49.1		
Cameroon	475.40	14,000	2.8	2.5	46%	29.4		
Canada	9,221.00	30,300	1.2	0.5	77%	3.3		
Cyprus	9.30	726	1.3		54%	78.1		
Dominica	0.80	74	-0.3		69%	92.9		
Fiji	18.30	813	1.4		41%	44.4		
Gambia	11.30	1,169	3.6	2.3	30%	103.4		
Ghana	228.00	18,000	3.1	2.3	37%	78.9	48	235
Grenada	0.30	99	0.2		37%	328.9		
Guyana	215.00	846	0.6		36%	3.9		
India	3,287.30	958,718	2	1.2	27%	291.6	600	1,166
Jamaica	11.00	2,564	1	0.9	55%	233.1		
Kenya	582.60	28,182	3.2	1.9	30%	48.4		
Kiribati	0.70	84	1.7		36%	119.3		
Lesotho	30.40	2,090	2.6	1.8	26%	68.7		
Malawi	118.50	10,455	2.9	2.2	14%	88.2		
Malaysia	329.80	20,983	2.5	1.6	55%	63.6		
Maldives	0.30	262	3.2		27%	872.5		
Malta	0.30	371	0.8		89%	1,237.2		
Mauritius	2.00	1,132	1	0.9	41%	565.8		
Mozambique	784.00	16,600	2.4	1.8	36%	21.2		
Namibia	824.30	1,622	2.7	1.9	38%	2.0		
Nauru	0.02		2.8		100%			
New Zealand	270.50	3,671	0.9	0.5	86%	13.6		
Nigeria	923.80	118,077	2.9	2.5	41%	127.8		
Pakistan	796.10	137,143	3.1	2.3	35%	172.3	45	1,981
Papua New Guinea	461.70	4,468	2.2	1.9	17%	9.7		
Saint Kitts and Nevis	0.30	41	-0.4		34%	136.4		
Saint Lucia	0.60	159	1.4		38%	265.2		
Saint Vincent & The Grenadines	0.40	112	0.9		50%	281.0		
Samoa	2.80	173	0.4		22%	61.8		
Seychelles	0.50	78	1		55%	156.1		
Sierra Leone	71.70	4,625	1.8	1.9	35%	64.5		
Singapore	0.60	3,090	2.1	0.9	100%	5,150.8		
Solomon Islands	27.60	402	3.4		18%	14.6		
South Africa	1,221.00	40,600	2.3	1.1	50%	33.3	6	3,383
Sri Lanka	65.60	18,500	1.3	1	23%	282.0	13	1,096
Swaziland	17.40	951	2.8		32%	54.6		
Tanzania	945.10	31,429	3.2	2.1	26%	33.3		
Tonga	0.70	98	0.4		42%	139.7		
Trinidad & Tobago	5.00	1,300	1.1	0.9	73%	260.0		
Tuvalu	0.03		1.4		40%			
Uganda	236.00	20,625	2.7	2.3	13%	87.4		
United Kingdom	242.00	58,918	0.2	0	89%	243.5		
Vanuatu	12.20	178	2.5		19%	14.6		
Zambia	752.60	9,474	2.3	1.9	44%	12.6		
Zimbabwe	390.60	11,467	3	1.3	33%	29.4		

Sources: CW=Commonwealth, CIA=Central Investigation Agency, ITU=International Telecommunications Union, WB=World Bank

Commonwealth Countries - Education

Country	Adult Illiteracy (%) 1995-98, CW	Public Sending on education (% of GNP) 1996, WB	Gross enrollment ratio - Primary (% of relevant age group) 1996, WB/CW	Gross enrollment ratio - Secondary (% of relevant age group) 1996, WB/CW	Gross enrollment ratio - Tertiary (% of relevant age group) 1996, WB/CW
Antigua & Barbuda	5				
Australia	1	5.6	101	148	76
Bahamas	2		*94*	*90*	
Bangladesh	62	2.9	*78*	*19*	6
Barbados	3	*7.2*	*90*	*85*	
Belize	30	*6.1*	*121*	*49*	
Botswana	30	10.4	108	65	6
Brunei Darussalam	*10*		*110*	*78*	
Cameroon	37	2.9	89	27	4
Canada	1	*7.0*	102	105	90
Cyprus	*4*	*4.4*	*100*	*97*	
Dominica	6		-	-	
Fiji	8	5.4	*128*	*64*	
Gambia	61	6	77	25	2
Ghana	35	3.3	*77*	*37*	1
Grenada	2				
Guyana	2	*4.1*	*94*	*76*	
India	48	3.4	100	49	7
Jamaica	15	7.4	100	-	8
Kenya	22	6.6	85	24	2
Kiribati	7				
Lesotho	29	7	108	31	2
Malawi	44	5.5	89	17	1
Malaysia	16	5.2	102	61	11
Maldives	*4*	*8.4*	*134*	*49*	
Malta	9	*5.2*	*109*	*88*	
Mauritius	17	4.3	107	65	7
Mozambique	60	-	60	7	1
Namibia	24	9.1	131	61	9
Nauru					
New Zealand	1	7.3	99	114	59
Nigeria	43	0.9	98	33	4
Pakistan	62	3	74	-	3
Papua New Guinea	28	-	80	14	3
Saint Kitts and Nevis	10	*3.3*			
Saint Lucia	18	*9.9*			
Saint Vincent & The Grenadines	18				
Samoa	2		*116*	*47*	
Seychelles	12	*7.5*			
Sierra Leone	69	-	*51*	*17*	2
Singapore	9	3	101	67	39
Solomon Islands	38		*97*	*17*	
South Africa	18	7.9	131	94	19
Sri Lanka	10	3.4	109	75	5
Swaziland	23	*8.1*	*122*	*52*	
Tanzania	32	-	66	5	1
Tonga	1				
Trinidad & Tobago	2	9.7	98	74	8
Tuvalu	1				
Uganda	38	2.6	74	12	2
United Kingdom	1	5.4	115	133	50
Vanuatu	36	*4.9*	*106*	*20*	
Zambia	22	2.2	89	27	3
Zimbabwe	15	8.3	113	49	7

Sources: CW=Commonwealth, CIA=Central Investigation Agency, ITU=International Telecommunications Union, WB=World Bank

Commonwealth Countries - Economy

Country	GNP (US$ Millions) 1997, CW	GNP Growth (%) 1990-97, WB	GDP Growth (%) 1998, WB	GNP/Cap (US$) 1997, CW	GNP/Cap (US$PPP) 1997, CW	Agriculture (% of GDP) 1997, WB, CW	Industry (% of GDP) 1997, WB, CW	Manufacturing (% of GDP) 1997, WB, CW	Services (% of GDP) 1997, WB, CW	Government Revenues (% of GDP) 1996, WB
Antigua & Barbuda	489	1.5		7,380	8,720	4	20		76	
Australia	380,000	0.6	*3.6*	20,540	20,170	4	28	15	68	24.3
Bahamas	3,288			11,830	10,180	2	14		84	
Bangladesh	33,200	6.3	5.6	270	1,050	30	17	9	53	
Barbados	1,741			6,590	10,510	5	16		79	
Belize	625	2.4		2,740	4,110	20	28		53	
Botswana	4,922	5.5	*4.5*	3,260	8,220	5	46		48	49.4
Brunei Darussalam	7,151			25,090		3	81		17	
Cameroon	9,100	4.6	5	650	1,980	41	20	10	39	13
Canada	583,900	4.0	*2.2*	19,290	21,860	3	31	22	66	20.6
Cyprus	10,839			14,930	20,490	5	25		69	
Dominica	232	2.7		3,120	4,470	21	18		56	
Fiji	2,009	1.9	2.4	2,470	4,040	21	18		61	
Gambia	409	5.2	*2.2*	350	1,340	28	15		58	*24.5*
Ghana	6,600	4.3	4.5	370	1,790	36	26	9	39	*17.9*
Grenada	296	4.9		3,000	4,450	11	19		67	
Guyana	677	7.1		800	2,890	36	29		30	
India	373,900	6.1	5.2	390	1,650	27	30	19	43	13.6
Jamaica	4,000			1,560	3,470	8	36	17	55	
Kenya	9,300	2.9	2.7	330	1,110	29	17	11	54	27.1
Kiribati	76	1.4		910		24	9		67	
Lesotho	1,400	4.5	*7.8*	670	2,480	14	41	16	45	55
Malawi	2,300	5.2	4	220	700	36	18	14	46	
Malaysia	98,200	7.5		4,680	10,920	13	46	34	41	24.9
Maldives	301	8.5		1,150	3,230	22	17		61	
Malta	3,203	4.8		8,630	13,870	3	35		62	
Mauritius	4,300	5.2	5.3	3,800	9,360	10	32	23	58	18.8
Mozambique	1,700	13.3	*4.9*	90	520	39	23	10	38	
Namibia	3,600	1.2	*3.8*	2,220	5,440	14	34	12	52	
Nauru										
New Zealand	60,500	0.9	*3.4*	16,480	16,600	8	29	18	63	35.3
Nigeria	30,700	5.1		260	880	45	24	8	32	
Pakistan	67,200	0.0	5.3	490	1,590	26	25	17	50	17.1
Papua New Guinea	4,200		2.5	940	2,390	26	40	8	33	22
Saint Kitts and Nevis	252	7.4		6,160	7,730	6	26		68	
Saint Lucia	576	1.9		3,620	5,030	11	21		68	
Saint Vincent & The Grenadines	281	3.0		2,500	4,320	11	23		59	
Samoa	199			1,150		40	20		40	
Seychelles	537	3.8		6,880		4	19		77	
Sierra Leone	925		0.7	200	510	44	24	6	32	8
Singapore	101,800	8.8	*8.5*	32,940	29,000	0	36	26	64	29
Solomon Islands	362	2.6		900	2,350	52	8		40	
South Africa	130,200	1.3	1	3,400	7,490	5	39	24	57	28.8
Sri Lanka	14,800	7.3	5	800	2,460	22	26	17	52	19
Swaziland	1,369	7.1		1,440	3,560	9	39		50	

Tanzania	6,600	3.9	*2.7*	210		58	17		24	
Tonga	179	2.2		1,830		35	13		52	
Trinidad & Tobago	5,500	7.9	3.2	4,230	6,410	2	43	8	55	27.3
Tuvalu						17	14		77	
Uganda	6,600	6.0	*7.4*	320	1,050	44	17	8	39	
United Kingdom	1,220,200	4.0	*2*	20,710	20,520	2	32	21	66	36.2
Vanuatu	233	3.9		1,310	3,020	20	14		66	
Zambia	3,600	4.4		380	890	16	41	30	43	18.6
Zimbabwe	8,600	2.1	2.4	750	2,280	28	32	19	41	

Sources: CW=Commonwealth, CIA=Central Investigation Agency, ITU=International Telecommunications Union, WB=World Bank

Commonwealth Countries - Telephony

Country	Mainline Telephones (000's) 1998, ITU	Mainline Telephones (000's) 2000 expected, ITU	Mainline Telephones CAGR (%) 1995-98, ITU	Mainline Telephones per 100 inhab. 1998, ITU	Mainline Telephones per 100 inhab. 2000 expected, ITU	Mainline Telephones per 100 inhab CAGR (%) 1995-98, ITU	Digitali-sation (%) 1998, ITU	Telecom Investment (US$ Millions) 1998, ITU	Telecom Revenue (US$ Millions) 1998, ITU	Telecom Investment/ Revenue Ratio
Antigua & Barbuda	34.0	40	9.5	46.8	59.16	6.4	100.0	-	-	
Australia	9,580.0	9,967	2.5	51.21	52.46	1.3	95.0	2,844.5	12,941.1	0.22
Bahamas	104.3	120	7.6	35.23	40.25	5.5	100.0	16.2	156.7	0.10
Bangladesh	378.0	454	9.7	0.3	0.34	7.7	66.8	34.5	255.8	0.13
Barbados	113.6	131	8.0	42.4	47.50	7.1	100.0	25.0	176.0	0.14
Belize	31.6	33	3.0	13.75	13.62	0.9	99.6	12.0	40.0	0.30
Botswana	85.6	142	19.8	5.64	7.11	17.4	100.0	36.8	82.7	0.44
Brunei Darussalam	77.7	87	4.5	24.68	28.26	1.0	100.0	-	58.7	
Cameroon	75.2	92	7.1	0.54	0.58	4.7	68.3	35.6	73.9	0.48
Canada	19,206.0	20,265	2.6	63.39	67.55	1.6	99.4	4,033.9	16,919.4	0.24
Cyprus	404.7	448	5.2	58.51	58.17	2.8	88.2	88.8	260.3	0.34
Dominica	18.7	26	5.3	25.23	33.28	4.5	100.0	-	-	
Fiji	77.1	88	6.0	9.68	10.79	4.8	99.7	10.8	61.9	0.17
Gambia	25.6	30	10.1	2.08	2.38	5.9	100.0	5.6	17.4	0.32
Ghana	144.2	245	31.7	0.75	1.22	26.8	70.0	7.3	145.9	0.05
Grenada	27.5	31	5.8	26.28	29.66	2.7	100.0	-	-	
Guyana	59.9	70	10.3	7.05	7.87	9.5	100.0	53.6	79.7	0.67
India	21,593.7	32,061	21.7	2.2	3.16	19.4	99.0	2,405.1	5,051.1	0.48
Jamaica	419.4	708	19.9	16.57	23.61	19.1	100.0	133.9	427.7	0.31
Kenya	271.8	324	3.0	0.92	1.08	4.7	56.0	70.9	310.8	0.23
Kiribati	2.8	3	11.4	3.46	3.98	10.3	100.0	1.5	3.5	0.43
Lesotho	20.1	23	4.1	0.97	1.02	3.6	99.0	0.8	13.8	0.06
Malawi	37.4	40	2.9	0.35	0.36	-0.3	58.8	-	32.8	
Malaysia	4,384.0	5,424	9.6	19.76	24.66	6.0	97.0	2,188.9	2,492.1	0.88
Maldives	20.0	26	13.0	7.05	8.68	7.5	100.0	11.1	39.1	0.28
Malta	191.5	208	3.9	49.88	53.95	2.8	100.0	20.6	97.8	0.21
Mauritius	245.4	338	18.3	21.37	28.41	17.4	100.0	45.3	126.4	0.36
Mozambique	75.4	86	7.2	0.4	0.43	4.4	99.0	22.2	63.8	0.35
Namibia	113.9	145	13.2	6.86	7.27	10.7	98.0	49.0	82.1	0.60
Nauru										
New Zealand	1,868.0	1,983	2.8	47.91	49.57	0.4	100.0	302.0	1,838.5	0.16
Nigeria	412.8	531	1.9	0.4	0.41	0.9	42.5	188.4	771.2	0.24
Pakistan	2,757.0	3,384	9.0	1.94	2.29	5.9	92.6	311.4	978.6	0.32
Papua New Guinea	47.0	61	7.7	1.14	1.21	5.9	61.0	-	113.6	
Saint Kitts and Nevis	17.2	22	9.2	41.83	52.78	9.0	100.0	3.1	27.0	0.11
Saint Lucia	39.5	50	8.9	26.79	29.37	8.4	100.0	-	-	
Saint Vincent & The Grenadines	20.5	24	6.0	18.37	21.00	5.6	100.0	-	-	
Samoa	8.5	9	2.8	4.87	5.16	1.0	100.0	1.0	9.8	0.10
Seychelles	19.0	23	11.9	24.35	28.59	10.7	100.0	4.7	35.2	0.13
Sierra Leone	17.4	18	1.5	0.38	0.37	1.1	88.9	8.7	2.2	3.95
Singapore	1,777.9	2,054	7.6	56.2	64.30	5.5	100.0	751.8	2,915.9	0.26
Solomon Islands	7.9	9	6.6	1.89	2.07	3.0	100.0	5.2	13.8	0.38
South Africa	5075.4	5,885	8.2	11.46	12.52	5.7	82.0	2,738.3	5,971.5	0.46
Sri Lanka	523.5	891	36.5	2.84	4.69	35.6	100.0	152.3	2,143.2	0.07
Swaziland	29.0	37	11.1	3.05	3.28	9.5	100.0	13.7	22.2	0.62
Tanzania	121.8	143	10.5	0.38	0.43	7.6	82.3	254.7	109.9	2.32
Tonga	7.8	11	17.7	7.9	11.03	17.2	84.0	1.2	5.3	0.23
Trinidad & Tobago	264.1	301	8.1	20.58	22.7	7.1	100.0	34.4	212.6	0.16
Tuvalu										
Uganda	56.9	78	13.5	0.28	0.35	11.1	90.6	2.0	32.8	0.06
United Kingdom	32,800.0	35,275	3.7	55.64	59.79	3.5	100.0	7,453.7	36,990.9	0.20
Vanuatu	5.2	6	7.0	2.84	2.93	4.5	100.0	-	-	
Zambia	77.7	77	0.4	0.88	0.77	-2.3	73.1	10.8	102.0	0.11
Zimbabwe	212.0	309	17.9	1.72	2.58	11.6	50.0	130.0	135.6	0.96

Sources: CW=Commonwealth, CIA=Central Investigation Agency, ITU=International Telecommunications Union, WB=World Bank

Commonwealth Countries - Internet and PCs

Country	PCs (000's) 1998, ITU	PCs per 100 inhab 1998, ITU	PC CAGR (%) 1995-98, Derived	Internet Users (000's) 1998, ITU	Internet Users per 100 inhab 1998, Derived	Internet Users CAGR (%) 1995-98, Derived	Internet Hosts 1998, ITU	Internet Hosts per 100 inhab 1998, ITU	Internet Hosts CAGR (%) 1995-98, Derived
Antigua & Barbuda				3.0	4.53	26.0	175	0.241	3.0
Australia	7,700	41.2	15.6	3,000.0	16.22	44.2	750,000	4.009	34.3
Bahamas				12.0	4.32	64.4	481	0.163	20.3
Bangladesh				1.2					
Barbados	20	7.5	10.1	5.0	1.89	530.0	44	0.016	180.2
Belize	*6*	*2.8*		10.0	4.38		252	0.110	
Botswana	40	2.6	59.4	10.0	0.66		658	0.042	
Brunei Darussalam	*8*	*2.9*		10.0	3.51	128.9	1,195	0.379	97.1
Cameroon	*20*	*0.2*		2.0	0.01		3		
Canada	10,000	33.0	20.6	7,500.0	24.78	83.2	1,119,172	3.694	44.2
Cyprus	*29*	*4.1*		30.0	4.13	115.4	5,491	0.794	141.5
Dominica				2.0	2.69	74.4	148	0.195	58.7
Fiji				5.0	0.61	314.9	214	0.027	60.3
Gambia	3	0.3		2.5	0.21		10	0.001	
Ghana	30	0.2	14.5	6.0	0.03	364.2	192	0.001	217.5
Grenada				2.0	2.03		3	0.003	
Guyana				2.0	0.24		69	0.008	
India	2,700	0.3	31.0	500.0	0.05	268.4	13,253	0.001	156.2
Jamaica	12	0.5		50.0	1.95	215.0	322	0.013	25.2
Kenya	75	0.3	60.9	15.0	0.05	321.7	686	0.002	243.0
Kiribati	1	0.7		0.3	0.36				
Lesotho				0.2	0.01		19	0.001	
Malawi				2.0	0.02		1		
Malaysia	1,300	5.9	17.6	800.0	3.81	171.4	47,852	0.216	125.1
Maldives		*1.2*		1.5	0.57		109	0.039	
Malta	100	26.0	49.4	20.0	5.39	186.6	1,838	0.479	177.5
Mauritius	100	8.7	40.6	12.5	1.10		575	0.050	
Mozambique	30	0.2	21.8	3.5	0.02	758.4	141	0.001	313.1
Namibia	30	1.9	15.0	5.0	0.31	256.9	2,654	0.160	522.5
Nauru									
New Zealand	1,100	28.2	11.2	600.0	16.34	49.4	137,247	3.520	36.8
Nigeria	600	0.6	10.9	4.0			410		
Pakistan	561	0.4	53.5	61.9	0.05	628.7	3,096	0.002	466.8
Papua New Guinea				0.1			118	0.003	
Saint Kitts and Nevis	5	12.2		1.5	3.67		5	0.012	
Saint Lucia	20	13.6		2.0	1.26	64.4	23	0.016	184.4
Saint Vincent & The Grenadines		-		2.0	1.78				
Samoa	1	0.5		0.4	0.23		2	0.001	
Seychelles		-		2.0	2.56		7	0.009	
Sierra Leone				5.0	0.11		13		
Singapore	1,450	45.8	41.2	550.0	17.80	82.8	67,060	2.120	43.3
Solomon Islands		-		2.0	0.50	181.1	20	0.005	30.5
South Africa	2,100	4.7	24.1	1,266.0	3.31	0.1	144,445	0.326	44.1
Sri Lanka	76	0.4	56.0	20.0	0.11	593.4	539	0.003	347.9
Swaziland		-		1.0	0.11	364.2	278	0.029	552.7
Tanzania	50	0.2		3.0	0.01		129		
Tonga		-		0.2	0.20	26.0	1,871	1.890	1132.2
Trinidad & Tobago	60	4.7	33.9	20.0	1.54	116.9	1,944	0.152	228.2
Tuvalu									
Uganda	30	0.2	44.2	4.0	0.02	88.2	113	0.001	24.9
United Kingdom	15,500	26.3	12.5	8,000.0	13.58	74.7	1,449,315	2.459	48.8
Vanuatu		-		0.1	0.06		78	0.043	
Zambia				3.0	0.03	55.4	303	0.004	63.8
Zimbabwe	110	0.9	49.4	10.0	0.09		1,031	0.008	

Sources: CW=Commonwealth, CIA=Central Investigation Agency, ITU=International Telecommunications Union, WB=World Bank

Commonwealth Countries - Media

Country	TVs (000's) 1998, ITU	TVs per 100 inhab 1998, ITU	TV CAGR (%) 1995-98, Derived	TV Broadcasting Networks 1997, CIA	Radios (000's) 1997, CIA	Radios per 100 inhab 1997, Derived	Radio Broadcast Stations 1997, CIA
Antigua & Barbuda	31	45.2	4.7	2			6
Australia	11,840	63.9	0.8	104	*25,294*	*136.7*	608
Bahamas	259	89.6	58.5	1	200	72.0	7
Bangladesh	850	0.7		11	*6,065*	*4.9*	26
Barbados	75	28.3		1			5
Belize	40	18.0	3.6	2			13
Botswana	40	2.7	4.6		*226*	*14.9*	27
Brunei Darussalam	196	63.8	4.2	2	284	99.6	13
Cameroon	1,100	8.1	4.6	1	6,000	42.9	22
Canada	21,450	71.5	4.3	80	*32,276*	*106.6*	376
Cyprus	110	16.7	1.6	49	500	68.9	49
Dominica	13	17.5	9.1		*45*	60.5	5
Fiji	75	9.7	2.3				8
Gambia	4	0.4		1	*190*	*16.3*	7
Ghana	2,200	11.5	102.5	15	12,500	70.1	27
Grenada	35	32.5	32.6	2	80	81.1	1
Guyana	50	5.9	12.6	3	398	47.0	8
India	66,000	6.9	5.0	562	111,000	11.6	303
Jamaica	813	32.3	1.7	7	1,973	76.9	8
Kenya	620	2.1	10.3	8	5,000	17.7	33
Kiribati	2	2.2		1	15	18.0	1
Lesotho	50	2.4	56.7		66	3.2	7
Malawi	23	0.2			1,011	9.7	27
Malaysia	3,600	16.6		27	8,080	38.5	31
Maldives	10	3.9		1	*28*	*10.8*	3
Malta	196	51.8	5.5	2	*189*	*50.9*	12
Mauritius	260	22.8	7.4	13	*401*	*35.4*	2
Mozambique	70	0.4	11.1	1	700	3.7	33
Namibia	50	3.2	3.6	28	*223*	*13.7*	44
Nauru				1	*4*		1
New Zealand	1,845	50.1	0.5	743	*3,868*	*105.4*	66
Nigeria	7,000	6.7	20.5	1	17,200	14.6	124
Pakistan	12,500	8.8	64.7	29	10,200	7.4	47
Papua New Guinea		2.4		3	*401*	*9.0*	33
Saint Kitts and Nevis	10	24.4		4	*25*	*61.1*	2
Saint Lucia	31	21.1		3	*104*	*65.4*	5
Saint Vincent & The Grenadines	18	16.2		4	*76*	*67.6*	2
Samoa	12	6.9	19.7	6	*76*	*43.9*	1
Seychelles	15	19.0	2.3	11	*50*	*64.1*	3
Sierra Leone	120	2.6	18.0	2	*1,159*	*25.1*	2
Singapore	1,100	34.8	0.6	4	*2,244*	*72.6*	17
Solomon Islands	6	1.4			*38*	*9.4*	4
South Africa	5,399	12.5	8.7	556	7500	19.6	180
Sri Lanka	1,700	9.2	12.3	21	*3,856*	*20.8*	17
Swaziland	100	10.7	3.6	9	200	21.0	13
Tanzania	650	2.1	13.0	4	*8,432*	*26.8*	16
Tonga	5	5.1	35.7	1	*66*	*67.5*	1
Trinidad & Tobago	419	33.1	0.3	4	700	53.8	11
Tuvalu					*4*		1
Uganda	525	2.6	1.6	9	*2,431*	*11.8*	10
United Kingdom	38,000	64.5	2.0	947	70,000	118.8	750
Vanuatu	2	1.3		1	*49*	*27.5*	2
Zambia	1,200	13.7	26.0	9	1,889	19.9	16
Zimbabwe	350	2.9	6.5	16	*1,072*	*9.3*	26

Sources: CW=Commonwealth, CIA=Central Investigation Agency, ITU=International Telecommunications Union, WB=World Bank

ANNEX B

TELECENTRE SUMMARY TABLE

TELECENTRE SUMMARY CHART

Project generalities			Operational Characteristics and Issues			
Location	Total	Time Frame	Services/Functionality	Environment/Usage:	Sustainability	Problems
Suriname - Brownsweg (1) and Gujaba (1)	2	Started up; Operated 1996-97; Finalized	Telephone, Fax, data Communications, Computer; Link through a Fixed Cellular Communication System; No communications facilities or continuous power.	Basic Communications, Tele-education	Initial funding by International Organisations, national NGOs and local government. Population considered able to sustain telecentre. (prepared to pay 3% of income).	*Market:* Lack of marketing, low partnership enlargement, lack of local entrepreneurial spirit; non-competitive prices. *Operational:* lack of training (operational and customer service), high cost of band-with, continuous technical problems: short operational periods, Internet congestion in feeding center (Paramaribo). funding partially supplied,
South Africa - in the following provinces: Northern Province, Northern Cape, Kwa Zulu Natal, North West Province, Free State and Eastern Cape.	8	Started up: early 1998, operating	Telephone, fax, photocopying, PC, e-mail, scanner	Basic telecommunications, office equipment use and training	Initial funding provided by the Universal Service Agency supported by: a R$ 3 Million fund, International Organisations and National Telecoms Providers	High cost of internet provision; sub-optimal equipment use; no tariff/pricing guidelines; no proper financial management; unclear hr policies; security concerns.
India – Pondicherry	4	Project launched Feb. 1998 (2 more telecentres planned)	Telephone, fax, etc. and Internet and local info databases	Access to information meeting local needs e.g. agricultural market info	Project finance by IDRC and additional finance and management by M.S. Swaminathan Research Foundation	Infrastructure problems e.g. unreliable telephone connection and sporadic power supply
India – Madras	11	no information available	Telephone and Internet	Networking services, electronic databases	Planned to be self-sustaining, currently supported by Foundation of Occupational Development (FOOD)	Infrastructure problems e.g. unreliable telephone connection and sporadic power supply

Uganda – Nakaseke, Nabweru, Buwama	3	Original Start-up date: Nov-Dec 1998; Pilot to last 3 yrs.	Not all have working phone connections yet; books, videos, CD-ROMs and library to be included	Education, Health, Network: NGO's, local gov, and business; farmers and women	Investment over 3 years: US$396K: International telecom and development organisations US$68K: UPTC US$56K:other national partners	
Mozambique - Manhica (1) and Namaacha (1)	2	Operations started-up Aug 1999 Pilot to last 4 yrs. Currently tested.	Telephone, fax, 3 computers, printers, Internet, photocopying, scanner, word processing service; library, teaching rooms	Telecommunications, IT training, education	Support by International development organisation and local university: US$60K approx: Feasibility Studies US$80K: site setup (CIEUM)	
Projects with operations to be assessed:						
Mali - Timbuktu.	1	Original Start-up date: Jan 1998; pilot to last 3 yrs.	Basic telecoms,	Education, health, commerce, weather, agriculture research.	Initial support from national and local gov's: $155K: PTT SOTELMA ($278K, + subsidies on calls and waived connection fees) $423K: Intl. telecom, and development organisation.	
Bhutan - Jakar	1	Original Start-up date Jan 1998 (Equipment and training); Operations start-up: Nov-Dec 1998	Telephony, fax, photocopying, Internet in 99, virtual office, Eq. TB installed Nov/Dec 98	DE, tele-medicine, community info, tele-trading.	Support by International telecom and development organisations and national PTT Medical equipment was offered to be supplied by Japanese manufacturer.	

Benin - Malanville	1	Original Start-up date 1999; Pilot to last 3 yrs.	Includes basic Telecom services; relies on use of VSAT		Participation from Intl. telecom, and development organisation.	
Honduras - Valle de Angeles	1	Original Start-up date end 1998	Telephony, fax, Photocopying	telemedicine and DE	Support by International telecom and development organisations and national PTT	
Tanzania - Sengerema	1	Original Start-up date 1999; Pilot to last 3 yrs.			Support by International telecom and development organisations	
Romania - Balotesti	1	Original Start-up date 1999; Pilot to last 3 yrs.			Support by International telecom and development organisations and national PTT Local supermarkets Involved	
Ghana - Asante Akim;	1	Original Start-up date: Dec 2000			Support by foreign non-profit IT development organisations and local government. International development groups and a private company contacted	
Projects still in Planning stages:						
Vietnam - dac Lac Province (2) and Ha bac (2).	4	Network Planning: March 1998 Pilot to last 3 yrs.			Support by International telecom and development organisations and national PTT	
Haiti	1	Feasibility study to start Aug 98.			ITU	
Maldives	1	Proposal: Jan 98.				
Total	43	1993-1999				

ANNEX C

LIST OF KEY MATERIALS

ANNEX C: KEY SOURCE MATERIALS

Telecommunications Sources and Websites

BMI-TechKnowledge Group (1999), *Communication Technologies Handbook 1999*, Johannesburg, South Africa
Website at: www.bmi-t.co.za

Materials and Websites related to ICT and Education - by Organization

AfricaEducation (Centre for Lifelong Learning)

This website provides the latest information in the area of education and development in Africa. It was conceived, created and maintained by the Centre for Lifelong Learning®.
Website found at: www.africaeducation.org

Africa Internet Connectivity

Jensen, Mike, "Information & Communication Technologies (ICTs) Telecommunications, Internet and Computer Infrastructure in Africa".
Last update: July 1999.
Extensive website with National ICT profiles for 54 African countries:
http://www3.sn.apc.org/
http://www3.sn.apc.org/africa/
http://www2.sn.apc.org/africa/counsrch.cfm
http://www3.sn.apc.org/africa/afrmain.htm
http://www3.sn.apc.org/africa/partial.html

Jensen, Mike. "African Internet Status", July 1999.
Document found at: http://www3.sn.apc.org/afstat.htm

Jensen, Mike, "Summary of International ICT Development Projects in Africa", October 1998. Website at: http://www3.sn.apc.org/projects.htm

African Information Society Initiative (AISI) - see also Economic Commission of Africa (ECA)

Website at: http://resources.bellanet.org/partners/aisi/index.htm

African Information Society Initiative, Meeting Report (21-23 October 1996) - Co-ordination Meeting African Information Society Initiative, Addis Ababa, Ethiopia.
Document found at: www.bellanet.org/partners/aisi/coordn/oct21/finrepor.htm

African Information Society Initiative, Report of the Donor and Executing Agency Meeting on Information Technology (IT) for Development in Africa, Rabat 16-18 April, 1997, Rev. 2 (23 May 1997).

Ndiaye, Momar Aly, Moustapha Ndiaye, and Papa Assane Dieye (April 1996), "Empowering Socio-Economic Development in Africa Utilizing Information Technology A Critical Examination of the Social, Economic, Technical and Policy Issues in: Senegal", African Information Society Initiative (AISI) Case Study. Document found at: www.bellanet.org/partners/aisi/policy/cntry/senegal.htm

Werner, Marcel (April 1996), "Empowering Socio-economic Development in Africa Utilizing Information Technology - A Critical Examination of the Social, Economic, Technical and Policy Issues in Mozambique". African Information Society Initiative (AISI) Case Study. Document can be found at: www.bellanet.org/partners/aisi/policy

African Virtual University (AVU)

Website at: www.avu.org
Provides background documentation, rationale, list of institutions, etc.

African Virtual University, "Feasibility Study and Preparation of Prototype Service Phase". Document found at: www.infodev.org
When at *info*Dev website select "Our Projects" link. Then select "Completed *info*Dev Projects" for a listing of completed projects. Select African Virtual University final report.

Alliance for Global Learning

Alliance for Global Learning, a strategic partnership between Schools Online, World Links for Development (WorLD), and the International Education and Resource Network (I*EARN), was created to provide education opportunities for students around the world.

Alliance for Global Learning website at: www.global-learning.org
International Education and Resource Network (I*EARN) website at: http://www.igc.apc.org/iearn/globe.html
Schools Online website at: http://www.schoolsonline.org/

The British Council

Website at: www.britishcouncil.org

"Commonwealth Knowledge" initiative - a partnership among the British Council, OneWorld Online, and Article 19 - website at: www.commonwealthvoices.org

Canadian International Development Agency (CIDA)

Website at: www.acdi-cida.gc.ca/index.htm
Use keywords to search for past ICT, education or country-related projects.

Sectors of Intervention website: http://www.acdi-cida.gc.ca/sector-e.htm
Select "Education" for a listing of news releases and reports.

Caribbean Community and Common Market (CARICOM). Canada and Caricom - Summit of the Americas, Santiago, Chile. (April 18-19, 1998). Background Information.

Commonwealth of Learning

Website at: www.col.org

The Commonwealth of Learning (1999), *The Development of Virtual Education: A Global Perspective*, Dr. Glen M. Farrell, Editor, COL, Vancouver, British Colombia, Canada.

The Commonwealth of Learning (1997), *Perspectives on Distance Education: Quality Assurance in Higher Education - Selected Case Studies*, Alan Tait, Editor, COL, Vancouver, British Colombia, Canada.

The Commonwealth of Learning (1999), *Report to Ministers of Education*, COL, Vancouver, British Colombia, Canada.

Economic Commission of Africa (ECA) - African Information Society Initiative (AISI)

Economic Commission for Africa (ECA) - NICI in Africa. "Building National Information and Communications Infrastructure (NICI) for Sustainable Development in Africa" - an extensive NICI website with 53 NICI Country Profiles prepared for ADF'99 (20 October 1999) can be found at:
www.bellanet.org/partners/aisi/nici
www.bellanet.org/partners/aisi/nici/index.htm

NICI in Africa - Building National Information and Communications Infrastructure (NICI) for Sustainable Development in Africa, (last update),

African Information Society Initiative (1994-1997). Policy and Awareness - Studies of Effectiveness of Informatics Policy Instruments in Africa
List of studies can be found at: www.bellanet.org/partners/aisi/policy

United Nations Economic and Social Council (30 May 1995), "Building Africa's Information Highway: The Case of Mozambique", Economic Commission for Africa. Document can be found at: www.idsc.gov.eg/aii/mozambiq.htm

FAO

D. Richardson and L. Paisley, eds., FAO 1998. (For a copy contact: FAO Communication for Development Group, Viale delle Terme di Caracalla, 00100 Rome, Italy, Email: loyvan.crowder@fao.org). Last update: 28 July 1999. Relevant sections of this document can be found at:
www.fao.org/waicent/faoinfo/sustdev/CDdirect/CDan0010.htm
www.fao.org/waicent/faoinfo/sustdev/CDdirect/CDre0025.htm

The Global Knowledge Partnership (GKP)

Website at: www.globalknowledge.org

Global Knowledge Activity Information Management System (GK-AIMS) - Online tools for Information Sharing and Project Planning. Projects / Activities database and record details.
Website at: http://gkaims.globalknowledge.org/
When in website, select the "Project & Activities Link" for a comprehensive database - detailed information can be found on the specific activities in which GKP Partners are involved. Often, information such as budgets, locations, contact names and project abstracts are included.

International Centre for Distance Learning (iCDL)

Institutions & Courses databases as well as Literature database at:
http://www-icdl.open.ac.uk/icdl/index.htm

International Development Research Centre (IDRC) - Acacia Initiative

Website at: www.idrc.ca or www.idrc.ca/acacia
IDRC (South Africa) website at: http://www.idrc.org.za
Acacia website at: www.acacia.org

Graham, Michael (Evaluation Unit, Corporate Services Branch, IDRC), "Use of Information and Communication Technologies in IDRC Projects: Lessons Learned", IDRC Study/Acacia Initiative, April 1997.

Harfoush, Nabil (BNK Informatics Canada Inc.). "Acacia Information and Telecommunications Technology Issues". IDRC Study / Acacia Initiative.

Harker, John (7 March 1997). "SchoolNet, Africa, and the IDRC", IDRC Study / Acacia Initiative.

IDRC Study / Acacia Initiative (mid-1990s), "Acacia National Strategies: Mozambique", a document prepared on the basis of a 2 day workshop initiated by IDRC to assist in designing the programme.

Knoch, Carsten (Global One South Africa) (February 1997), "Uninet - The South African Academic and Research Network", IDRC Study / Acacia Initiative

M-POWA, Midrand, South Africa (February 1997). "Exploring a Basic Illiterate Web Access System - Discussion and demonstration of technical concepts, and pointers to future research". IDRC Study / Acacia Initiative.

International Institute for Communication and Development (IICD)

IICD's website, which serves as a starting point for gathering information on issues with ICT and sustainable development relevance, can be found at: www.iicd.org/index.ap
At website, select any interesting links, including "Latest Project Updates".

International Telecommunication Union (ITU)

Telecommunication Development Bureau - ITU-D Study Groups (5 August 1999), "Partial Draft of the Report of the Focus Group on Promotion of Infrastructure and Use of the Internet in Developing Countries", Document 1/xxx-E, ITU, Geneva. Source: Chairman of the Focus Group (Study Group 1).

PANOS

PANOS Media Briefing No. 28, April 1998, "The Internet and Poverty", Document can be found at: http://www.oneworld.org/panos/briefing/interpov.htm

SchoolNet

Bracewell, Robert, Alain Breuleux, Thérèse Laferrière, Jean Benoit, and M'hammed Abdous (30 December 1998). "The emerging contribution of online resources and tools to classroom learning and teaching". Report submitted to SchoolNet / Rescol by TeleLearning Network Inc. (Contractor)
Document found at: www.tact.fse.ulaval.ca/ang/html/review98.html
Executive summary found at: www.tact.fse.ulaval.ca/ang/html/rev98es2.html

Grégoire inc., Réginald, Robert Bracewell and Thérèse Laferrière (14 August 1996), "The Contribution of New Technologies to Learning and Teaching in Elementary and Secondary Schools" - Document Review - a collaboration of Laval University and McGill University.
Document found at: www.tact.fse.ulaval.ca/fr/html/apport/impact96.html

The South African Institute for Distance Education (SAIDE)

References to all SAIDE Publications (1998-1999) - online, published or unpublished reports can be found at: www.saide.org.za/publications.htm

Online SAIDE Publications:
SAIDE (1998). *Quality Criteria for Distance Education: Draft Policy Guidelines*.

Butcher (1998). *Possibilities and Pitfalls of Harnessing Information and Communications Technologies (ICTS) to Accelerate Social Development: A South African Perspective.* SAIDE: Johannesburg

SAIDE (1998). *Distance Education Practices of the Wits P& DM Master of Management Programme in Mpumalanga: An Evaluation Prepared by the South African Institute for Distance Education*. SAIDE: Johannesburg

SAIDE (1998). *Promat's Part Time In-Service Programme for Teachers : An Evaluation Prepared by the South African Institute for Distance Education - September 1997 to March 1998*, SAIDE: Johannesburg.

SAIDE (1998). *School Based Educational Broadcasting Service for South Africa : Strategic Plan Developed for the South African Broadcasting Corporation*. SAIDE: Johannesburg.

Swedish International Development Cooperation Agency (SIDA)

Website at: www.sida.se

Ekenberg, Love and Lars Asker (October 1999), "IT in Swedish Development Cooperation - Suggestions for ways of including the Low-income Countries", SIDA - Corporate Development Division, Stockholm, Sweden.

Telematics for African Development

*info*Dev (September 1995 - July 1996), "Telematics for African Development", Final Project Report.
Website at: www.infodev.org
When at *info*Dev website select "Our Projects" link. Then select "Completed *info*Dev Projects" for a listing of projects select Telematics for African Development final report.

UNINET

Steering Group for the Uninet Needs Analysis (15 December 1998), "Uninet Needs Analysis Draft Report", Version 1.4.

United Nations Development Programme (UNDP) - IT for Development Programme

Information and Communications Technologies for Development website at:
www.undp.org/info21/index5.htm
www.undp.org/info21

The Alliance of Small Island States (AOSIS), a coalition of 42 small island states from all regions of the world, has website at: www.aosis.org

The Small Island Developing States Network (SIDSnet) website and a Virtual Library can be found at:
www.sidsnet.org/main.html
www.sidsnet.org/sidsdocs/impdocs.html

Pacific Human Development Report 1999 - Creating Opportunities
Document found at: www.sidsnet.org/pacific/phdrwww/phdr
At website, select "See the full report" link, the select "Chapter 3: Broadening opportunities for Education and Training"

Website at www.undp.org.fj

United Nations Educational, Scientific and Cultural Organization (UNESCO)

Website at: www.unesco.org

UNESCO - Education Sector - Unit for Education of the Twenty-first Century

UNESCO Education Sector website: www.unesco.org/education/index.html

Delors, Jacques, chairman (The International Commission on Education for the Twenty-first Century) and members. "Learning: The Treasure Within". Report to UNESCO of the International Commission on Education for the Twenty-first Century, UNESCO Publishing.

UNESCO - "Creating Learning networks for African Teachers" Initiative

UNESCO (1999), "Introducing the Internet in African Teachers' Colleges - A Reflection" - part of a larger "Harnessing Information Technology for Development in Africa" project

UNESCO - Information and Informatics Division

Rose, John B. (early 1999). "Multipurpose Community Telecentres in support of People-Centred Development". UNESCO - Information and Informatics Division.

UNESCO, "Multipurpose Community Telecentre - a Community Learning Centre"

UNESCO - Learning Without Frontiers (LWF)

Learning Without Frontiers: Constructing Open Learning Communities for Lifelong Learning. Last Update: October-December 1999.
Website at: www.unesco.org/education/lwf

Telecentre links: www.unesco.org/education/educprog/lwf/links/mct.html
Internet in Africa link: www.unesco.org/education/educprog/lwf/links/iafr.html
LWF activities: www.unesco.org/education/educprog/lwf/lwf_activities.html
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Berg, David and Jeannette Vogelaar. *The Need for a New Perspective: Creating Learning Networks for African Teachers, Change, Professional Development and ICTs*, paper presented at the conference: Capacity Building for Information Technologies in Education in Developing Countries (CapBIT) 25-29 August 1997, Harare, Zimbabwe.
Document can be found at: www.unesco.org/education/educprog/lwf/doc/ifip.htm

Siegel, Elliot, Bonnie C. Carroll and Patricia Thompson. *Pilot Project on Access to Telematics Facilities in the Eastern Caribbean sponsored by Commonwealth of Learning, International Council for Scientific and Technical Information, International Telecommunication Union, Pan American Health Organization, United Nations Development Programme and UNESCO* (December 1998) - Final Report. UNESCO, Paris.
Document found at: www.unesco.org/webworld/publications/index.shtml

UNESCO - Learning Without Frontiers (LWF) Coordination Unit and the NGO Programme on Literacy and Education for All, in collaboration with ActionAid (UK). *Background Document and Concept Note.* Project: Transforming Community Schools into Open Learning Communities: Workshop, 12-16 July 1999, Ouagadougou, Burkina Faso. UNESCO, Paris.

Zuber, Ahmed and Fernanda Farinha. (April 1998) "Learning Without Frontiers - Project Proposal", February, 1999. Maputo.

USAID

The Southern Africa Regional Telecommunications Restructuring (RTR) Programme. South Africa Telecommunications Sector Profile. The web site includes country profile, tender notices, news articles and other items to meet the information needs of businesses seeking to enter or expand their presence in the regional telecom market. The SATCC Telecommunications Sector Development Programme is funded by USAID.

University of Pretoria

University of Pretoria - Virtual Campus - website at: www.up.ac.za/telematic

World Bank - Information for Development (*info*Dev)

*info*Dev is a World Bank Grant Programme for the innovative use of communication and information technology.
Website at: www.infodev.org
When at *info*Dev website select "Our Projects" link. Then select "Funded *info*Dev Projects" or "Completed *info*Dev Projects" for a listing of projects, organized by focus: education, Internet, telecommunications, etc. Completed projects may have final reports available online.

World Bank - World Links for Development (WorLD)

World Links for Development Programme website at:
www.worldbank.org/worldlinks

Ehsun, Samuel. *World Links for Development Programme - Ghana: Opening a World of Learning*. Presented at the Meeting for Headmasters / Headmistresses of Schools Nominated for WorLD Programme Phase 2 Expansion, November 1999.

SRI International. *World Links for Development: Accomplishments and Challenges - Monitoring and Evaluation Annual Report 1998-1999*. SRI Project No. P03617.

World Links for Development Programme. "WorLD - Ghana: Annual Report for Fiscal Year 1999 (July 1998 - June 1999)".

World Links for Development Programme. WorLD Programme Coordinators' Meeting - Mozambique Country Report, July 1999.

Kotsokane, Philemon Boragane, WorLD - South Africa (SchoolNet SA) Report (including spreadsheet with sub-sections on Institutional Information, Project Information, School Connectivity, Teacher Training as well as a section outlining successes, weaknesses, recommendations and objectives, and the way ahead).

Key Materials and Websites - by Country

Canada

Advisory Council on Health Infostructure, "Canada Health Infoway: Paths to Better Health".

Alberta Advance Education and Career Development. "1998-1999 Annual Report".
Extracts can be found at: www.learning.gov.ab.ca and www.gov.ab.ca/pao

Alberta Education (March 1999), "On-line Learning: Best Practices for Alberta School Jurisdictions".
Document found at: http://ednet.edc.gov.ab.ca/technology/

The Arlington Consulting Group, "The Canadian Health Info-Structure: A Conceptual Overview" (November 1997) - Background Paper for the February 1998 National Conference on Health Info-Structure. Prepared for Health Canada, Office of Health and the Information Highway and Alberta Heath.

Athabasca University website at: www.athabascau.ca

Canadian Network for the Advancement of Research, Industry and Education (CANARIE), "Towards A Canadian Health Iway - Vision, Opportunities and Future Steps" (September 27, 1997).

CANARIE, "Towards a Strategy for Distributed Learning in Support of Health" (June 1998) - based on the workshop "Bridging the Pacific: Education and Health for All through Distance Learning, November 21-22, 1997, Vancouver, B.C."

Human Resources Development Canada (1999). "Professional Development and Learning Technologies". Canadian Alliance of Education and Training Organizations - Office of Learning Technologies and Human Resources Partnerships Directorate, Human Resources Development Canada.

Human Resources Development Canada (March 1999). "The Impact of Technologies on Learning in the Workplace". Final Report prepared for the Office of Learning Technologies by Ekos Research Associates Inc. And Lyndsay Green & Associates.

Industry Canada. "Industry Canada: Making A Difference - Our Priorities for 1999-2000".
Industry Canada corporate documents including "Making a Difference - Overview of Activities and Plans" can be found at: http://info.ic.gc.ca/epublications

Lee, Marc (February 1998). "Report of the National Conference on Health Info-structure"- final report for conference, 8-10 February 1998.

"The RM G7 Report 1998: ICT Provision in Schools". Research carried out by The Advisory Unit: Computers in Education.

"Technology-Mediated Learning: Current Initiatives and Implications for Higher Education". Report presented to the Council of Ministers of Education, Canada

(25 November 1998). Prepared by Simon Fraser University Telelearning Policy Initiative: Brian Lewis, Richard Smith and Christine Massey, and TeleEducation NB: Rory McBreal and Julia Innes.

Fiji

The University of the South Pacific (USP)

USP's University Extension - Distance & Continuing Education website: www.usp.ac.fj/ext and www.usp.ac.fj

Others

Keith Harry, Editor (1999). "Higher Education through Open and Distance Learning - World Review of Distance Education and Open Learning". Routledge: London and New York and The Commonwealth of Learning.

Telecom Fiji Limited website: www.tfl.com.fj

Cafe Pacific (Nius Country Profiles - Fiji Islands) website: www.asiapac.org.fj/cafepacific/resources/profiles/fiji.html

Fiji government website: http://www.fiji.gov.fj/core/about.html

Ghana

World Links for Development (WorLD)

World Links for Development (WorLD) – Internet connectivity & training in the use of technology for secondary schools, Ghana

WorLD - Ghana: Annual report for Fiscal Year 1999 (July 1998 - June 1999)

WorLD: Accomplishments and Challenges Monitoring and Evaluation Annual Report 1998-1999

WorLD – Ghana, Internal report prepared by Samuel Eshun, national coordinator, November 1999

www.worldbank.org/worldlinks/english/html/ghana.htm

www.world-links.org/ghana/about.html

Asante Akim Multipurpose Community Telecentre Project

http://ghaclad.org/about/index.htm

http://ghaclad.org/changes/index.htm

www.uic.edu/~darkwa/profile.htm

Others

General Regulations under the National Communications Act of 1996.

Ministry of Transport and Communications, Telecommunications Policy for an Accelerated Development Programme 1994-2000.
Document found at www.communication.gov.gh

Ghana Broadcasting Corporation: www.gbc.com.gh

Ghana Review - Newsreel (news articles). Last update: November 5, 1999
http://www.ghanareview.co.uk/

MOZAMBIQUE

Eduardo Mondlane University's (EMU) Distance Education

University Eduardo Mondlane website: (in Portuguese) http://www.ci.uem.mz

SchoolNet - Mozambique

WorLD: Mozambique Country Report, July 1999 - Coordinator internal report.

www.worldbank.org/worldlinks/english/html/mozam.htm

Telecentres in Mozambique

Telecentres website: www.telecentros.org.mz

Information on telecentres can be found at:
www.ci.uem.mz/telecentros/index.htm, www.ci.uem.mz
When at website, select "Pesquisa e Desenvolvimento" link for one paragraph announcement of telecentres, and a brief description about 2 telecentres "Pilot Telecentres in Manhiça and Namaacha".

MAAC's description on telecentres: http://www.iscd.mz/maacs/projtele.htm

Global Knowledge Information on telecentres: gkaims.globalknowledge.org (choose projects and search by country) - one page abstract about project from the GK-AIM database.

Learning Without Frontiers - Reaching Unreached Learners in Mozambique

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AVU

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SchoolNet South Africa (SchoolNet SA)

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Technology Enhanced Learning Initiative of Southern Africa (TELISA)

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Updates on the TELISA Initiative, March and August 1999
TELISA websites:
http://pgw.org/telisa/
http://pgw.org/telisa/news.htm
http://pgw.org/pw/

The Distance Education Digital Learning System Project

Overview of the project, describing the pilot phase and rationale can be found at:
www.unisa.ac.za
www.unisa.ac.za/dept/buo/projects/dedls/index.html
www.unisa.ac.za/dept/buo/projects/dedls/foundations.html

Universal Service Agency – Franchised Telecentres

Website: www.usa.org.za

Universal Service Agency's website: www.usa.org.za

http://usa.org.za/projects/field.htm explains the telecentre project in terms of selection criteria and provincial breakdown of approved telecentres

www.usa.org.za/works/bplan.htm provides a business plan.
"Universal Access and Universal Service Discussion Paper" - second draft

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www.doc.gov.za/docs/policy/telewp.html

TRINIDAD & TOBAGO

University Of West Indies Distance Education Centres (UWI DEC)

UWI's website: www.uwichill.edu.bb

UWI DEC's directory: http://www.uwichill.edu.bb/bnccde/dec.htm

Website of the university's Board for Non-Campus Countries and Distance Education: www.uwichill.edu.bb/bnccde

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Caribbean University Network (CUNeT)

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www.redhucyt.oas.org/webing/cunet.htm

Nortel's case study on the University of Puerto Rico Educational Network:
www.nortelnetworks.com/products/02/studies/2727.html,
www.nortelnetworks.com/solutions/education

Satellite-based Education and Health-Care Network for the Americas, Trinidad & Tobago

Website: http://www.ybiz.com/edsatamericas, http://www.netoedsat.org

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Satellite-based Education and Health-Care Network for the Americas project description, background and mission: http://www.ybiz.com/edsatamericas

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ANNEX D

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ANNEX D: KEY CONTACTS

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