

MEMORANDUM

TO: Bill Smith, Mike McIntosh, Bernard Paulin, Rory McGreal
FROM: W. David Ferguson
DATE: November 27, 1995
SUBJECT: Alberta's vision for a Virtual Learning System

The attached document provides an excellent vision that is equally applicable to New Brunswick. Although a number of us have talked and written about this subject, I don't recall seeing a similar document that ties it all together. I particularly like the notion of an Adult Learning System that is learner-centered and includes universities!

There are a number of activities and initiatives underway that need to be connected: our concept of a "virtual college", the roll-out of Tele-Education N.B., the universities's distance consortium, the consortium for the enhancement of educational services through multi-media learning technologies, CASP's, Community Learning Centres, our draft strategy for universities, the future of NBCC curriculum development, the development of a learner portfolio (managed by DAEL?), and on and on.

I would like to meet and discuss how we might take advantage of the Alberta "vision" to further develop the implementation of a Virtual Learning System in New Brunswick. I have asked Murielle to schedule a meeting in a couple of weeks time.

W. David Ferguson

NOV 22 1995

*Vision for Change: a concept paper for the development of
a virtual learning system*

September 1995

Executive Summary

Background

Several government departments and educational organizations have recently generated reports regarding the future use of technologies in our province. All share the view that the "Alberta Advantage" needs to be secured by taking bold steps to provide Albertans with affordable electronic access to education, health, and government services. They cite the following reasons for using technologies in education and training:

- the use of technology is critical to many careers
- technologies facilitate more efficient and effective learning
- the prevalence of technology requires education to keep pace, and
- technologies are tools for re-engineering the educational system

Regardless of which rationale is adopted, it is apparent that a virtual learning system will play a significant role in Alberta's Adult Learning System.

Advanced Education and Career Development, with the assistance of an external resource group, has prepared this discussion paper as an initial attempt to provide a conceptual framework for facilitating and supporting system-wide change in Alberta's Adult Learning System. Its premise is that a province-wide virtual learning system, developed through effectively integrating technologies into programs and student support services at both traditional and non-traditional places of learning, can meet our goals of increased accessibility, cost-effectiveness, responsiveness and accountability.

Virtual Learning Environments:

- ◆ are created when distance, information and telecommunication technologies are used to provide educational services which transcend barriers of time and place associated with traditional lecture-type teaching. Technologies unite the learner and the teacher, carry course content and information and provide the opportunity for two-way interaction.
- ◆ are supported by a virtual learning system which is composed of two co-dependent infrastructures: a services support network (soft infrastructures which include educational products, instruction, and learner services) and an electronic network linking learners and educators with services (hard infrastructures which include sending, receiving and carrier technologies.)
- ◆ serve individuals and groups, facilitate synchronous (same time) and asynchronous (different time) learning, and provide educational services which can be accessed from homes, institutions, communities and workplaces.
- ◆ provide opportunities for learners to increase their participation in the management of the learning process, often creating changes in the relationship between teachers and learners.

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- ◆ challenge educational organizations and bureaucracies to modify or remove formal and informal restrictions which have traditionally limited learner access and institutional responsiveness, e.g. transferability, geographic and programmatic jurisdictions, attendance and residency requirements.

Principles Guiding a Virtual Learning System

The effectiveness and efficiency of a virtual learning system are determined by the degree to which it adheres to the following principles:

- that the learner is the centre of the Adult Learning System,
- that the "collective" resources and services of the Adult Learning System are made accessible to the learner,
- that all educational organizations use their potential to fully participate in a virtual learning system,
- that educational organizations act as "inter-dependent agents", each relying on the other to perform a necessary function, and
- that the soft and hard infrastructures are well integrated to provide seamless access to services and technologies.

Access to Educational Services: Virtual Communities of Learners

As described earlier, learners will be the centre of virtual learning in Alberta. They will be part of a "virtual community of learners" which, unlike the traditional learning community, gives each learner just-in-time access to learning opportunities. The system must provide four levels of electronic access to learners: specialized, regional, local and home. The services required at each level are determined by the specific needs of the associated virtual community of learners. For example, a virtual community of home-based learners will have different support requirements than a virtual community of campus-based learners. Using a variety of technologies, for example, computers, fax-modems, teleconferencing, databases, videoconferencing, and computer conferencing, learners in virtual communities will access a world of learning opportunities, regardless of their location or the time of day.

A Virtual Learning System to Meet the Goals of the Adult Learning System

Advanced Education and Career Development believes that the development and implementation of a virtual learning system in Alberta must be driven by the goals of the Adult Learning System.

Accessibility: A virtual learning system will significantly reduce the barriers of time and place which restrict learners from accessing educational opportunities and support services. This will enhance existing opportunities for on-campus learners and create new points of access for off-campus learners in both urban and rural settings.

Responsiveness: A virtual learning system will reduce curriculum, institutional and departmental barriers which impede the Adult Learning System's timely response to the needs of learners, for example, transferability, attendance and residency, student finance, product development and modification, professional development, service and network coordination.

Implementation: Possible Roles for Advanced Education and Career Development

A systemic approach will be essential to the successful development of a virtual learning system in Alberta. Advanced Education and Career Development is prepared to assume a leadership role in enabling the development of a learner-centered adult learning system which embraces an aligned and interoperable network of learner services supported by a network of electronic technology.

To establish this system, the department would pursue the following goals and strategies in support of the system vision:

Goal : Provide strong leadership and coordination

Strategies:

1. Develop policy guidelines that help providers coordinate the development of content, minimize the duplication of educational programs and services for learners, and encourage all providers of educational services to build business plans that integrate information and learning technologies into their program deliveries.
2. Develop performance criteria that encourage interdependency among educational providers and that reward their contributions to program development, delivery, student support mechanisms, and research on behalf of the system.

Goal: Facilitate the development of a network of technology- enhanced learner support services

Strategies:

1. Facilitate the development of system-wide support services to learners at educational institutions, community learning centres, workplaces, and homes.
2. Facilitate the establishment of information services.
3. Encourage and support community and institutional libraries in improving and expanding their electronic delivery of services at affordable costs to learners.

Goal: Ensure the availability of appropriate learning opportunities

Strategies:

1. Provide support to post-secondary institutions.
2. Align future objectives for programs developed and delivered via ACCESS/LTA with the needs of learners using a virtual learning system.

Goal: Facilitate the establishment of an Alberta virtual learning system

Strategies:

1. In cooperation with other key users, develop a plan for the staged development of a province-wide telecommunications-based virtual learning system.
2. Take a lead role in the design of a mechanism for coordinating and managing the technical network to ensure that control of educational services on the network remains within the adult learning system.
3. Increase opportunities for educational agents and learning communities to acquire technologies and telecommunications which meet the standards and guidelines for an Alberta Virtual Learning System.

Affordability: A virtual learning system has the potential to lower delivery costs to learners in non-institutional settings and cost-effectively enhance the learning opportunities of institutionally-based students. Cost benefits could be gained through economy of scale, collective purchasing power, articulation among educational organizations, reduced demands on student finances, and alignment of technologies. A virtual learning system will accommodate growing demand by increasing investments in electronically supported learning services and decreasing investments in traditional infrastructures. Through a virtual system, the cost per new enrollment will decrease while the number of adults served across Alberta will increase. Services of the system will also attract new Canadian and international markets to Alberta's educational organizations.

Accountability: A virtual learning system will accelerate and sustain the transformational changes needed to move toward a learner-centered Adult Learning System comprehensively supported by technologies. Development of the system will escalate the need for articulating inter-dependent roles between educational organizations and for co-ordination of resources, expertise, products and services across the system. Furthermore, it will provide a common platform from which the organizations of the Adult Learning System can collectively address barriers which currently curtail accessibility, responsiveness and affordability.

Building an Adult Virtual Learning System in Alberta: A Systemic View

Perhaps the greatest challenge in developing a virtual learning system is ensuring that a systemic approach is used in planning and implementing both the support services and electronic networks. Such a view implies that clients throughout the Adult Learning System are served, that participating educational organizations contribute to the system as a whole, and that the inputs, processes and results are examined on a systemic basis.

Establishing a network of electronically-mediated educational services capable of reaching every learner in the province will require a high degree of inter-dependence among, and significant contributions from, current providers of educational services. In many instances, Alberta educational institutions, community adult learning councils, and other agencies will be asked to adopt or expand their current roles as providers to ensure that "virtual" learners are offered the best in electronic content and instruction. These must be supported by responsive, reliable and comprehensive learning support services and infrastructures.

Both "hard" and "soft" infrastructures are required by a virtual learning system.

Hard infrastructure includes sending/receiving technologies, carrier technologies and the connecting information network. In Alberta, hard infrastructure is, for the most part, in place. It includes: audio, video, and data networks such as the telephone system (AGT), the cable system (multiple vendors), and RITE system (Alberta Government).

Soft infrastructure refers to the educational services sent and received through the provincial education network and also the management of those services. In a virtual learning system, learners will receive not only educational products (courses and programs) which meet their needs but also the necessary educational and technical support. Various projects and initiatives currently underway in the province may serve as examples of and models for establishing provincial infrastructures necessary to support learning and maximize success within a virtual learning system.

DRAFT

Vision for Change:

**a concept paper
for the development
of a virtual learning system**

September 1995

Alberta
ADVANCED EDUCATION AND
CAREER DEVELOPMENT

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*"If Alberta is to keep pace... then we must change the way we develop, support and deliver learning opportunities".
(New Directions for Adult Learning In Alberta, Oct. 1994)*

Foreword.

The greatest challenge for the Alberta Adult Learning System is to perform effectively and efficiently within a relentlessly changing environment. Policy is shifting us toward decentralization, rationalization and re-engineering of services. Information and knowledge are rapidly becoming a primary platform for our economy both at home and in a global market. Expenditures are being significantly reduced and monies strategically re-invested, and new alliances are being built across public and business sectors. Added to this rapid social and economic change is our growing reliance on technologies and telecommunications as fundamental to our social, cultural and economic development and sustainability.

The Adult Learning System, like other publicly funded service sectors operating in this context, is being levered to go beyond the incremental modifications which have, in the past, been sufficient to adapt to change. Simply cutting programs, restructuring organizations or "tacking on" technologies to current operations are inadequate approaches to achieving the transformational changes now required of the system. The pervasiveness of technology coupled with new social and economic policy directions prompts us to question our current paradigms. We have the opportunity to rethink the way we perceive clients and their learning, how our services, instruction and products can be organized and provided, and new times, places and ways for distributing and accessing educational services.

Several of Alberta's educational organizations are already engaged in re-engineering activities. They are investing in new learning, teaching and carrier technologies, redesigning and digitizing curricula, re-organizing their services for distance and alternative learners, and adjusting their policies and administrative processes to accommodate technology supported learning opportunities. Their endeavors demonstrate that Alberta has the intellectual capital, the will and the ability to undertake the transformations needed. The value of their efforts is limited, however, by the lack of an articulated vision and framework for change across the whole of the Adult Learning System.

Advanced Education and Career Development, with the assistance of an external resource group, has prepared this discussion paper as an initial attempt to provide a conceptual framework for facilitating and supporting system-wide change. Its premise is that a province-wide virtual learning system, developed through effectively integrating technologies into services at both traditional and non-traditional places of learning, can meet our goals of increased accessibility, cost-effectiveness, responsiveness and accountability.

Vision for Change: A Concept Paper

This vision transforms our quasi-system of loosely connected institutions into a coordinated system of inter-dependent organizations. It calls for re-investment and re-allocation of resources to develop technology supported learning opportunities. Most importantly, it addresses our desire to remove barriers to serving adult learners in ways, times and places conducive to their changing needs and circumstances.

Readers of this document are encouraged to examine the significance of this vision and framework for transforming Alberta's Adult Learning System to better meet the needs of all adult learners in a changing environment. We ask readers to consider to what degree the concepts in this document will:

- facilitate and support advancements in the learning-teaching process;
- enhance the system's ability to increase the self-sufficiency and employability of adults in Alberta;
- enable all participants in the Adult Learning System to use technologies to increase the effectiveness and efficiency of educational services;
- align the services of the Adult Learning System with the diverse and changing expectations, skills, and demands of our clientele.

This document, and the responses to it, will provide the basis for future policies and strategies of Advanced Education and Career Development. We thank the following resource persons for their insights and guidance in preparing a "**Vision for Change**".

Dr. Terry Anderson
Mr. Rob Bosscha
Dr. Dale Howard
Dr. Tom Keenan
Ms. Pat Larson
Ms. Sylvia Teare
Mr. Allen Wilke
Dr. Clayton Wright

Lynne Duncan
Deputy Minister
Advanced Education and Career Development

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Virtual Learning Environments

●●● **are created** when distance, information and telecommunication technologies are used to provide educational services which transcend barriers of time and place associated with traditional lecture-type teaching.

●●● **use technologies** to unite the teacher and learner, carry course content and information and provide the opportunity for two-way interaction.

●●● **are supported** by a virtual learning system which is composed of two co-dependent infrastructures: a support services network (soft infrastructures which include educational products, instruction, and learner services) and an electronic network linking learners and educators with services (hard infrastructures which include sending, receiving and carrier technologies).

●●● **serve** individuals and groups, facilitate synchronous (same time) and asynchronous (different time) learning, serve individuals and groups and provide educational services which can be accessed from homes, institutions, communities and workplaces.

●●● **provide** opportunities for learners to increase their participation in the management of the learning process, often creating changes in the relationship between teachers and learners.

●●● **challenge** educational organizations and bureaucracies to modify or remove formal and informal restrictions which have traditionally limited learner access and institutional responsiveness, eg. transferability, geographic and programmatic jurisdictions, attendance and residency requirements.

Section I

already done

“... it is crucially important that the state of Alberta's infrastructure and the government's policy position be revised. An aggressive plan of action must be adopted by the Alberta government immediately.

Alberta has a short time frame within which to create a world class infrastructure. Not acting now risks the loss of an important opportunity that will impose economic and social costs for generations to come.”

(Alberta's Information Technology and Telecommunications Infrastructure: Building on Our Strengths, Dr. Marshall M. Williams, Premier's Council on Science and Technology, March, 1995)

READINESS FOR CHANGE

The Provincial Climate

Recently, in response to government direction and the impact of technologies, several government departments and educational organizations have reported on the future use of technologies in our province. All share the view that the "Alberta Advantage" needs to be secured by taking bold steps to provide Albertans with affordable electronic access to education, health, and government services. They cite the following reasons for using technology in education and training:

- technologies facilitate more efficient and effective learning,
- the prevalence of technology requires education to keep pace,
- technologies are tools for re-engineering the educational system, and
- the use of technology is critical to many careers.

Regardless of which rationale is adopted, it is apparent that a virtual learning system, which by definition uses technologies to increase access to information and learning opportunities, will play a significant role in Alberta's Adult Learning System.

Alberta's Experience

Alberta's participation with distance learning over the past 25 years and, more recently, alternative learning has created a bank of expertise across the Adult Learning System in providing learning opportunities which reduce the limitations of time and place. Individual post-secondary initiatives, faculty and staff have drawn international attention for their knowledge and innovative use of a

Telecom. Sr. Plan
- 21st C. Now
- Task force Dept.
- Virtual Camp us

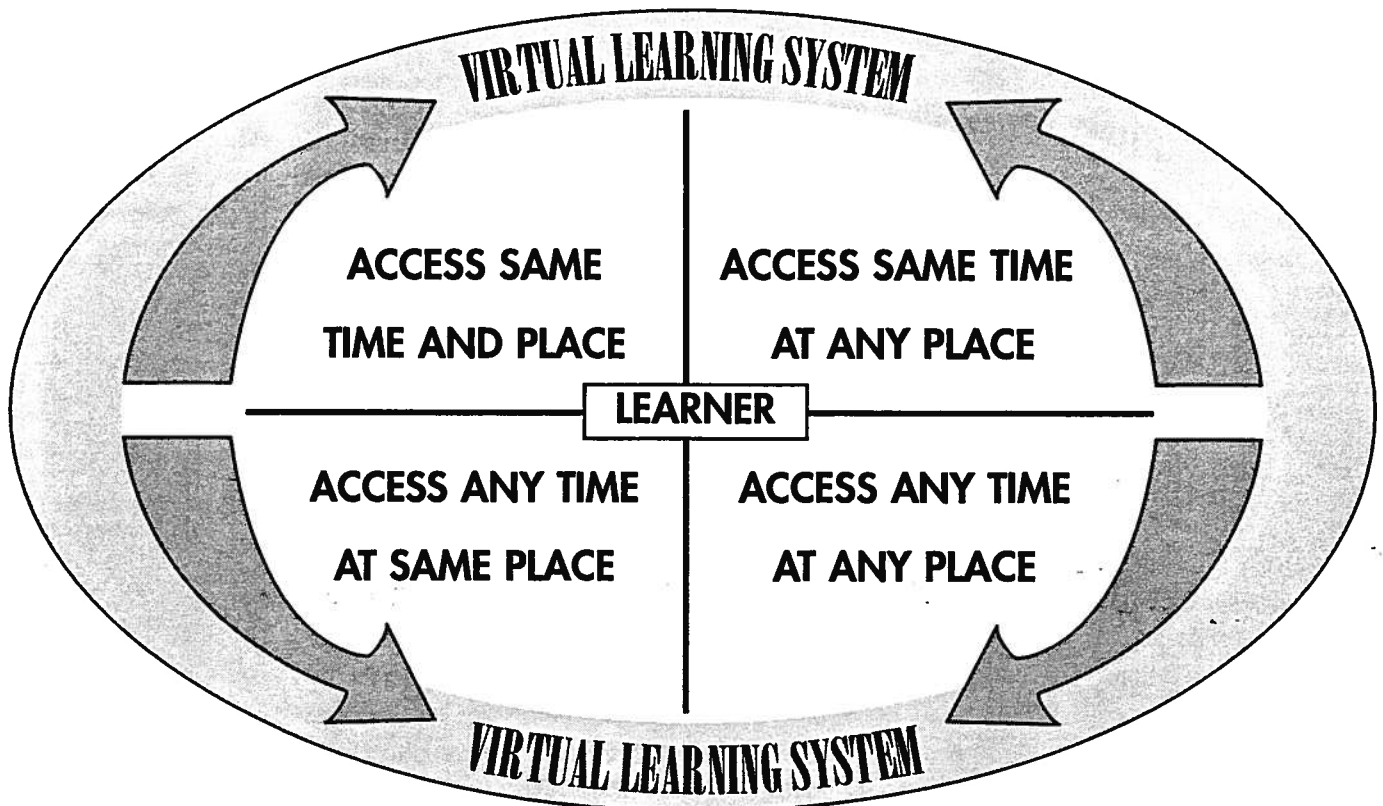
diversity of educational technologies, for their leadership in addressing issues confronting the non-traditional learner, for their collaborative relationships with communities, employers and other educational organizations in delivering education services on and off campus, and for their instructional design in distance, computer-mediated and open learning. Collectively, these initiatives represent the quality of expertise and experience needed to develop a virtual learning system in Alberta.

Demand for Access

There is growing evidence of demand for a different type of access to services. Many sectors are rapidly automating their services, creating and responding to a technically sophisticated public. Access to training through technologies is viewed by major business as essential to meeting accelerating demand and achieving cost effectiveness.

The dimensions of time and place create four access windows to the Adult Learning System: same time and same place, same time at any place, any time at same place, and any time at any place. Historically, most learning opportunities have been provided through the same time and place (or face to face) window. Technologies, however, are giving us the opportunity to add value to traditional learning modes and to increase access to educational services through the other three windows. A virtual learning system uses technologies to increase access to services through all four windows. The following diagram illustrates the four windows of access to the Adult Learning System which are supported by a virtual learning system.

Access Windows



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“... adult learners will have the ability to use the technology to get access to knowledge just in time to upgrade their skills as they see fit We are asking all the players in our adult learning system to help us extend this ‘learner-centered’ approach out into our communities to meet this new learning paradigm.”
(The Honourable Jack Ady, NADC Telecommunications Conference, January 1995)

Learning Centered

FEATURES OF A VIRTUAL LEARNING SYSTEM

Effectiveness and Efficiency

The effectiveness and efficiency of a virtual learning system are determined by the degree to which the Adult Learning System adheres to the following principles:

- that the learner is the centre of the Adult Learning System,
- that the “collective” resources and services of the Adult Learning System are made accessible to the learner,
- that all educational organizations use their potential to participate fully in a virtual learning system,
- that educational organizations act as “inter-dependent agents”, each relying on the other to perform a necessary function, and
- that the soft and hard infrastructures are well integrated to provide seamless access to services and technologies.

The features of a virtual learning system are described below.

A Culture of Learning

Learners of tomorrow will be distinguished for their proficiency in using technologies to know about, access and successfully manage information and learning opportunities. They will select learning places and opportunities which provide the highest value for the least cost and which accommodate continuous changes in their personal, social and workplace needs and environments. Regardless of their location, they will expect equity regarding range and quality of opportunities and services, and they will have little tolerance for barriers to learning which are created by the system. There will be little, if any, distinction in opportunity for those engaged in traditional, distance or alternative learning. A virtual learning system accommodates these forecasted changes in the learning culture of our society. It gives adult learners the opportunity to participate in an Adult Learning System frequently or intermittently, on a part or full time basis, for formal or informal learning throughout their lives and from home, institution, community, and workplace.

The Virtual Community of Learners

In a virtual learning system, the traditional view of the learning community is redefined. It shifts from a group of learners congregated in discrete institutional settings for specified periods of time to a community of widely distributed learners who require "just-in-time" access to learning opportunities. Technologies are instrumental in driving this change in perspective. Through strategic visioning, the Adult Learning System can embrace the opportunity to serve a virtual community of learners by using technologies to eliminate barriers of time and place.

The Learner as Centre

In creating virtual learning environments, a learner-centred Adult Learning System no longer demands physically placing the learner, sources of knowledge, resources and learning opportunities at select locations. The centre becomes the lifelong learner situated at home, work, community learning centre or institution; and the activity is the linking of the learner to learning opportunities, support services and resources.

Learners as Participatory Learning Managers

Through a virtual learning system, adults have the opportunity to share more fully in planning effective educational services. The system allows them increased control in selecting their educational setting, tailoring curricula and choosing programs and services to suit their needs. They can build their programs using instruction and content available from a diversity of educational organizations and are credited accordingly. Regardless of their circumstance and location, there are few, if any, limits to the range of learning opportunities, information and support services available to them through such a system.

A Systemic View

Perhaps the greatest challenge to developing a virtual learning system is a systemic approach to planning and implementing both the support services and electronic networks. Such a view implies that clients are served throughout an Adult Learning System, that participating educational organizations contribute to the system as a whole, and that the inputs, processes and results required are examined on a systemic basis. A systemic approach is critical if an Adult Learning System is to position itself successfully in the global market of a knowledge based society.

The Networks of a Virtual Learning System

The concept of a virtual community of learners also changes our view of education from that of a commodity acquired through selected vendors at prescribed locations to the notion of education as a "network of support services" accessed by learners through a "network of electronic infrastructures". Together, these two networks create a *virtual learning system* which gives learners and educators, in both new and traditional places of learning, access to the collective resources of the Adult Learning System.

The Electronic Network

A virtual learning system is a digitized environment which uses information and telecommunication technologies to store, exchange, and manipulate data and information. The pervasiveness of these technologies is already leveraging the education sector to create new places and times for learning, redesign support services, diversify modes of delivery, adopt more learner-centred teaching/learning models and accommodate continuous changes in curriculum and in learner demand. A well integrated

Why limit it to Adult learning?

provincial network of inter-operable digital technologies, easily accessible to learners and educational organizations across the province, is the primary avenue by which a vision for an effective virtual learning system can be realized.

The Support Services Network

While technologies are the means by which learners and educational organizations access a virtual learning system, it is the extent and quality of services to learners, educators and organizations using the electronic network which are most critical. It is these services which determine the use for technologies. Support services enable adult learners to know about, receive and manage their learning opportunities. They also encompass services which support educational organizations in developing and providing content and instruction to clients. The support services network, like the electronic network, requires an integrity which ensures ease of access to and seamless transition within an Adult Learning System.

Inter-dependent Functions

A system, by definition, is composed of parts with inter-dependent functions. This means that both networks in a virtual learning system have agents that provide specific functions upon which other parts of the system rely. The functions within an electronic network include a) the acquisition and management of receiving and sending technologies and b) the provision, coordination and maintenance of carrier technologies. These functions are usually undertaken through substantive alliances between governments and departments, the electronic and telecommunication industry, and educational organizations. The functions within a support services network include the provision and coordination of a) content development, b) instruction, and c) learning support and information services. Specific educational organizations usually assume one or more of these roles. They work in consort with other segments of the education sector and with the private sector to provide these functions across a virtual learning system.

Curric.

PDF

Inst. & T.S

Tele. & Ed

Roles of Educational Organizations

A virtual learning system makes it possible for educational organizations to adopt specific functions on behalf of the total system. This is particularly evident in the development of a support services network. For instance, some educational organizations have, as their primary role, the function of facilitating learners in accessing content, information, instruction and support services available through a virtual learning system. Other organizations assume principal leadership for the system's product development; still others specialize in program and course delivery. Organizations performing any function in a virtual learning system are recognized and rewarded for their respective contributions to an Adult Learning System as a whole.

Educators as Facilitators

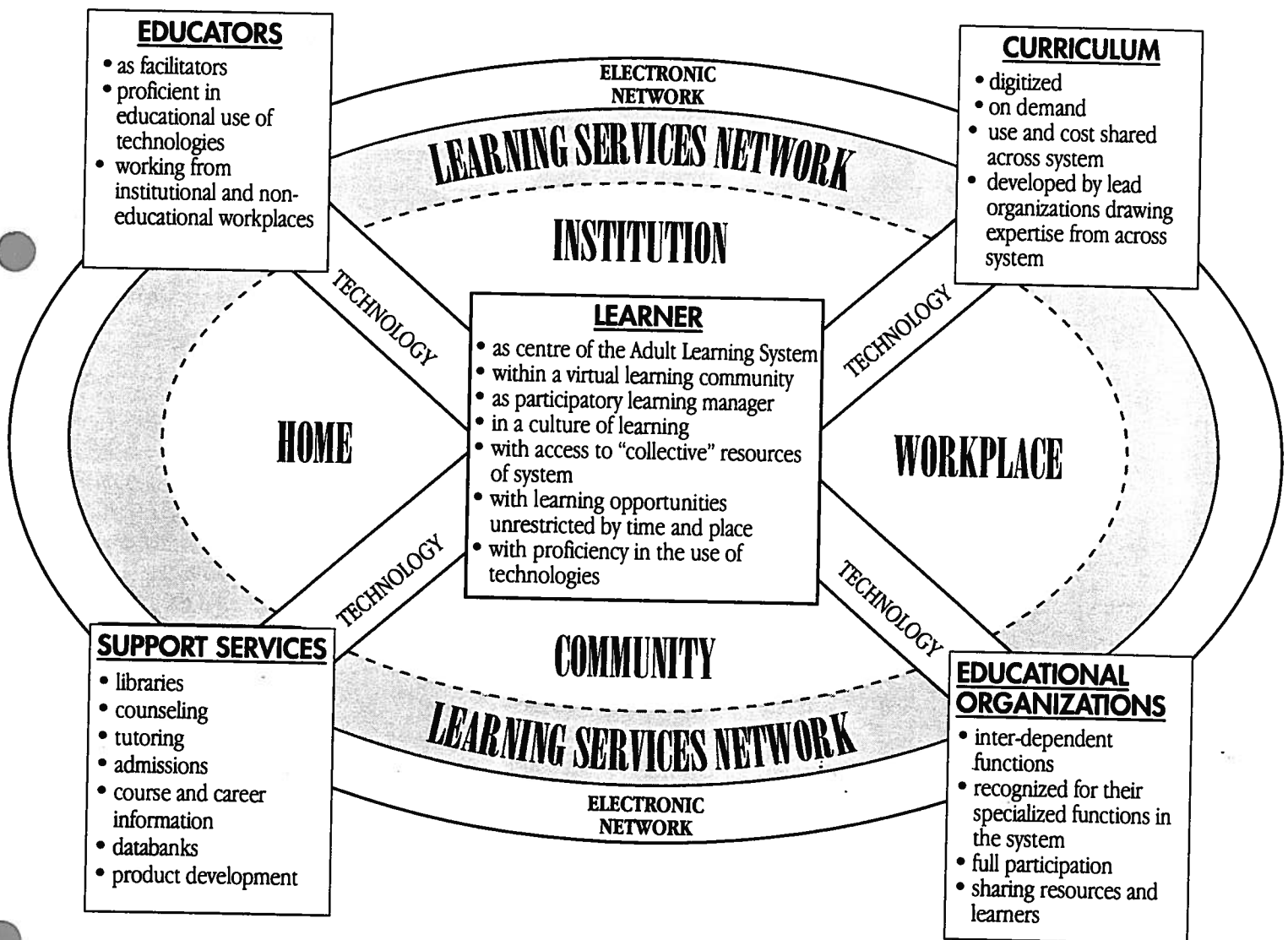
Faculty and staff participating in a virtual learning system are well trained and supported to routinely use technologies in creating products, accessing professional development, providing services to learners and interacting with learners. Their role shifts from being the primary source of knowledge toward one of facilitating learners to access, process and use information effectively in a virtual learning environment. They communicate electronically with peers and clients provincially and globally through a distance and time insensitive system, and work from non-educational workplaces, institutions, community learning centres, homes and schools.

The Digitized Curriculum

A virtual learning system has the potential to provide on-demand access to electronic repositories of curriculum resources and information for teachers and learners. Product development focuses on digitized information and multi-media resources which support learning at a diversity of institutional and non-institutional locations. The function of curricula development is lead by educational organizations who draw expertise and resources from across the Adult Learning System and the private sector. Costs and use of curricula are shared with other educational organizations participating in the virtual learning system.

Overview of a Virtual Learning System

The following diagram illustrates the features of a virtual learning system. Both the electronic and learning services are highly integrated to support these features.



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"As educators, our job is to focus on learning communities first and foremost, not on the information highways and pipelines, but on the content and on people in communities and what they need to learn to make their way in the world and to participate in renewing the local, regional and national economy."
(Heather Menzies, Keynote speaker, CADE Annual meeting, May 12, 1994, Vancouver)

MEETING GOALS OF THE ADULT LEARNING SYSTEM

Advanced Education and Career Development believes that the re-engineering of educational services through the integration of technology must be driven by the goals of the Adult Learning System. To determine how a virtual learning system will achieve increased accessibility, responsiveness, accountability and affordability, it is necessary to envision what each goal means in a learner-centred system supported by a comprehensive network of technologies.

Accessibility

The Adult Learning System must increase the ability of learners to know about, receive and manage their own educational opportunities. Quality access is achieved when the system has sufficiently developed and directed its resources and services toward enabling learners to accomplish this from locations and at times conducive to their needs and circumstances.

A virtual learning system will significantly reduce the barriers of time and place which restrict learners from accessing educational opportunities and support services. This will enhance existing opportunities for on-campus learners and create new points of access for off-campus learners in both rural and urban settings.

Responsiveness

The Adult Learning System must increase its ability to adapt and deliver a wide range of educational products and services, in a timely way, to accommodate changing needs and circumstances of all types and levels of adult learners in a diversity of locations.

A virtual learning system will reduce curriculum, institutional and departmental barriers which impede the Adult Learning System's timely response to the needs of learners, eg. transferability, attendance and residency, student finance, product development and modification, professional development, service and network co-ordination.

Affordability

The whole system cost of the Adult Learning System must be sustainable over an extended period of time. It must be able to accommodate fluctuations in demand, support traditional and alternative delivery, demonstrate reliability, and be cost effective from the perspective of learners, educational organizations, and the public.

A virtual learning system has the potential to lower delivery costs to learners in non-institutional settings and cost-effectively enhance the learning opportunities of institutionally based students. Cost benefits could be gained through economy of scale, collective purchasing power, reduced demands on student finances, articulation among educational organizations, and alignment of technologies (*1). A virtual learning system will accommodate growing demand by increasing investments in electronically supported learning services and decreasing investments in traditional infrastructures. Through a virtual learning system, the cost per new enrollment will decrease while the number of adults served across Alberta will increase. Services of the virtual learning system will also attract new Canadian and international markets for Alberta's educational organizations.

Accountability

The Adult Learning System must demonstrate to both the learner and the public that the results of its publicly funded learning opportunities are aligned with its goals and the intent to remove barriers which have traditionally restricted learner participation.

A virtual learning system will accelerate and sustain the transformational changes needed to move toward a learner-centred Adult Learning System comprehensively supported by technologies. Development of the system will escalate the need for articulating inter-dependent roles between educational organizations and for co-ordination of resources, expertise, products and services across the system. Furthermore, it will provide a common platform from which organizations of the Adult Learning System can collectively address barriers which currently curtail accessibility, responsiveness and affordability.

(*1) Lack of co-ordination and standards for technologies and telecommunications adversely affects the Adult Learning System's ability to achieve three of its goals: to increase accessibility, responsiveness and affordability. In most instances, lack of technology alignment limits responsiveness to current and new markets, creates elite access niches which are counterproductive to expansion and escalates costs for establishing a network which will serve the majority of Albertans.

Section II

*"...the educational institution of the future (is) one with no clearly defined campus, with open access to information for the learner, with a fully networked electronic learning environment, and a flexible time schedule."
(J. Elson, Campus of the Future, Time, May 1992)*

BUILDING AN ALBERTA ADULT VIRTUAL LEARNING SYSTEM

Developing a Virtual Learning System will enhance the quality and accessibility of learning opportunities currently available at campus, community, and home-based centres of learning. As well, it will increase the geographic distribution of these services to a significantly wider community of learners. Establishing a network of electronically-mediated educational services capable of reaching every learner in the province, however, will require a high degree of inter-dependence among and significant contributions from current providers of educational services. In meeting this challenge, Alberta educational institutions, community adult learning councils, and other agencies will be asked to gather their collective will and expertise in elevating and legitimizing the creation of virtual learning environments. In many instances they will be asked to adapt or expand their current roles as providers, to ensure that learners accessing the virtual learning system are offered the best in electronic content and instruction and supported by responsive, reliable and comprehensive learning support services and infrastructures.

INFRASTRUCTURES

Virtual learning systems require infrastructures. The virtual learning system requires both "hard" and "soft" infrastructures, each suggesting a unique role of development and support from Advanced Education and Career Development.

Hard Infrastructure

Hard infrastructure includes the sending/receiving technologies, carrier technologies, and the information network that connects them together and to other provincial, national, and international networks. In Alberta, hard infrastructure is, for the most part, in place. These include audio, video, and data networks such as the telephone system (AGT), the cable system (multiple-vendors), and RITE system (Alberta Provincial Government). Also, other corporate networks exist in the province, capable and willing to share bandwidth with other interests such as education. What is not in place is a co-ordinated provincial telecommunications network dedicated to the provision of educational services capable of meeting the educational needs of all adult Albertans.

The cost of hard infrastructure is high, and it is unlikely that adult education alone would justify a proprietary network. A shared network would be more feasible, where the adult education system reserved a portion of the network shared by other groups such as Alberta Education, Alberta Health, and other provincial departments.

Linking multiple networks, with varying interests, is easier in theory than practice. What will be required is encouragement to current public and private network providers to devise a process for the evolution of linking separate telecommunication infrastructures into a single integrated network that is both secure and profitable. As a unified network, Alberta can provide more than enough "lanes" on the information highway to facilitate an extensive array of educational products and services.

Soft Infrastructure

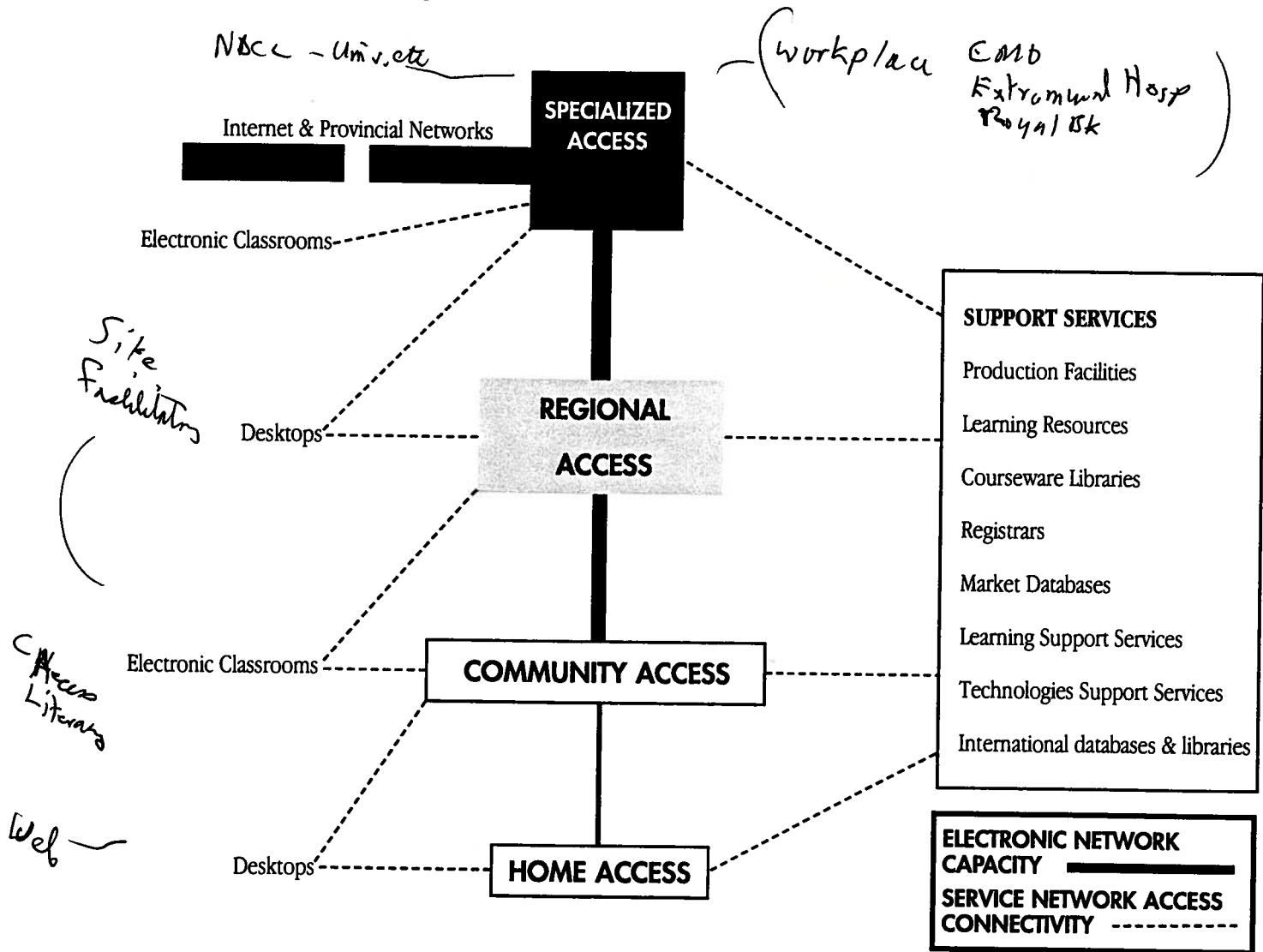
Soft infrastructure refers to the educational services sent and received through the provincial electronic network and to the management of those services. From a virtual learning system perspective, this means that learners, regardless of location, will receive not only educational products (courses and programs) which meet their needs, but that they will receive the necessary learner support (educational and technical) to have the best chance for completion and success.

Various projects and initiatives, currently under way in the province, may serve as examples and models for establishing provincial infrastructures necessary to support learning and maximize student success within a virtual learning system.

Again, system integrity is critical in establishing an effective adult virtual learning system in the province of Alberta. Not only must the system accommodate a variety of learners and learning preferences, it must bridge both time and distance to reach these learners at almost any location within the province, and in some instances outside the province. More importantly, the virtual learning system must accommodate the delivery of the educational products and support services that learners would expect to receive at traditional campuses, whether the learner is attending a classroom lecture connected to a guest speaker via videoconferencing, is engaged in independent study at home or using a multi media station at a learning centre or workplace.

Access to Educational Services

In Alberta, the virtual learning system must provide four levels of electronic access to educational services: specialized, regional, local, and home. The specifications for services at each level are determined by the demands and requirements set out by the learning communities associated with that level. The following diagram illustrates the capacity of the electronic connectivity for each level and the types of services available at each level.



Following are descriptions of the access points where learning communities will access educational services through a virtual learning system. Each description is accompanied by virtual learning environment scenarios learners and providers may encounter.

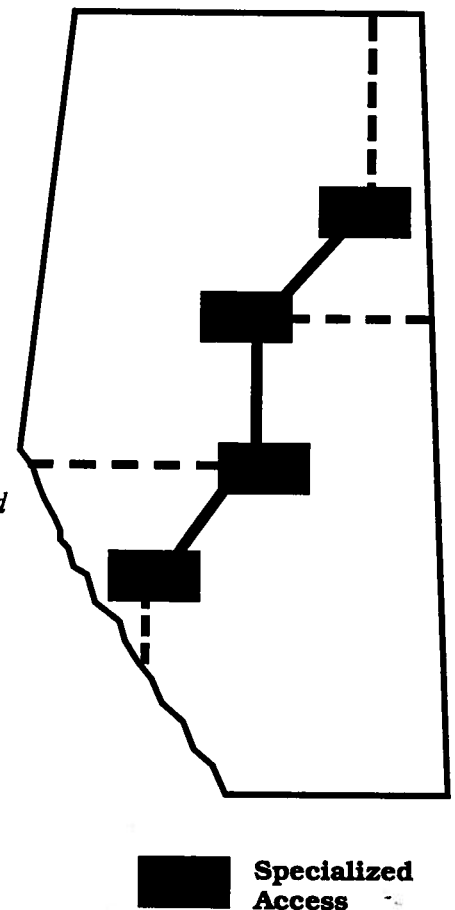
Learning Communities Requiring Specialized Access to Services

Learning communities requiring a specialized level of access to services through a virtual environment represent the narrowest base of the learning community. They are usually congregated at or have electronic access to designated centres equipped with the most sophisticated and powerful technologies and the highest capacity telecommunications network. In the Alberta Virtual Learning System these centres would be connected to each other and the outside world through broadband networks and would serve as the primary "backbone" to a provincial educational telecommunications system. Products and services developed at centres of specialization are often leading edge and serve learners with extraordinary needs. Their educational value to Alberta is in bringing the province world-wide recognition as a leader in certain fields of specialized study.

Examples of Specialized Access

... James is a graduate student working on "chaos theory." He connects to the Virtual Learning System from an electronic classroom at the University of Calgary. His classmates, Mary at the University of Toronto, and Bill at the University of Chicago share an advisor, Professor Patricia Edwards, at the University of Alberta. This morning they are meeting electronically to discuss their latest findings regarding a weather pattern they have been following. James offers his data for examination and a world map appears on one of three monitors. The high speed super computer located in the Biological Sciences building instantly computes the information received from James and displays an array of swirling global weather patterns. Mary inserts her data on these patterns. Bill draws their attention to a small but significant pattern beginning to form over Spain. As follow-up to this session, they agree to jointly prepare a final analysis using document sharing software over the Internet.

... Jointly, two provincial universities wish to provide professional upgrading and refresher courses to civil engineers located throughout the province. Using the market analysis services available through the virtual learning system, Brenda H., coordinator of the universities' program, requests a needs analysis. The virtual system's database stores and tabulates requests for such programs from persons at home, work, local and regional sites connected to the system. From the needs analysis report, Brenda determines that 50 engineers are interested in the program. However, the delivery and receiving of this program calls for specialized electronic connectivity, therefore Brenda uses the inventory database on the virtual learning system to generate a list of adequately equipped sites nearest each of the 50 participants. The engineers are notified of the times and locations and 35 register. Later, Brenda drafts a proposal to upgrade several local learning centres to better serve the engineering community when the program is offered again in six months.



Learning Communities Requiring Regional Access to Services

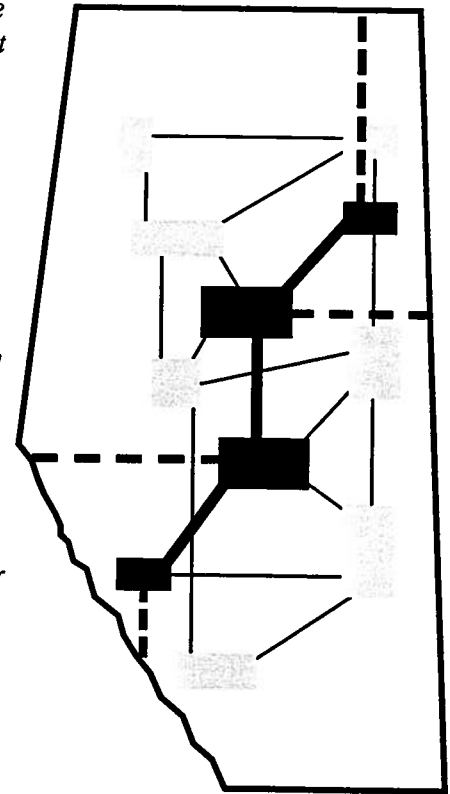
In Alberta, learners and providers requiring regional access to services are usually assembled around the more than twenty post-secondary institutions across the province. To respond to these constituents, the virtual learning system must connect these regions to each other and to specialized access sites and provide a uniform level of service across regions. The virtual learning system will accommodate and support inter-institutional program development, program delivery and support services. It will support synchronous delivery between campuses and asynchronous delivery within and between regions. Products developed at regional centres and services distributed through a regional level of access to the virtual learning system are those required to meet the broad curriculum demands of both pre and post-secondary adult study.

a step
backward
for us.

Examples of Regional Access

... **Sarab H., a B.Ed. student** specializing in languages, enters a videoconference room at Red Deer College along with nine other students. She checks the equipment and connects with the video bridge in Calgary. On the screen the Red Deer class is greeted by 25 more students and the instructor from the University of Lethbridge, seven students from Grande Prairie Regional College, and four at the Peace River campus of Fairview College. The guest lecturer, a specialist in Japanese linguistics, connecting from the University of British Columbia, lays a paper on a viewer and the students are able to see the outline of the presentation on their monitors. Bob G. in Grande Prairie, asks a question, and the objectives are replaced by a three quarter view of Bob and his cohort at that location. At the end of the presentation, the professor splits the virtual class into two project groups and asks students to stay on-line to discuss assigned questions. The professor disconnects and the students continue with the conference.

... **Peter T. is designing his first course** to be delivered through the virtual learning system. The course requires that students view photographs of several art works followed by a discussion of the artist. Using the Internet from his home, Peter sends a request to the Art History list-serve for digitized renditions of the photographs he needs. By the end of the week he has responses from instructors in the United States, Australia, Japan, Belgium, France, and Italy. Peter creates a databank for his students to access during the course. Meeting by videoconference with an instructional designer and alternative delivery specialist at another institution, he receives advice on the best way to deliver the course. Following the consultation, he decides that the audiographics capabilities of the virtual learning system would be most appropriate for delivering the course. Over the next two weeks Peter receives assistance from the designer and the specialist in re-designing the course and preparing the materials and presentation strategies required to use the delivery medium. Peter schedules the course with the network manager and posts a bulletin to the coordinators of the regional and local sites where his students will be receiving the course. He requests that the coordinators inform students of the course schedule, train them on accessing the art databank, and arrange for local artists who could act as advisors to the students.



Regional
Access

Learning Communities Requiring Local Level Access to Services

Learning communities requiring a local (community and neighborhood) level of access have the potential of representing a very broad base of learners in the province. To reach and respond to the needs of those needing local access, the Alberta adult virtual learning system must extend to all four borders of the province. Local access to the services of the virtual learning system should include certain base-line services made available to learners and providers regardless of where they are located. In general, this will require an educational telecommunications network connecting all of Alberta's communities, sufficient educational products and services formatted to be transmitted by this network, and learner support services tailored to clients at local access points.

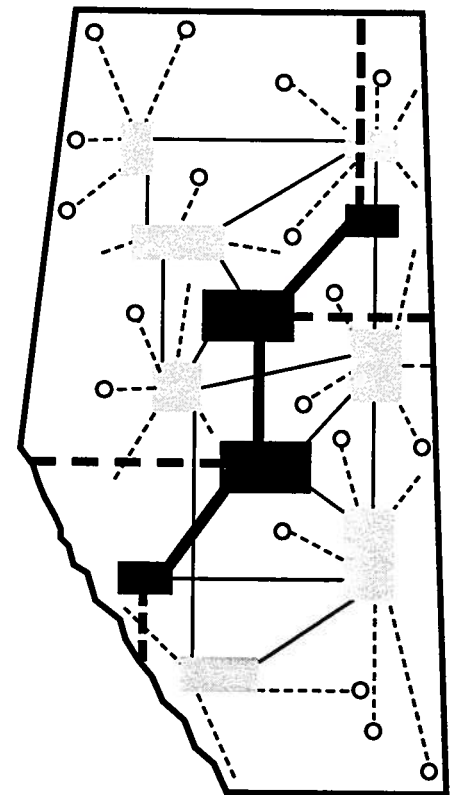
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Examples of Local Access

... Alfred N. cannot relocate for retraining. With assistance from his local learning centre, he has registered in a computer repair program being offered jointly through NAIT and SAIT. During the day, while looking after his four-year old, Alex works on a print-based home study course. Three evenings a week he uses the multi-media stations located at the community learning centre. Here he studies and interacts with video, CD ROM materials and computer-assisted lab simulations produced by the institutions. The centre facilitator provides him with writing tips for preparing a business plan for opening his own computer repair shop. On these evenings he also E-mails an update of his progress to his instructor in Brooks. On one of these occasions he uses the Internet to access a diagnostic software program at SAIT and downloads it to a disk. The next day he will be able to try it out on his home computer system.

... Linda J. has decided to complete her high school diploma while she works full-time and helps support a family. Her community has just established a local learning centre connected to the provincial virtual learning system. Linda, hesitant at first, visits Dan B., the centre facilitator. Together they discuss the various services Linda can access at the centre. Dan arranges for Linda to talk, via videoconference, to a career counselor in the next community. The counselor helps Linda examine some career choices and prepare an education plan. Following the conference, Linda decides to register in two courses being offered jointly by the Alberta Vocational Colleges. Before she leaves, Dan assists her in filling out the electronic registration forms and sending them to the institution administering the courses. Within a few minutes, confirmation is received and Linda uses her debit card to pay her tuition. She leaves the centre with a course schedule, list of resources required, course outlines, and a welcome letter from her instructor. Next week Linda will return to the centre to begin her program which will be delivered by a combination of print, desktop videoconferencing and computer conferencing.



○ Local Access

Photo and Network map

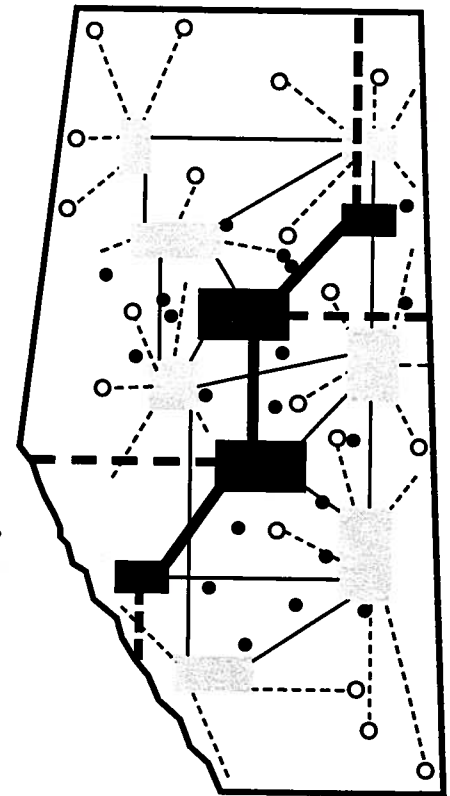
Learning Communities Requiring Home Access to Services

The home-based learning community is potentially the largest base of learners in the province. This community accesses learning products and services through the virtual learning system by connecting to the system through home-based technologies, usually a personal computer and a modem or through broadcast services received by home radios and televisions. The connectivity capacity the home learner has will be, in most instances, determined by the learner, usually in terms of the investment the learner wishes to make in technology. Growth in both the capability of technology and the number of learners demanding educational services into the home, has encouraged development of integrated services. This means that telecommunication services to the home (radio, television, telephone, and Internet) would be available through one carrier. More importantly, these services would accommodate two-way interaction.

Examples of Home Access

Jill and Brian F. live on a small farm just outside Camrose. Jill is a full-time graduate home-study student with Athabasca University. Some of her courses require that she work with a cohort group on assignments. Jill is able to communicate with classmates and the professors facilitating the courses by accessing the communication services available through the virtual learning system. She has just completed an assignment where she and two other students registered in a course have been participating in an on-line interview with a genetics expert at the University of California. The expert has his own home page on the world-wide web, and the students are able to download many of the expert's photographs of mutated shark fetuses. Brian uses the virtual learning system to access on-demand video documentaries of the latest research on wheat rust, being conducted at Olds Agricultural College. Their daughter, Angela, sends them regular E-mail from a small college in Holland, where she is attending as an Alberta exchange student.

Brian C. has completed several courses at three different provincial institutions. He does not have a program of studies, but has now decided to settle on completing a business administration diploma. Using the virtual learning system on-line catalogue and information service from his home computer, Brian requests an unofficial assessment of his transcripts, which he had faxed to the service the day before. Within 48 hours, Brian is informed that two provincial institutions will give him credit for all his previous work. Again on-line, Brian completes an electronic admission and registration form from the institution of his choice. Using an electronic document transfer arrangement established among all the provincial institutions, Brian's official transcripts are assessed and Brian is able to begin his program.



● Home Access

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Connecting to the Rest of the "Virtual" World

Virtual environments, by their very nature, transcend time and place and know few boundaries except those created through choice (security) or through technology design (system protocols). Therefore, the virtual learning system will not be a system in isolation from other systems. It will be connected to other systems in the province, in the country, and in the rest of the world.

Within the province, the virtual learning system will share telecommunications infrastructures and resources with systems such as those proposed by other provincial government departments, for example: Alberta Education, Alberta Health and Alberta Public Works. Where appropriate, it will partner with the private sector to enable adult learners across the province to access specialized educational and training services better provided by industry. At a national level, the virtual learning system will be extended through its connections to all the provincial networks in Canada, which in turn connect to the broader world network of telecommunication services.

Such inter-connectivity represents far more opportunity than threat. Through the Alberta virtual learning system, Alberta learners will be the recipient of world-class products and services. Moreover, Alberta educational providers will have opportunities to create and market to a global audience of learners eager to buy and apply the vast educational expertise resident in Alberta.



Section III:

"Acceptance of competition as the norm, protection of turf, and fragmented approaches to accountability limit our potential. If solid partnerships are to be established that will benefit learners ... educators have to come to the table ready to share visions and resources, and committed to new ways of working together in a different, expanded context."

*(L.M. Pacey and W.P. Penney, in J. Roberts & E. Keough (Eds.),
Why the Information Highway?, 1995)*

IMPLEMENTATION: POSSIBLE ROLES FOR ADVANCED EDUCATION AND CAREER DEVELOPMENT

Advanced Education and Career Development is prepared to enable the development of a learner-centred adult learning system which embraces a network of learner services supported by a network of electronic technology. This approach would have the potential to:

- improve the accessibility and quality of learning opportunities available to Albertans;
- increase the responsiveness of educational providers; and
- position Alberta's public Adult Learning System to compete successfully on a global scale.

This potential, however, could not be realized without developing a province-wide virtual learning system composed of services and technologies which are aligned and inter-operable. Paramount is the willingness of educational providers to establish and participate in a highly interdependent system.

To establish this system, Advanced Education and Career Development would be prepared to

- provide leadership and coordination;
- facilitate the provision of support services for learners;
- assist educational providers to increase learning opportunities to Albertans; and
- actively participate in developing a province-wide educational technology and telecommunications infrastructure.

Who is going to implement it?

Doesn't the leadership also implement.

Advanced Education and Career Development would pursue the following goals and strategies in support of the system vision.

A. PROVIDE STRONG LEADERSHIP The department will act to ensure that the needs and interests of the adult learning student are fundamental to all decision making, that the interests of the adult learning system are represented and co-ordinated with other telecommunications and technology integration initiatives across levels and departments of government, and that departmental policies enhance the development and use of a province-wide virtual learning system.

Strategies:

1. Develop policy guidelines that help providers co-ordinate the development of program content, minimize the duplication of educational programs and services for learners, and encourage all providers of educational services to build business plans that integrate information and learning technologies into their program deliveries.
2. Develop performance criteria that encourage interdependency among educational providers and that reward their contributions to program development, delivery, student support mechanisms, and research on behalf of the system.

Does this mean redirect funding & other resources

B. FACILITATE THE DEVELOPMENT OF A NETWORK OF TECHNOLOGY-ENHANCED LEARNER SUPPORT SERVICES The department will support the development of a network of learner support services that are comparable to those available to on-campus students. The goal of these services is to increase the ability of learners to know about, apply for, receive and manage their learning opportunities.

Strategies:

1. Facilitate the development of system-wide support services to learners at educational institutions, community learning centres, workplaces, and homes by:
 - a) identifying baseline levels and types of support services which will be comparable across the province; and by
 - b) reviewing and supporting the role of Community Adult Learning Councils, Career Development Centres, Community Educational Consortia in co-operation with post-secondary institutions in providing support services to learners.
2. Facilitate the establishment of information services which:
 - a) report on learning issues identified by learners and other participants in the system;
 - b) identify broad labour market and student demand, and provide system wide analysis of this data;
 - c) describe local site technologies and support services available to learners;
 - d) identify learning initiatives and opportunities, modes of delivery, access locations, entrance requirements and procedures and key contact persons;
 - e) facilitate electronic program application and registration for students accessing a virtual learning system.
3. Encourage and support community and institutional libraries in improving and expanding their electronic delivery of services at affordable costs to learners.

Library & Network

C. ENSURE THE AVAILABILITY OF APPROPRIATE LEARNING OPPORTUNITIES The department will support the development of courses and programs that are accessible to students in their homes, communities, workplaces and institutions.

Strategies:

1. Provide support to post-secondary institutions for the following kinds of initiatives:
 - a) developing and sharing electronically based curriculum content conducive to synchronous and/or asynchronous delivery;
 - b) delivering full programs to learners accessing a virtual learning system;
 - c) working interdependently with other agents and the private sector in the development of content, delivery of programs, and the provision of learning support services to learners;
 - d) integrating alternate delivery and distance learning strategies into their strategic planning;
2. Align future objectives for programs developed and delivered via Access/ LTA with the needs of learners using a virtual learning system.

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D. FACILITATE THE ESTABLISHMENT OF AN ALBERTA VIRTUAL LEARNING SYSTEM.

Strategies:

1. In co-operation with other key users, develop a plan for the staged development of a province-wide telecommunications-based virtual learning system that
 - a) enables the delivery of learning opportunities and the provision of learning support services;
 - b) is scalable in capacity to accommodate current and future technologies required to best serve the needs of learners;
 - c) reaches all Albertans and connects with other parts of Canada and the world; and
 - d) establishes standards and guidelines for reach and capacity of the network.
2. Take a lead role in the design of a mechanism for co-ordinating and managing the technical network, ensuring that control of educational services on the network remains within the adult learning system.
3. Increase opportunities for educational agents and learning communities to acquire technologies and telecommunications which meet the standards and guidelines of the plan for an Alberta Virtual Learning System.

Turf
protection

Appendix A:

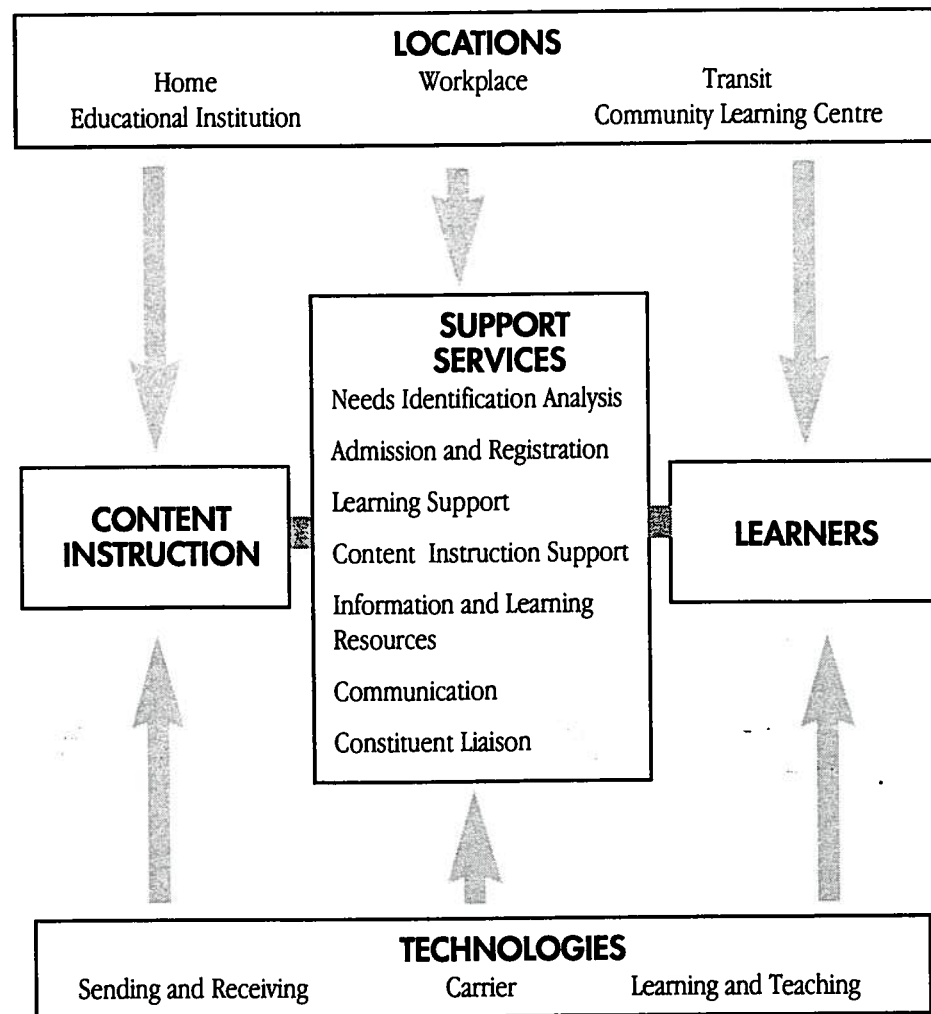
A MODEL OF A VIRTUAL LEARNING SYSTEM

The "virtual" in a virtual learning system refers to the application of electronic networking to transcend time and place.

A virtual learning system has five components: 1) content and instruction, 2) learners, 3) support services, 4) technologies, and 5) locations. Together these elements allow providers of content, instruction, and support services to interact with learners located in same or different locations at the same or different times.

Points of access to virtual learning environments vary. They range from traditional classroom learning settings where the classroom instructor is supporting or enhancing classroom activities through electronic access to the Internet, to learning settings where the instructor and learners may never meet face to face.

Bridging time and place between provider and learner is accomplished through the use of technology. The following model illustrates the relationship between the system components.



CONTENT and INSTRUCTION

Content and instruction providers develop, deliver and co-ordinate the diverse types and levels of instructional products provided through the virtual learning system. Their primary function is to provide learning opportunities to learners.

Content and instruction can be designed for use with synchronous (same time) and/or asynchronous (different time) delivery. This allows course and program providers to respond to and interact with individuals, small classes, and distributed classes (members of a class in different locations).

In a virtual learning system, however, the major proportion of content and instruction must be designed and formatted to accommodate an electronic network. This requires that material be digitized and stored as electronic media and that instruction be mediated through an electronic network.

LEARNERS

Learners in a virtual environment are similar to learners in any educational environment. They are individuals and groups requiring education, training, and learning support services. However, learners accessing a virtual system have an increased opportunity to take responsibility for knowing about, receiving and managing appropriate course/programs. Also, they must receive the learner support which enables them to access and use the electronically supported services associated with the virtual learning system.

SUPPORT SERVICES

Learners and content and instruction providers accessing a virtual learning system require a variety of facilitating and/or mediating services comparable to those available to learners in more traditional settings. These services include needs analysis/identification, admission and registration, learning support, content/instructional support, information and learning resources, communication, and constituent liaison. Support services, on one hand, are designed to assist content providers and deliverers in identifying markets, creating quality education products, distributing quality courses and programs to those markets, and assessing learners' satisfaction with the educational products and services received. On the other hand, support services are designed to assist learners in knowing about, receiving and managing appropriate learning opportunities and to facilitate the learners success in a chosen educational endeavour.

Needs Identification/Analysis

Learners require mechanisms through which their needs and desires for educational products and services can be made known to providers of content and instruction. Providers require mechanisms by which they can assess these needs and desires and make appropriate, well informed decisions concerning the viability of offering products and services to learners.

Admission and Registration

Admission and registration includes educational products and services information, student intake, application collection, application processing, registration processing, fee assessment, fee collection, and fee processing. It also includes providing the necessary information required for learners to engage in the above processes and the rules and regulations governing these activities. In a virtual learning system, this information is shared between the educational provider and the learner via the same mechanisms used

to deliver and receive content and instruction. In many instances, this requires that product and service descriptions, schedules and forms be electronically formatted and transmitted.

Learning Support

Often critical to learner success, is the availability to the learner of various educational and counseling services which assist the learner in making informed decisions, coping with content and instruction, and managing the personal and occupational stresses which accompany institutionalized learning. Educational services include: a) writing and numerical skills assistance, b) content tutoring, c) exam preparation assistance, d) test writing skills, e) communication skills, f) time management training, g) research and information processing skills training, and h) monitoring and coaching. Counseling services include educational, retention, financial, career and employment counseling.

As with admissions and registration, learner support must be received at the location of the learner, either through on-site face-to-face contact with resource personnel, or through information technologies facilitating contact with resource personnel at the provider location.

Content/Instructional Support

Deliverers of courses and programs to adult learners are expected to consistently provide a quality product. However, in a virtual learning environment the communication facilitated and mediated through various information and educational technologies brings both familiar and unique challenges to the educational forum. Therefore, content and instructional support dedicated to the development and delivery of education courses and programs designed for these virtual learning environments is required. In addition, the support received by developers and deliverers within the adult virtual learning system should support multiple modes of teaching and learning and should equip developers and deliverers with the knowledge and skills necessary to provide learners with ready access to course materials and information, timely feedback on progress and performance and ample opportunity for interaction between instructors and learners.

Information and Learning Resources

Information and learning resources provision involves ensuring that educational providers and learners have access to and are able to conveniently receive the necessary core and supplementary resources and information required by a course or program. This requires an efficient resource location and distribution system and a technical infrastructure compatible with both the delivery methods and technologies used by the provider and the receiving methods and technologies at the learner location. Information and learning resources services generally include electronic and/or physical access to resources, inter-library loan, information retrieval skills training, access to regional, national and international databases, and storage and cataloguing of various educational media.

Communication

Communication is at the centre of all educational endeavours. To facilitate and mediate communication in a virtual learning environment requires extensive dependence on information technologies. This implies that the learners and providers must have consistent and reliable information technology service and support which accommodate both synchronous and asynchronous communication. This service establishes and

maintains point-to-point and multipoint connectivity and the necessary skills training and technical support to ensure learners and providers are able to use the various communications technologies efficiently and effectively.

Constituent Liaison

Where a virtual learning environment is the primary educational avenue, liaison with the managers of the virtual learning system is important. This liaison has both political and co-ordinating functions. As a political function, it ensures that the correct protocol is followed when providers wish to serve a community of learners. As a co-ordinating function, constituent liaison ensures appropriate educational products and services are provided and that a duplication of services is avoided. In addition, constituent liaison helps stakeholders understand the financial and resource limitations of the educational providers and assists educational providers in recognizing the potential contributions stakeholders are able to make to the system.

TECHNOLOGIES

Technology plays a major role in a virtual learning system, since it provides the primary communications medium through which learners and providers interact. The technologies can be categorized as either sending and receiving technologies or as carrier technologies. Together, they are becoming more commonly referred to as information technologies.

Information technologies are used for more than the sending and receiving of telecommunications signals. At both provider and learner locations they are used extensively as learning and teaching technologies. As applications, productivity, and media-based instructional tools, sending and receiving technologies assist providers and learners in the creation of learning environments, where content and information may be created, delivered, stored, retrieved, and manipulated.

Sending and Receiving Technologies

Sending and receiving technologies are those which send and receive data, audio, and video signals. Data technologies include computers of various configurations, modems, and facsimile machines. Audio technologies send and receive audio signals and include radio, telephones and audio recording devices. Video technologies are composed of television and various video equipment such as video cameras, monitors, VCR's, and video codecs (coder/decoder).

Data, audio, and video are becoming more difficult to delineate as distinct signals since the trend is toward digitization and integration. In this sense, all signals are becoming data signals, thereby allowing data, audio, and video to become integrated as a single signal.

Carrier Technologies

Carrier technologies [which are made up of primarily storage and controlling devices (computers) and of data, audio and video signal transmission devices (telecommunications systems)] connect sending and receiving technologies. These technologies are often referred to as the "highway" or "backbone". Often, carrier technologies are owned and operated by large utility companies or by organizations that have sufficient information demands to set up their own carrier.

Terrestrial Carrier Technologies. Terrestrial carrier technologies are those technologies that carry telecommunications signals (audio, video, data) across the ground or below the ground. They include such conduits as microwave, telephone lines, coaxial cable, and fibre optics. Satellite carrier technology relies on the use of geostationary (22,300 miles above the earth) orbiting satellites to relay telecommunications signals.

Routers and Bridges. Organizing the traffic flow of information and making sure that the information gets to the right place requires routing and bridging technology. A router is an interface between two networks. In a sense, they are the "collection and delivery agents" of the network, and are not only able to connect the networks, but are able to find the best route between networks. Bridges are similar to routers, but lack some of the functionality of a router. In audio and videoconferencing, bridges connect three or more telecommunications channels (multipoint) so that they can all communicate together. Video bridges are also referred to as MCUs (Multipoint Conferencing Units).

Standards. Not all information technology is designed to "talk to" each other. To facilitate communication, a series of standards have been established for data, audio, and video transmission. Standards, in the telecommunications industry, are agreed upon principles of transmission and reception protocol. Equipment manufacturers, then, of telecommunications equipment make decisions as to whether or not their equipment will only "talk to" like equipment (proprietary) or will "talk to" other manufacturers' equipment (standards), or whether equipment will "talk to" both. Manufacturers often develop proprietary systems which provide enhancements over standards-based systems.

Learning and Teaching Technologies

In a virtual learning system, sending, receiving, and carrier technologies are critical, however the application of those technologies better describes the technology environment at both the provider and learner locations. Various configurations and uses of the technology facilitate both synchronous or asynchronous learning and instruction.

Audio Teleconferencing. Audio teleconferencing, also called audioconference, is a synchronous interaction between two or more people remote from one another but linked by a telecommunications system, usually telephone. As a learning and teaching technology, audio teleconferencing is well-suited to group-based, interactive learning situations. Generally, instructional materials are made available to the learners in advance of the learning activity.

Audiographics. Audiographics is an audio conference with an additional data link to facilitate the exchange of data files (applications, text, and graphics). The data link may be integrated within the audio link or be transmitted on a separate line. Like audio teleconferencing, audiographics usually serves the learner in a group-based, interactive learning situation. However, instructional materials may be presented through the graphics (file exchange) facility during the time the learning activity is taking place.

Computer-mediated Communications. Computer-mediated communications (CMC) is a broad category generally including data information exchange between people, people and computer programs, and people and information archives, using telecommunicating tools such as e-mail, computer conferencing, interactive Telnet sessions (ability to sign on to another computer located in another city or country). In the majority of instances, CMC is used asynchronously. CMC is suited to both group and individually-based learning activities. The asynchronous facility of this learning and teaching technology allows the student to interact with the group or the learning material at the convenience of the learner.

Video Teleconference. Video teleconference is also called videoconferencing. It is usually two-way synchronous communication and involves the transmission of digital video images between two or more places. The transmission speeds of these images may range from a freeze-frame (TV screen updated every 20 seconds) to full motion (30 frames per second). The audio portion of the signal may be integrated as part of the video signal or be transmitted separately via the telephone. The cost of videoconferencing is affected by a number of factors, however the trend is toward reduced cost through better compression of video signals and lower cost switched digital networks. As with most synchronous communication tools, this learning and teaching technology is well suited to group learning activities.

Media-based Instruction. Media-based instruction is the use of media to deliver all or part of the content and instruction of a particular course or program. These technologies include print, computer-assisted instruction, audio tapes, video tapes, films, and various combinations of each. Generally, media-based learning is designed for individualized instruction. Therefore as a teaching and learning technology, it is well suited to independent learning activities.

Internet Facilitated Instruction. The tremendous increase in the use of the Internet as an educational tool warrants considering the Internet as separate from CMC or media-based instruction. Not only is the Internet a communications medium and the gateway to vast amounts of information, but it is a learning environment on its own. Through such utilities as MUDS (Multiple User Dimensions), learners are able to explore and participate in "virtual" worlds. In the not too distant future we are apt to see an entire credit-granting educational institution emulated on the Internet.

Note: It should be remembered that often learning and teaching technologies work well in combination, and that to meet the varying needs of adult learners, it is often necessary to use multiple technologies. As well, when creatively applied, these technologies are effectively used in face-to-face classroom learning environments just as they are in virtual learning environments.

LOCATIONS

Locations are the physical settings where providers and receivers of educational services are located. In a virtual learning system both provision and reception of educational services may take place at the same location type. Following is a description of location types, including the relationship of the locations to a virtual learning system and the kind of technologies one might find in these locations.

Educational Institution

Educational institutions are typically located in major or urban centres of population. Usually, they are campus-based organizations whose resources and priorities are geared to serving learners registered in courses or programs provided by a single institution.

In a virtual learning system, educational institutions may continue to serve as primary providers of instruction and content. However, they are able to enhance and extend content and instruction through electronically interacting with internal and external sources, thereby leveraging expertise and resources to provide content and instruction to more learners. Furthermore, in a virtual learning environment providers may collaborate to take advantage of the efficiencies and opportunities created by the aggregated demand for services by learners affiliated with each of the independent educational institutions. Often, due to the limited resources available to any single educational institution, it is only through these collaborative efforts that expensive, electronic educational services can be developed and provided to learners.

Support services located at educational institutions are traditionally designed to serve learners and staff located at the particular educational institution and to support courses and programs provided by that institution. In a virtual system, support services of an educational institution may serve students located at any location type, and may be used to support large numbers of learners affiliated with other educational institutions. In some instances, educational institutions in a virtual learning system, may specialize as much or more in providing support services, as they do in providing content and instruction.

"On-campus residency" continues to be a desirable setting for many learners. In some instances, residency is required in order to receive a credential. This makes educational institution locations suitable for learners living near the site or for those able to relocate to a particular site. In the virtual learning system, learners at educational institutions are better able to access educational resources and services. Also, they can be supported when they are away from the campus through electronic connections from other locations connected to the virtual learning system.

Educational institutions use both synchronous and asynchronous information technologies. Synchronous communication technologies such as video, audio, or audiographic conferencing, allow learners at the same or different institutional or remote locations to receive instruction and content and to engage in learning activities at the same time. Asynchronous communication technologies such as computer-mediated conferencing, e-mail and voice mail, are often used to provide on-campus and off-campus learning support.

Community Learning Centre

Community learning centres are located in rural or urban population centres. Sites vary with the specific community and include such places as community halls, libraries, schools, and church basements. Often the management of these locations rests with one or more community-based agents or partners (e.g. Adult Learning Councils, schools, libraries, hospitals, colleges, municipalities, and community economic development councils).

Collectively, as part of a virtual learning system, community learning centre locations serve a relatively wide and diverse market, and reflect the concept of "one-stop-shopping" by facilitating access to a variety of courses and learning services from a diversity of sources. They bring sophisticated educational products and services to relatively small populations, without the need for large staffs and the extensive development of physical structures to house offices, labs, and classrooms. However, many community learning centres are able to host itinerant or local instructors and house resource materials. As such, community learning centres may serve as producers of content and instruction, intended for the use of the community or to be distributed to other locations through a virtual learning system.

A strength of a community learning centre is its suitability as a location for the reception and provision of support services. Although the facilitating resources of many community learning centres may be shared through the virtual system, local support to learners is primary, since these centres are usually staffed by an individual(s) familiar with providing non-partisan access and co-ordination of resources from many different agencies or institutions.

Community learning centres are suited to learners who, through desire or circumstance, do not wish to commute or relocate. Learner access to community learning centres may be seasonal and restricted to prescribed hours, varying from all-day and evening to times such as evenings only. However, learners may experience more control over the content and direction of their educational plans than they may experience at campus-based locations.