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This Journal was established to facilitate collaboration and communication among researchers, innovators, practitioners, and administrators of education and training programs involving technology and distance learning.

An academic institution, Duquesne University, was chosen for its commitment to academic excellence and exemplary programs in instructional technology and distance learning. Duquesne University is supporting the Journal through its graduate program in Instructional Technology and its Center for Technology Education Innovation and Research (TEIR Center). In addition to its educational programs, Duquesne University has major training contracts for industry and government.

The Journal is refereed, global, and focused on research and innovation in teaching and learning. Duquesne University and its partner, DonEl Learning Inc., are committed to publish significant writings of high academic stature.

Lawrence A. Tomei, EdD
Executive Director, Center TEIR

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Editorial

Volume 2. Number 1.

Donald G. Perrin

The editors and publisher thank 120 authors for 75 articles published in 2004. Readership grew to about 10,000 unique visitors each month by year's end. In the last quarter, there were over 30,364 visits from 142 countries. 49 articles came from the United States, and 26 articles came from 12 other countries (**boldface in the table below.)

Rank	Country	Visits	% Visits
1	**United States****	13,529	44.6
2	(Unknown)	5,394	17.8
3	**Canada****	1,523	5.0
4	**United Kingdom****	1,444	4.8
5	**Australia****	859	2.8
6	Spain	506	1.7
7	Germany	404	1.3
8	Malaysia	392	1.3
9	Netherlands	379	1.2
10	Norway	320	1.1
11	**China****	319	1.1
12	India	312	1.0
13	Italy	273	0.9
14	**South Africa****	266	0.9
15	Japan	261	0.9
16	Sweden	233	0.8
17	**Saudi Arabia****	217	0.7
18	**Taiwan, Province of China****	213	0.7
19	**Turkey****	161	0.5
20	Philippines	154	0.5
21	United Arab Emirates	149	0.5
22	France	143	0.5
23	Romania	143	0.5
24	**Israel**	131	0.4
25	Korea, Republic of	122	0.4
26	Singapore	115	0.4
27	**New Zealand****	114	0.4
28	Indonesia	110	0.4
29	Czeck Republic	100	0.3
30	**Mauritius****	100	0.3
31	Hong Kong	97	o.3
32	Mexico	94	0.3
33	Brazil	93	0.3
34	Thailand	93	0.3
35	Belgium	86	0.3
36	Austria	74	0.2
37	Iceland	74	0.2
38	Greece	68	0.2
39	Finland	64	0.2
40	Ireland	62	0.2
41	Portugal	54	0.2
42	Jordan	53	0.2
43	Switzerland	51	0.2
44	**Egypt****	50	0.2

**Bold face countries provided articles for the Journal

In the 271 days for which we have records, the Journal logged approximately 309,000 hits representing 93,000 page views (one page view is an entire article, editorial, or index page). In addition, Acrobat files of the entire journal were accessed 21,662 times.

Goals for 2005 are as follows:

1. Improve technical quality and layout

2. Add news and resource links to the home page

3. Recruit a higher percentage of authors from foreign (non-U.S.) countries

4. Expand the number of countries represented by 100%

5. Expand readership, page views and visits by 100%

6. Build the Journal based on assessed needs of readers and authors

You are invited to forward your comments and ideas to editor@itdl.org.

Editor's Note: This is a milestone article that deserves careful study. Connectivism should not be con fused with constructivism. George Siemens advances a theory of learning that is consistent with the needs of the twenty first century. His theory takes into account trends in learning, the use of technology and networks, and the diminishing half-life of knowledge. It combines relevant elements of many learning theories, social structures, and technology to create a powerful theoretical construct for learning in the digital age.

Connectivism:
A Learning Theory for the Digital Age

George Siemens

Introduction

Behaviorism, cognitivism, and constructivism are the three broad learning theories most often utilized in the creation of instructional environments. These theories, however, were developed in a time when learning was not impacted through technology. Over the last twenty years, technology has reorganized how we live, how we communicate, and how we learn. Learning needs and theories that describe learning principles and processes, should be reflective of underlying social environments. Vaill emphasizes that "learning must be a way of being – an ongoing set of attitudes and actions by individuals and groups that they employ to try to keep abreast of the surprising, novel, messy, obtrusive, recurring events…" (1996, p.42).

Learners as little as forty years ago would complete the required schooling and enter a career that would often last a lifetime. Information development was slow. The life of knowledge was measured in decades. Today, these foundational principles have been altered. Knowledge is growing exponentially. In many fields the life of knowledge is now measured in months and years. Gonzalez (2004) describes the challenges of rapidly diminishing knowledge life:

> *"One of the most persuasive factors is the shrinking half-life of knowledge. The "half-life of knowledge" is the time span from when knowledge is gained to when it becomes obsolete. Half of what is known today was not known 10 years ago. The amount of knowledge in the world has doubled in the past 10 years and is doubling every 18 months according to the American Society of Training and Documentation (ASTD). To combat the shrinking half-life of knowledge, organizations have been forced to develop new methods of deploying instruction."*

Some significant trends in learning:

- Many learners will move into a variety of different, possibly unrelated fields over the course of their lifetime.

- Informal learning is a significant aspect of our learning experience. Formal education no longer comprises the majority of our learning. Learning now occurs in a variety of ways – through communities of practice, personal networks, and through completion of work-related tasks.

- Learning is a continual process, lasting for a lifetime. Learning and work related activities are no longer separate. In many situations, they are the same.

- Technology is altering (rewiring) our brains. The tools we use define and shape our thinking.

- The organization and the individual are both learning organisms. Increased attention to knowledge management highlights the need for a theory that attempts to explain the link between individual and organizational learning.

- Many of the processes previously handled by learning theories (especially in cognitive information processing) can now be off-loaded to, or supported by, technology.

- Know-how and know-what is being supplemented with know-where (the understanding of where to find knowledge needed).

Background

Driscoll (2000) defines learning as "a persisting change in human performance or performance potential…[which] must come about as a result of the learner's experience and interaction with the world" (p.11). This definition encompasses many of the attributes commonly associated with behaviorism, cognitivism, and constructivism – namely, learning as a lasting changed state (emotional, mental, physiological (i.e. skills)) brought about as a result of experiences and interactions with content or other people.

Driscoll (2000, p14-17) explores some of the complexities of defining learning. Debate centers on:

- Valid sources of knowledge - Do we gain knowledge through experiences? Is it innate (present at birth)? Do we acquire it through thinking and reasoning?

- Content of knowledge – Is knowledge actually knowable? Is it directly knowable through human experience?

- The final consideration focuses on three epistemological traditions in relation to learning: Objectivism, Pragmatism, and Interpretivism

  o Objectivism (similar to behaviorism) states that reality is external and is objective, and knowledge is gained through experiences.

  o Pragmatism (similar to cognitivism) states that reality is interpreted, and knowledge is negotiated through experience and thinking.

  o Interpretivism (similar to constructivism) states that reality is internal, and knowledge is constructed.

All of these learning theories hold the notion that knowledge is an objective (or a state) that is attainable (if not already innate) through either reasoning or experiences. Behaviorism, cognitivism, and constructivism (built on the epistemological traditions) attempt to address how it is that a person learns.

Behaviorism states that learning is largely unknowable, that is, we can't possibly understand what goes on inside a person (the "black box theory"). Gredler (2001) expresses behaviorism as being comprised of several theories that make three assumptions about learning:

1. Observable behaviour is more important than understanding internal activities

2. Behaviour should be focused on simple elements: specific stimuli and responses

3. Learning is about behaviour change

Cognitivism often takes a computer information processing model. Learning is viewed as a process of inputs, managed in short term memory, and coded for long-term recall. Cindy Buell details this process: "In cognitive theories, knowledge is viewed as symbolic mental constructs in the learner's mind, and the learning process is the means by which these symbolic representations are committed to memory."

Constructivism suggests that learners create knowledge as they attempt to understand their experiences (Driscoll, 2000, p. 376). Behaviorism and cognitivism view knowledge as external to the learner and the learning process as the act of internalizing knowledge. Constructivism

assumes that learners are not empty vessels to be filled with knowledge. Instead, learners are actively attempting to create meaning. Learners often select and pursue their own learning. Constructivist principles acknowledge that real-life learning is messy and complex. Classrooms which emulate the "fuzziness" of this learning will be more effective in preparing learners for life-long learning.

Limitations of Behaviorism, Cognitivism, and Constructivism

A central tenet of most learning theories is that learning occurs inside a person. Even social constructivist views, which hold that learning is a socially enacted process, promotes the principality of the individual (and her/his physical presence – i.e. brain-based) in learning. These theories do not address learning that occurs outside of people (i.e. learning that is stored and manipulated by technology). They also fail to describe how learning happens within organizations

Learning theories are concerned with the actual process of learning, not with the value of what is being learned. In a networked world, the very manner of information that we acquire is worth exploring. The need to evaluate the worthiness of learning something is a meta-skill that is applied before learning itself begins. When knowledge is subject to paucity, the process of assessing worthiness is assumed to be intrinsic to learning. When knowledge is abundant, the rapid evaluation of knowledge is important. Additional concerns arise from the rapid increase in information. In today's environment, action is often needed without personal learning – that is, we need to act by drawing information outside of our primary knowledge. The ability to synthesize and recognize connections and patterns is a valuable skill.

Many important questions are raised when established learning theories are seen through technology. The natural attempt of theorists is to continue to revise and evolve theories as conditions change. At some point, however, the underlying conditions have altered so significantly, that further modification is no longer sensible. An entirely new approach is needed.

Some questions to explore in relation to learning theories and the impact of technology and new sciences (chaos and networks) on learning:

- How are learning theories impacted when knowledge is no longer acquired in the linear manner?

- What adjustments need to made with learning theories when technology performs many of the cognitive operations previously performed by learners (information storage and retrieval).

- How can we continue to stay current in a rapidly evolving information ecology?

- How do learning theories address moments where performance is needed in the absence of complete understanding?

- What is the impact of networks and complexity theories on learning?

- What is the impact of chaos as a complex pattern recognition process on learning?

- With increased recognition of interconnections in differing fields of knowledge, how are systems and ecology theories perceived in light of learning tasks?

An Alternative Theory

Including technology and connection making as learning activities begins to move learning theories into a digital age. We can no longer personally experience and acquire learning that we need to act. We derive our competence from forming connections. Karen Stephenson states:

"Experience has long been considered the best teacher of knowledge. Since we cannot experience everything, other people's experiences, and hence other people, become the surrogate for knowledge. 'I store my knowledge in my friends' is an axiom for collecting knowledge through collecting people (undated)."

Chaos is a new reality for knowledge workers. ScienceWeek (2004) quotes Nigel Calder's definition that chaos is "a cryptic form of order". Chaos is the breakdown of predictability, evidenced in complicated arrangements that initially defy order. Unlike constructivism, which states that learners attempt to foster understanding by meaning making tasks, chaos states that the meaning exists – the learner's challenge is to recognize the patterns which appear to be hidden. Meaning-making and forming connections between specialized communities are important activities.

Chaos, as a science, recognizes the connection of everything to everything. Gleick (1987) states: "In weather, for example, this translates into what is only half-jokingly known as the Butterfly Effect – the notion that a butterfly stirring the air today in Peking can transform storm systems next month in New York" (p. 8). This analogy highlights a real challenge: "sensitive dependence on initial conditions" profoundly impacts what we learn and how we act based on our learning. Decision making is indicative of this. If the underlying conditions used to make decisions change, the decision itself is no longer as correct as it was at the time it was made. The ability to recognize and adjust to pattern shifts is a key learning task.

Luis Mateus Rocha (1998) defines self-organization as the "spontaneous formation of well organized structures, patterns, or behaviors, from random initial conditions." (p.3). Learning, as a self-organizing process requires that the system (personal or organizational learning systems) "be informationally open, that is, for it to be able to classify its own interaction with an environment, it must be able to change its structure…" (p.4). Wiley and Edwards acknowledge the importance of self-organization as a learning process: "Jacobs argues that communities self-organize is a manner similar to social insects: instead of thousands of ants crossing each other's pheromone trails and changing their behavior accordingly, thousands of humans pass each other on the sidewalk and change their behavior accordingly.". Self-organization on a personal level is a micro-process of the larger self-organizing knowledge constructs created within corporate or institutional environments. The capacity to form connections between sources of information, and thereby create useful information patterns, is required to learn in our knowledge economy.

Networks, Small Worlds, Weak Ties

A network can simply be defined as connections between entities. Computer networks, power grids, and social networks all function on the simple principle that people, groups, systems, nodes, entities can be connected to create an integrated whole. Alterations within the network have ripple effects on the whole.

Albert-László Barabási states that "nodes always compete for connections because links represent survival in an interconnected world" (2002, p.106). This competition is largely dulled within a personal learning network, but the placing of value on certain nodes over others is a reality. Nodes that successfully acquire greater profile will be more successful at acquiring additional connections. In a learning sense, the likelihood that a concept of learning will be linked depends on how well it is currently linked. Nodes (can be fields, ideas, communities) that specialize and gain recognition for their expertise have greater chances of recognition, thus resulting in cross-pollination of learning communities.

Weak ties are links or bridges that allow short connections between information. Our small world networks are generally populated with people whose interests and knowledge are similar to ours. Finding a new job, as an example, often occurs through weak ties. This principle has great merit

in the notion of serendipity, innovation, and creativity. Connections between disparate ideas and fields can create new innovations.

Connectivism

Connectivism is the integration of principles explored by chaos, network, and complexity and self-organization theories. Learning is a process that occurs within nebulous environments of shifting core elements – not entirely under the control of the individual. Learning (defined as actionable knowledge) can reside outside of ourselves (within an organization or a database), is focused on connecting specialized information sets, and the connections that enable us to learn more are more important than our current state of knowing.

Connectivism is driven by the understanding that decisions are based on rapidly altering foundations. New information is continually being acquired. The ability to draw distinctions between important and unimportant information is vital. The ability to recognize when new information alters the landscape based on decisions made yesterday is also critical.

Principles of connectivism:

- Learning and knowledge rests in diversity of opinions.
- Learning is a process of connecting specialized nodes or information sources.
- Learning may reside in non-human appliances.
- Capacity to know more is more critical than what is currently known
- Nurturing and maintaining connections is needed to facilitate continual learning.
- Ability to see connections between fields, ideas, and concepts is a core skill.
- Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.
- Decision-making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision.

Connectivism also addresses the challenges that many corporations face in knowledge management activities. Knowledge that resides in a database needs to be connected with the right people in the right context in order to be classified as learning. Behaviorism, cognitivism, and constructivism do not attempt to address the challenges of organizational knowledge and transference.

Information flow within an organization is an important element in organizational effectiveness. In a knowledge economy, the flow of information is the equivalent of the oil pipe in an industrial economy. Creating, preserving, and utilizing information flow should be a key organizational activity. Knowledge flow can be likened to a river that meanders through the ecology of an organization. In certain areas, the river pools and in other areas it ebbs. The health of the learning ecology of the organization depends on effective nurturing of information flow.

Social network analysis is an additional element in understanding learning models in a digital era. Art Kleiner (2002) explores Karen Stephenson's "quantum theory of trust" which "explains not just how to recognize the collective cognitive capability of an organization, but how to cultivate and increase it". Within social networks, hubs are well-connected people who are able to foster and maintain knowledge flow. Their interdependence results in effective knowledge flow, enabling the personal understanding of the state of activities organizationally.

The starting point of connectivism is the individual. Personal knowledge is comprised of a network, which feeds into organizations and institutions, which in turn feed back into the network, and then continue to provide learning to individual. This cycle of knowledge development (personal to network to organization) allows learners to remain current in their field through the connections they have formed.

Landauer and Dumais (1997) explore the phenomenon that "people have much more knowledge than appears to be present in the information to which they have been exposed". They provide a connectivist focus in stating "the simple notion that some domains of knowledge contain vast numbers of weak interrelations that, if properly exploited, can greatly amplify learning by a process of inference". The value of pattern recognition and connecting our own "small worlds of knowledge" are apparent in the exponential impact provided to our personal learning.

John Seely Brown presents an interesting notion that the internet leverages the small efforts of many with the large efforts of few. The central premise is that connections created with unusual nodes supports and intensifies existing large effort activities. Brown provides the example of a Maricopa County Community College system project that links senior citizens with elementary school students in a mentor program. The children "listen to these "grandparents" better than they do their own parents, the mentoring really helps the teachers…the small efforts of the many- the seniors – complement the large efforts of the few – the teachers." (2002). This amplification of learning, knowledge and understanding through the extension of a personal network is the epitome of connectivism.

Implications

The notion of connectivism has implications in all aspects of life. This paper largely focuses on its impact on learning, but the following aspects are also impacted:

- Management and leadership. The management and marshalling of resources to achieve desired outcomes is a significant challenge. Realizing that complete knowledge cannot exist in the mind of one person requires a different approach to creating an overview of the situation. Diverse teams of varying viewpoints are a critical structure for completely exploring ideas. Innovation is also an additional challenge. Most of the revolutionary ideas of today at one time existed as a fringe element. An organizations ability to foster, nurture, and synthesize the impacts of varying views of information is critical to knowledge economy survival. Speed of "idea to implementation" is also improved in a systems view of learning.

- Media, news, information. This trend is well under way. Mainstream media organizations are being challenged by the open, real-time, two-way information flow of blogging.

- Personal knowledge management in relation to organizational knowledge management

- Design of learning environments

Conclusion:

The pipe is more important than the content within the pipe. Our ability to learn what we need for tomorrow is more important than what we know today. A real challenge for any learning theory is to actuate known knowledge at the point of application. When knowledge, however, is needed, but not known, the ability to plug into sources to meet the requirements becomes a vital skill. As knowledge continues to grow and evolve, access to what is needed is more important than what the learner currently possesses.

Connectivism presents a model of learning that acknowledges the tectonic shifts in society where learning is no longer an internal, individualistic activity. How people work and function is altered when new tools are utilized. The field of education has been slow to recognize both the impact of new learning tools and the environmental changes in what it means to learn. Connectivism provides insight into learning skills and tasks needed for learners to flourish in a digital era.

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Finding Our Way:
Better Understanding the Needs and Motivations of Teachers in Online Learning

Kathleen P. King and Marlene D. Dunham

Abstract

Research among K-12 educators participating in 6-week online professional development modules of study provides insight into their needs and motivations. 324 educators participated in this research through focus groups and an online survey. The most telling findings indicate four themes regarding teacher online professional development: learner expectations, learner support and access, incentives, and content. Overall, this project illuminates issues that we face in formal education online learning environments as we continue to discover how to best serve educators' learning needs.

Introduction

In the midst of the Post-Information Age we are constantly challenged to do more in less time. This need extends directly to the classroom as teachers and schools, and faculty and educational institutions face increased and incessant demands to integrate technology into teaching and learning, raise student test scores, and meet or exceed academic and content-area standards. This research explores how online professional development can offer a valuable vehicle for convenient, 24-7 access to a professional development community and content that can address these challenges. This article explores one extensive online professional development environment, the strengths and limitations of that environment and the emergent needs of the participating teachers. Exploring this specific context provides insight into how computers and online technologies can be best employed to meet some of the urgent demands facing educators today.

The *project* is an extensive online course delivery system of multiple reoccurring six-week courses. Each course passes through stages of development, implementation, evaluation, and revision, in a cycle of continual improvement. This online professional development school, funded by a United States Department of Education Fund for the Improvement of Postsecondary Education (FIPSE) Learning Anytime Anywhere Partnership (LAAP) grant, has among its goals, the development of online courses in several content areas that provide opportunities for teacher development in teaching and learning. Realizing that there are many online initiatives, this project is distinctive in including a focus on the needs of teachers as adult learners, the development of local and distant learning communities, and unique content in the areas of standards-based teaching, online learning, adult learning, and high performance classrooms.

Within this online program, courses are written for a learner population of teachers, administrators, and others interested in standards and online learning, and classroom strategies. The online courses consist of instructor-guided, interactive, asynchronous formats that present in-depth material, cultivate application, and facilitate critical reflection and collaboration in online

threaded discussions and group projects. Realizing that there are many essential characteristics for online learning, this research adds to the field of knowledge and practice by investigating this distinctive online learning format and community (Owston, & Wideman, 2002; Palloff & Pratt, 2001; Stephenson, 2001).

Since the project's inception in 2000, and going live with its first class in March 2001, we have experienced many changes in partnerships and much formative reorientation of our direction and implementation. While the primary goals of the professional development school have remained the same, the path of implementation has shifted based on formative evaluation data and collaboration of the entire project team. It is from this perspective that this paper offers a discussion of two especially important research questions: What characterizes the strength of this distinctive online learning format? And, what needs does teacher education and professional development face within online learning environments? This project illuminates many issues that we face in online learning environments and as colleges and universities of teacher education.

Literature Review

In considering the needs of educators in online professional development two areas of the literature in particular inform our discussion: professional development from an adult learning perspective and distance education.

Professional Development

In considering the needs of educators in their ongoing professional development, one salient perspective is to recognize them as adult learners (Cranton, 1996; King, 2002a; Lawler & King, 2000). The growing literature in this area brings to the forefront concerns and needs that may not have been especially accentuated in the same way in the past. In particular, the field has considered characteristics of adult learners that are especially meaningful in cultivating a climate of respect, building on prior experience, learning for application, encouraging active participation, using collaborative learning, and empowering participants (Lawler & King, 2000). These broad principles are then interpreted for and applied to the professional development context more specifically.

Within schools and educational institutions the climate in which educators work is a critical element in forming perspectives of teaching and learning and personal professional learning. When educators work within an environment in which their high value is communicated and in which they are addressed as professionals, they can perhaps more freely develop responsibility for and investment of time in their own professional development. Intrinsic motivation is a powerful complement to extrinsic rewards and can be communicated through the organization, individual relationships and the way in which professional development is planned and delivered.

Similarly building on prior experience enables educators to scaffold their learning and move ahead in thought and practice while also validating their expertise (Lawler & King, 2000). This approach in turns points to transfer of learning and application, so that professional development is not pursued as a separate sphere of activity, but instead is significantly tied to what educators feel they need and in forms that they can readily apply it.

Such learning is also well received when educators are active participants in interacting with the content and one another through multiple instructional strategies (King, 2002b). Finding ways to cultivate this active interaction with experience, content and application can be a challenge for developers. A valuable strategy in many regards is collaborative learning. Within such methods are opportunities for reflection, application, deeper dialogue, and further development of ideas. The online learning platforms have become widely used in educational and personal settings alike to foster such collaborative discussion and can be used readily to facilitate further exploration and development of ideas and application (King 2002b; Simonson et al., 2003).

Ultimately these adult learning strategies can move professional development initiatives towards the further empowerment of educators. By building on these strategies and principles, educators may participate in learning experiences that can lay a basis for lifelong learning orientations and practice (Lawler & King, 2000). Rather than professional development stopping when an in-service program ends, educators have the opportunity to continue the learning both individually and together when their organization supports and validates their learning, experience and collaboration.

Several authors build upon this view of educators as adult learners to recognize that professional development can be a valuable opportunity for building reflective perspectives and practice (Brookfield, 1995; Cranton, 1996; King 2002a, 2003). Rather than focusing on "skills" and "methods" this view further reveals a vision of learning that evaluates the past, looks at new possibilities, and carefully develops approaches to teaching and learning that incorporate new learning and perspectives (Hawkes, 2001; Twigg, 2001). Online learning formats can articulate very well with this perspective as web-based bulletin boards and online journals offer tools for in-depth individual contemplation and group dialogue about teaching, learning, and philosophy, and practice (Hawkes, 2001; King, 2001, 2002b; Paloff & Pratt, 2001).

Distance Education

With the advent of online learning via the Internet, and then the World-wide Web in the early 1990's a new wave of possibilities emerged for distance education (Palloff & Pratt, 2001; Simonson, et al., 2003). Instructional design concerns took new forms as the possibilities of user-friendliness and interactivity took new turns. The web's graphical interface, and increased options for Internet connections, and decreasing costs of Internet-capable computers, have all played an important part in building a base of users who may engage in online learning.

As we consider this need for online learning professional development to take form and develop further we can also see a multitude of recommendations in the literature to guide practice (Berge, 1998; Palloff & Pratt, 2001; Passig, 2001; Simonson, et al., 2003). Building upon the view of educators as adult learners, critical issues that emerge in this literature are climate, expectation, experience, and interactivity. Embedded within these issues are individual and community aspects. The widespread adoption of the web as a major source of information, news, and entertainment has brought the use of the Internet into the mainstream. When in the early 1990's you asked about Internet access most people thought you had to be highly technical to use it or even know about it. In 2003 if you need information you will probably be advised to reach to the Web first. This culture and climate of online dependency is critical in introducing and sustaining the viability of online learning. . Indeed in the corporate sector, a large portion of professional development is being moved to distance modalities, and more specifically, online (Berge, 1998). These dynamics create expectations within organizations and among individuals that need to be addressed in online learning programs. The literature has shown that online learning usually takes considerably more time than learners expect and that even though they might have experience with using online resources for other purposes, until they engage in online learning, they do not fully comprehend the dynamics, possibilities, and responsibilities (Palloff & Pratt, 2001).

Additionally, experience and interactivity can be incorporated successfully in online learning (Alexander & Boud, 2001). These issues necessitate careful planning that considers a variety of online instructional strategies, pedagogical issues, learner needs, and program/course objectives. (Cain, Marrar, Pitre, & Armour, 2003; Coomey & Stephenson, 2001; Palloff & Pratt, 2001) Online learning offers opportunities to draw out learner experience and not only instructor-learner dialogue, but also peer-to-peer dialogue that can be sustained over much longer periods of time than in the traditional face-to-face classroom (King, 2002b). Indeed these limits and interactivity can be extended so far that educators and learners alike may need to set boundaries for their own participation (Palloff & Pratt, 2001). All of these dynamic possibilities set the scene for a

challenging pathway ahead as we continue to discover the possibilities and limitations of this multifaceted, still evolving delivery mode of professional development. This discussion serves as a brief representation of the wide base of support for this research as it approaches online learning as a valuable means to build on adult learning principles, familiar and accessible online technology, distance learning recommendations, and professional development needs.

Method

This research integrates two modes of data collection, focus groups and online surveys, within a mixed, quantitative and qualitative design (Creswell, 2003). This mixed design allows researchers to include a broad base of participants, as in the online survey (N=324), and also to explore a greater depth of experience through qualitative methods such as questioning techniques in focus groups (N= 13, 8). Findings that are particularly relevant to faculty teaching, evaluation, and development are presented here. This research and development project consisted of two phases over its first two years according to the method and type of information collected.

During Phase One, the first eight months, findings were discussed informally and frequently, and adapted as appropriate into project design. Phase Two began in the ninth month, as data collection became more routine and project management shifted from a development phase to a schedule of project coordination and monitoring. In Phase One, focus group findings were based on participant experience with one course offered at the earliest part of the project. During Phase Two, data were gathered through focus group findings and the online survey.

Online Survey

The more quantitative study consisted of an online survey. The 128-item online survey was voluntarily completed by learners within the 4th-6th weeks of their online course. Learners were notified when and how to access the survey by course facilitators. Respondent identity is kept confidential through passwords. The survey is a combination of multiple choice, Likert items, and free responses that cover nine broad topics: demographics (7), satisfaction (4), motivation (23), course and course impact (45), online learning (23), technology experience (2), access (12), barriers (5), and contacts (7). This paper focuses on the data collected from 34 items concerning demographics, satisfaction, and motivation.

The survey was developed by the external evaluation team with a review and revision process that included input from program directors, and course content specialists. Pilot testing of survey questions were distributed to the first focus group in person and email. A survey response rate of 33% (N=324) was achieved from among those who completed the courses.

Focus Groups

Two focus groups were conducted by the project evaluation team at two critical points in the project: (1) at the initial implementation phase, and (2) when the project had been underway for nine months. These on-site focus groups were conducted in the learners' school communities and included refreshments. Major differences between the two sessions were evident at these different points in time: first, the format of the session, and second, the availability of course offerings (as a result of maturation/development of project). The first focus group of 13 teachers occurred when they had been exposed to the first online course available (one month after the project began in March 2001). The two-hour afternoon session consisted of a presentation by the project director, followed by an open question and answer session. The project evaluator was present and distributed written surveys at the close of the session. Data were gathered through observation and notes by evaluator and journal notes of the project director. The session was held at a local community college, in a major urban area.

The second focus group of eight learners occurred in the evening at the district office in a large suburban district. Over three hours, discussion revolved around 15 questions developed by the district coordinators of the program. Discussion was audiotaped. The project evaluator recorded the discussion by question and tabulated responses.

Participants

All participants were enrolled in the project courses. Contact with the largest group of participants was primarily through the web-based online survey because courses are available to any educators who are in participating districts or who are members of Classroom Connect's total learner community (80,000 web visitors annually). All courses were delivered exclusively online.

Survey

Among the 324 participants, 287 were female and 35 male. Regarding ethnic background, 279 were self-identified as White, 13 as African American, 8 as Hispanic, and 5 multi-ethnic. Teaching experience of the participants ranged from 0 to 16 years and more: 100 had 16 or more years, 149 had 6 to 15 years, 65 had 1 to 5 years; and 2 had no teaching experience. For 102 (31.5%) respondents, this was their first online course.

Based on responses to descriptors in the survey, participants identified themselves as follows: 158 (48.8%) early adopters ("first to try something new"); 152 (46.9%) "like to try technology after its been tried by others"; 7 (2.1%) resist using technology, and 7 no response. 207 (63.9%) describe selves as advanced technology users; 85 (26.2%) as some experience, and 25 (7.7%) as beginners. Furthermore, 32 (9.9%) were enrolled in a degree program and 11 (3.4%) indicated that the course was part of the requirements for that program.

The majority of survey respondents were female (88.6%) and non-minority (86.1%). The majority also lived in suburban communities 168 (52%); 65 (20.1%) had over 21 years of professional educational experience, and nearly two thirds, 201 (62%), held a Master's degree. Less than a fourth of the respondents, 77 (23.8%), lived in rural areas, and less than a fourth of lived in an urban location 71 (21.9%). Studies indicate that there is a large economic and racial gap between users and nonusers of the Internet, and our respondent demographics appear to confirm this gap for our online learners. (Burdenski, 2001).

Focus Group One. Thirteen participants (all female) attended the first focus group among which 10 were African American, 1 Hispanic, and 2 white. Eleven had taught for 16 or more years. Although they were all "technology" teachers, all had far less technology experience than teaching experience. Most had less than five years experience in technology and rated themselves as "no experience," beginners, and limited experience. This course was their first online course. All the teachers had been required by their school or district to participate in the professional development activities. All were required, by the district administrator, to come to the focus group.

Focus Group Two. Ten participants, 9 females and 1 male, attended the second focus group. They were invited to the focus group by the district administration, but not required to attend. Ethic identification was 2 African American and 8 White. The group represented various positions in five district schools and the district office: 1 was a high school computer teacher; 1 worked in the high school guidance office, 3 were elementary teachers, 3 were experienced media or resource specialists working in two elementary schools, 2 were district technology coordinators. Their range of technical expertise extended from "needing help with email," resisting using technology, to experienced. For half of the group (5) this was there first online course. These learners had been selected by their district to participate in the classes and were characterized by intrinsic motivation, curiosity, and determination.

Analysis

Objective survey responses were tabulated and coded for frequencies, percentages, and correlations. Focus groups and discussion board transcripts and survey free responses were coded by constant comparison, as themes were determined from the data and then the data tabulated and grouped within those themes (Creswell, 2003). Gathering data from several sources provided a broad view of the online experience among these educators.

As commonly used in mixed design research, the multiple sources of data provide support for the validity of the data (Creswell, 2003). Survey items consisted of attitude scales and open-ended free response answers. The focus groups and discussion boards served to validate the survey responses as these participants had participated in both modes and the responses could be compared to one another. Construct validity of the survey instrument was a priority for the survey designers. Each section of the instrument had multiple items relating to the construct being used to ensure fit with the purposes of the survey and the population being surveyed. Hypothesized relationships among different sections of the survey instrument were tested with empirical observations in focus groups. Items covered both negative and positive responses, for example the items about assistance in accessing the computer was balanced by items about barriers to access. Both of these items also had write-in responses. The internal consistent reliability of the rating scales were tested using coefficient alpha showing reliability of .8581. Both validity and reliability were priorities for the instrument designers and several items were written and some items were not used after pilot results were evaluated. The online survey system also prevented redundancy of respondents because individual, unique, single-use passwords had to be developed for each participant each time they took a course, thereby preventing any individual learner "stacking" the responses with multiple entries.

Procedures

All teacher responses in the data collection process are coded and remain anonymous, and responses regarding individual teacher demographics, teaching experience, and teacher opinion are kept confidential. Prior to completing the online survey, participants are informed that the project courses are being studied to assist in course development and to learner more about online learning. Learners may decline to participate without negative consequences.

Findings and Discussion

Four major themes emerged as the data from the focus groups, online surveys, and hybrid classes were analyzed. The subjects and topics that occurred repeatedly in each method of data collection were: 1) **learner expectations, 2) learner support and access, 3) incentives, and 4) content.** Each of these common themes will be discussed within the context that they were gathered.

Focus Groups

The focus groups provide the best indication of the effects on the adult learner of district-mandated implementation of online professional development programs.

The first focus group, District A, provided early information as to the practicability, usability, and efficacy of the online professional development program within a district required professional development program. And the themes of those discussions centered on obstacles to participation and effective implementation.

The second focus group provided information after nine months of implementation as to the practicability, usability, and efficacy of the online learning system approach to professional development as it was implemented in District B, in the suburbs of a large metropolitan area. In District B's case, the district technology coordinator facilitated teacher participation. Thus familiarity with school organization and procedures was embedded in the implementation in

District B and was critical to the pre-implementation stage to correct assumptions about teacher motivation and usage. Additionally, the implementation approach in District B was influenced by changes made as a result of District A's feedback. We see similar findings emerging in District B.

Two comprehensive tables regarding findings from the focus groups are provided below. Table 1, "The Learner in the District," summarizes the differences in both the individual characteristics of focus group participants and the differences in district implementation and support of the online learning courses. We clearly see two contrasting district styles as well as two dissimilar groups of learners. The findings from the focus groups presented in Table 2, no doubt result from those differences and are described in more detail below. Although the focus groups are not comparable, the findings are useful for explanatory purposes in describing characteristics of successful implementation for both the adult learner and the district/school. We need to remember that these are results for two unique districts and we need to exercise caution in generalizing these themes. Further confounding the implications from the two focus groups is the fact that the available content is different for both groups. It is possible that District A might have demonstrated more individual motivation if presented with a broader array of content. Clearly, we need more evidence from additional focus groups to determine if these statements hold true for other districts.

Table 1

THE LEARNER IN THE DISTRICT

Implementation in Two Districts: Comparison of Focus Group Learner Characteristics and Support Provided by District		
Learner Background	**District A**	**District B**
Previous online learning experience	None	50% had previous experience
Learner attitude and motivation	Felt imposed, not enough time, already too busy	Privileged, honored, curious, personal growth motivation
Technology Experience/Proficiency	All were inexperienced	Moderate and advanced experience (50%)
Computer access	50% had computers a home. All had computers at work.	All had computers at home. All had computers at work.
Web-based learning style	Not comfortable reading screens; prefer to download and print all information	Comfortable with reading screens; able to set priorities/ identify materials to download
District/School Support Provided		
Online learning policy implementation strategy	A district mandate: Teachers required but not enforced	Invited. Level of implementation varied by school
Introduction of system, initial and continuing communication to teachers	Severely limited. District level only.	Better at district level; varied by school
District support team to provide ongoing support to teachers at implementing sites	Inactive and inexperienced	Active and experienced
Training to use system	none	none
Goals and follow-through	Unclear	Goals and follow-through set by district.

Table 2

SUMMARY OF THEMES THAT EMERGED IN THE FOCUS GROUPS

Needs for Successful Implementation of Online Instruction for Adult Learners in the Public School Setting		
Learner Expectations	**District A**	**District B**
Materials and content: relevance to professional work	Perceived as interesting, but not relevant	Perceived as relevant and interesting
Perception of time required	Took more time than expected	Courses varied; some took more time than others
Reason for not completing course	Time lack of meaningful incentives, din know how to use, not relevant	Course were more work than expected though would be easier fit into schedule better too much reading and intensity
INCENTIVES		
Incentive/Reward for participation	None felt by participants	Identified by participants
SUPPORT		
Communication, training and support	Severely limited; teachers on their own	Better but teachers still on their own
Use of Support provided: Web, e-mail, toll free telephone	None used; some deleted pertinent emails, not knowing they were about the class	Used support

Learner expectations

The theme of learner expectations prior to and during the courses surfaced repeatedly in the focus groups. In both districts learner expectations were directly influenced by district/school/ administrator communication about the program, the learner's level of technical proficiency, and lack of experience with online courses.

In District A, sometimes information was miscommunicated or not communicated leading to unrealistic expectations for the learners. One example is the message about the purpose and expectations of participating in the online courses; this message was conveyed to the teachers by district administration. For the web-based course deliverers, whether the technical team or the course guide/facilitator, being able to deliver accurate information to learners was difficult at best because many of the learners were novice technology users; their lack of understanding led them to repeatedly delete emails without reading them. A teacher in District A admitted she did not know how to distinguish the course facilitator's emails in her unopened email and deleted everything. She said, "I thought it was all junk mail and by the time I knew to read the emails I was too far behind in the course." These instances created great difficulties that delineate how critical basic electronic communication skills become in an online class. It also illustrates that assumptions about technical skill cannot be made from job titles; District A's participants were technology teachers, but did not have the computer expertise nor experience that one might assume teachers of technology would have.

In District B, participating teachers included a mix of resource coordinators and teachers from different schools in the district. Overall, communication was handled better and learners felt "honored and privileged" that they were asked to participate. Level of basic technology skills and lack of understanding about online learning was not an issue for most of these teachers, although they did face some small annoyances. One of the most frustrating issues reported by more than

one teacher was losing material: "I typed everything in for my final project in the online box," said one teacher, "and then I lost it all. I didn't know you should paste it in from a Word document." Another teacher from District B never started the course; she came to the focus group to learn more about technology and receive support and encouragement from the other teachers because she was intimidated and not "computer savvy," She explained, "I can't do email without help. I am computer illiterate but am taking courses to learn more." While not expressed directly, her desire for a community of support was directly suggested by District B participants.

A final point about learner expectations: sometimes teachers (even those who had taken previous online courses) found the workload to be greater than expected. An example of this mismatch of expectations may be seen in District B, where learners, although highly motivated, sometimes found they could not continue a course. According to the focus group participants, the intensity of course work varied somewhat from course to course and teachers who successfully completed one course found they had to drop the second because it was much more intense. In these cases, dropping a course was not done arbitrarily, but only when the course overburdened the teacher. "I was excited about the reading course," said one teacher in District B, "but I had to drop it. I also dropped the online trainer course. I thought I would be able to handle both but with a full and part time job and a new baby…." Another said, "I wouldn't change the heavy workload. You need it for a quality program. But you have to be prepared for the time it will take."

Learner support and online access

The need for learner support is multifaceted and far-reaching in online professional development. Because the focus groups were used where districts had implemented the online learning courses as part of a district professional development effort, the focus groups provide valuable information about the need for ongoing district support for adult learners in mandated professional development programs. The need is particularly pressing when the users of the system are novices in technology and online course-taking. The focus groups revealed the lack of district support offered, and what district support they would have like to have. These include a clearly articulated initial introduction of the program with explanatory materials and a continuous professional development program that follows up with teachers and troubleshoots and resolves problems. It is likely that if such a support system had been in place in District A, teachers would not have been deleting email due to lack of training (and understanding). During the first focus group, it was the research team (not the district) that was able to determine (from the comments of the participants) that greater technical expertise was needed among the learners than previously ascertained. This information was valuable to the project and helped to focus our recruitment for participants and further support efforts, but as revealed by the focus group participants, it unfortunately was too late to prevent the frustration in District A that a district training workshop would have prevented. In District B, training in how to submit online projects might have prevented the loss of the learner's paper and subsequent frustration. A participant in District B suggested that "each school needs a resource person" to coordinate the training and provide local help/support. Yet, even with a technical support person, District B participants stated that building a face-to-face community of learners among colleagues who are taking classes together to support online initiatives was not easily accomplished. In fact, participants expressed that the goals of group learning and online instruction as divergent goals in direct opposition to each other as group vs. individual learning.

In an online learning system that is not district based, learner support is primarily provided by the technical online course team. Two interrelated issues emerged in the focus groups. First, the district support of the online learning program through initial communication, training, and follow-up with participating learners did not occur. Therefore most support was provided through the technical team. But, without the training in how to use this support, the learners did not know how to access it or effectively use it, particularly in District A. Even though these courses

included online, email, and toll free telephone support, the novice learners still struggled greatly. Another area of difficulty experienced by some participants was the course registration process and support. One teacher in District B experienced difficulty in accessing support beginning at the registration process and "had difficulty" in accessing someone." As a result she did not enroll because it was too late and the course had begun.

A final word on support from District A. Discussion with the teachers in this district revealed that one cannot assume teachers are aware of the extent of the website and the course offerings event though they are using the system. District A teachers demonstrate the need for ongoing support and training. When these novice learners were further oriented to the online course environment and website they expressed greater interest in continuing and learning more. But the training of the basics of using the system needed to be structured and formalized. The teachers expressed that they did not have the comfort level, motivation, time, nor technical skills to attempt this learning (fundamental to online course taking) on their own.

Incentives

Perhaps one of the most important areas that emerges among educators' needs in this environment is the role of incentives. It became very clear that intrinsic incentives needed to be present in addition to extrinsic incentives. Based on these learners' comments, online learning takes such great a time commitment amidst such overburdened teacher schedules, that there has to be great motivation to pursue such efforts. One teacher in district B attests to the heavy workload of online courses, "It was so much work. I dropped it before it impacted my schedule." Thus, the online course, while convenient, was still seen as an extra imposed activity without rewards.

The most favored extrinsic incentive mentioned in the focus groups was financial. Next in line were academic credit incentives, such as graduate credit or CEU's: in sum, certification that would indirectly result in financial rewards. Another extrinsic incentive is public recognition for work accomplished or recognition by someone respected or in professional authority. A teacher in District B expressed pleasure that her principal asked her about her progress in the online courses; she had taken the course at the suggestion of this principal. She also expressed that she was motivated by CEU's. Teachers expressed that they are motivated by a combination of incentives. Other incentives (or lack of incentives) mentioned by the focus groups included personal and professional incentives, or desires to use technology and apply learning to their classrooms. One woman in Focus Group B was motivated because she "felt closer to two colleagues" while working on the online courses than she had in the environment of remote school buildings. Another specific incentive mentioned several times was related to the content standards knowledge that would result from course participation.

District A is an example of the role of incentives and how it affected the direction of the initiative in that district. Because of salary regulations in the location of this site, the teachers would not gain financially (salary increments). Thus, the primary incentives were personal knowledge gain and CEU's. The learners made it very clear that personal knowledge was not sufficient. In light of this, the university program development staff worked towards gaining new teacher professional development hours approval so it would better match District A's local requirements. In contrast, in District B all the learners were interested in implementing new technology and saw enrolling and completing the course as a personal goal. The focus groups provide evidence that teachers lacking intrinsic and extrinsic motivation withdrew from participation.

 In closing the discussion on learner support, we need to mention the learner as a source of their own support and motivation. District implementation of an online professional development system was confounded by individual learner motivation and learning style issues. Without district mandates and incentives, and support, teacher perseverance to complete the course was

dependent on personality style, time management, and learning style. In District B, we saw learners who persevered in online learning despite lack of support. District B's focus group tended to be interested in implementing new technology and they set enrolling in and completing the course as a personal goal. One teacher commented, "It disciplined me. It helped me in the classroom." Another said, "I was hooked. Totally hooked. Didn't want to miss anything. Couldn't get off the computer." And a teacher commented on learning, "One benefit is that you learn from other's perspectives." In contrast, District A felt the program was imposed on them as a district goal – not an individual goal, and combined with their lack of technology skill, they were not able to get as much out of the courses. Personality style and learning style vary — learners appear to be very individualistic and idiosyncratic and we have more to learn about how variation in their learning style impacts course completion.

Content

During the focus groups it became evident that in online learning the role of course content is critical, particularly that it is perceived by the learner as interesting and, even more importantly, relevant to the learner's professional work. Content surfaces as a priority because the learning experience relies so heavily on the course itself rather than spontaneous discussion, explanations, or sample examples and applications. Both Focus Groups clearly illustrate that the curriculum content must satisfy the needs of learners or it will lose them.

District A provides an example of teachers not being interested in the course content. Their district was eager to begin and enrolled the technology teachers in the first available course, "Introduction to Online Learning." However the learners were not interested enough in the content area and this seriously hampered their continued involvement. Consistent with characteristics of other adult learners, these teachers wanted a course that could directly apply and immediately relate to their teaching in the classroom. Even though all courses were not yet up and running when District A participated, they never grasped (until the focus group) the "whole picture" of planned course offerings within the larger project. (This is another example of the need for clarity in an initial training presentation.) The teachers were surprised that upcoming courses included standards, and they showed some enthusiasm: "Really? You mean there are courses in standards?" and "I could use that." Until that point, unaware of the potential ahead, District A did not perceive that there were any incentives to continue. The teachers had believed that the only online course available was the one they did not feel was relevant.

In contrast, District B began to participate when project was almost a year underway and knew the entire scope of courses available (resulting from what was learned in District A). Thus, several teachers in the District B focus group had participated in two or three courses, and were planning to participate in more. The relevance of content is further demonstrated in District B. Several teachers were quite enthusiastic about the courses with standards content. As they expressed, it was the first time they were able to see standards information presented in an organized and helpful manner. One teacher said, "I became more aware of the state standards and national standards. I wasn't before." She continued that her course guide "taught me to plan assessment," and she concluded, "I never integrated standards into my lesson plans until now. I am actually using the standards in a more meaningful way."

In concluding what the focus groups said about content, it is important to realize that in a district implementation, the choice of who is offered participation in online professional development must relate to the online courses being offered. Teacher needs and content need to match. District A used novice technology teachers when it might have been more effective to use teachers who would be directly involved with implementing standards in the classroom. District B selected technology teachers, resource teachers, as well as teachers directly involved with implementing standards in the classroom and this seemed to be a much more appropriate group. Compared to the comments from District A, District B's comments indicated that they benefited from the

courses more and enjoyed participation in them more. Enjoyment and perceived benefits are strong incentives for future participation.

Summary

We learned much about personal online experiences and district support systems for online learning from the participants in the focus groups. These adult learners were located in specific district professional development implementation projects. In our next section we look at the respondents to the web-based survey who are adult learners primarily from the larger CU community. They are not connected to a specific district and the primary way of contacting them is via the web.

Online Survey

From the 324 survey respondents we can begin to compile a profile of the successful learner in these courses. As we see the extent to which the respondents comprise a non-diverse group, we are presented with the opportunity to increase the diversity of learners in the online environment. As online educators and learning providers we need to address the needs that surface in the emerging profile of the potentially successful learner: 1) diverse learner expectations, 2) learner support, and online access availability, 3) incentives, and 4) rigorous content. Each of these areas is discussed in depth below.

Learner expectations

We also find that many potential and participating online learners have false preconceptions of such experiences. Characteristically learners think that the courses "will be easy," "will be convenient," and they tell us they think, "I can do this on the weekends," and "This will not really be work – it will be fun!" The reality is that quality online learning takes a substantial investment of time for reading, following online and perhaps written resources, composing and posting thoughts and assignments, and responding to their colleagues' postings online. A nearly universal cry from the online learners is "This is a lot of work!" From the survey we learn that many learners are spending 140 minutes (a little over two hours) every time they log in. The majority of respondents allocated the distribution of time according to these categories: 20 minutes reviewing assignments; 10 minutes downloading information; 30 minutes searching the internet for topics; 30 minutes reading the forum; 15 minutes posting on the forum; 30 minutes working on course project and reading email; and 5 reading the water cooler. If they are logging in several times a week, the total hours represent a substantial weekly time commitment. Once enrolled in the course, the learners follow their own self-paced schedules of participation. We asked the learners to tell us how many times they logged onto the course each week and almost half 139 (42.9%) said they logged in "once every few days;" 105 (32.4%) said they logged in every day. Several, 114 (35.2%), of the survey respondents thought the course took more time than they expected. Very few, 13 (4.0%), thought it took less time than they anticipated. Consistent with the focus group findings just discussed, as well as prior research findings (Palloff & Pratt, 2001), we strongly emphasize the need to address such preconceptions immediately. Learner perceptions and expectations are major factors in the successful online adult learner.

Learner support and the online access availability

We find that the potentially successful online teacher-learner needs to be a self-directed learner, sufficiently self-disciplined, and have minimum technology proficiency. Almost three quarters of our learners, 237 (73.2%) reported in the survey they had had three or more years experience with computers, and. almost half of the respondents, 149 (46.0), had six or more years experience. About half of the learners, 158 (48.8%) described themselves as "early adopters who are one of the first to try new programs or software". Only a small percentage, 7 (2.2%), said, "they resist using technology," and when they rated their technology expertise, two thirds, 207 (63.9%), said

they were "intermediate" and a little over a fourth, 85 (26.2%), rated themselves as "advanced.". Less than ten percent, 25 (7.7%) said they were "beginners." When these characteristics of self-direction, self-discipline, and comfort with technology are not present, numerous problems arise that may become insurmountable from the perspective of the learner and result in their discontinuing participation in the course. The previous section discussing the focus groups provides telling examples of how lack of very basic technology proficiency made the simple instructions and web-interface daunting.

While we do not know the economic status of our learners, we do know that almost all of the learners responding to the survey 212 (96.3%) had computers at home; 299 (92.3%) had classroom access, and 275 (84.9%) had access to a school computer lab. The most frequent responses regarding barriers that prevented them from accessing the course were: "personal time issues" 241 (74.4%) and "slow computer connections" 119 (36.7%). While neither money nor economics was directly mentioned as an obstacle, the majority of responses to open-ended questions from our learners indicate that they see their lives as filled with pressing demands of working families: "Just daily living, full schedule"; "work two jobs, married with three children"; "conference and vacation"; "pressing obligations such as report cards"; and "children."

Finally, regarding support and access, home computers appear to be the almost universal commonality of all the learners. We suggest it is essential for the successful online learner (Palloff & Pratt, 2001; Passig, 2001). When we combine these findings with the demographic profiles of our learners, it raises questions about equity and access. Clearly more equity in online leaning demands attention to the economic issues of hardware, software, and web connection fees.

Incentives

We learned much about intrinsic incentives from the survey. The survey did not cover extrinsic incentives, but based on the responses we see motivation for teachers to pursue a large time commitment despite overburdened teacher schedules because of intrinsic rewards. While the top responses for participation are content related (see next section), the third most frequent response regarding motivation was convenience 269 (83.0%). Convenience is indeed a powerful motivating factor. Additionally, of 277 responses to the open-ended question, "Why did you take an online course?" the most frequent write-in responses are convenience 112 (40.4%), freedom 54 (19.5%), and flexibility 46 (16.6%). Clearly being in control of their learning is an important intrinsic reward. Additional intrinsic rewards are found in the perceived quality of communication in online conversation in the web-based asynchronous forum. The most frequent reward for posting in the forum is that the learners found the conversation of their online peers to be interesting and engaging 306 (94.4%). The second most frequent incentive is that it is rewarding to communicate with peers across the country 290 (89.5%). Third in frequency is that learners received positive feedback to their comments 286 (88.3%).

Content.

Fourth, substantial and relevant content is needed in developing online courses. Educators and other Internet users have become more adept at recognizing watered down content and look for courses in which to invest themselves in which they were learn new information, perspectives and application. Tying back to motivation, educators, as other adult learners engaged in professional development (Brookfield, 1995, King, 2002a), are looking to learn what they can use in their work, their classroom. By building relevant courses that provide a substantial base for further development of their classroom practice and materials, it seems that more teachers will go the long haul to complete. Most of the respondents 291 (89.9%) said interest in the topic motivated them to enroll in the course with intellectual challenge 277 (85.4%) as a secondary motivating factor. The respondents indicated that they felt online courses can be more current and more

interesting than other types of professional development. Almost two-thirds 212 (65.5%) of the respondents believe an online course is more current compared to other types of professional development. Over half 175 (54.0%) believe an online course is more interesting compared to other types of professional development. A third 109 (33.6%) believe an online course is more rigorous compared to other types of professional development.

Learners reported that taking the course had an impact on their view of the Internet. Most of the respondents 269 (83.0%) said that the course helped them discover topics and resources related to teaching on the Internet that they would not have learned about otherwise. Over three quarters 231 (71.3%) said that the course provided them with new insight into the role of the Internet in teaching. Over a third 122 (37.7) of the respondents said that they use the Internet more than before enrolling in the course. Over two thirds of the learners 225 (69.4) reported that since taking the course they have a more positive attitude toward using online learning in their classroom, and many learners 208 (62%) reported that they have made some changes in their teaching as a result of the course.

These findings demonstrate how online teacher professional development confirms the centrality of felt needs and relevance among adult learners. Examining online course content in this light can focus our online professional development efforts and resources on learning that will have meaning and impact for learners.

Recommendations

Online professional development programs can benefit from building on the strengths of this program and addressing the needs of enrolled teachers. Six major recommendations are offered here.

1. Clarity of expectations. Online developers need to be familiar with district school procedures and expectations to prevent communication issues that may hinder effective implementation. Communicating through email is not adequate for some novice technology users and alternate means such as paper-based memos and/or phone calls may be needed. In addition, online developers need to provide districts with guidelines for training programs for novice learners. In turn, districts need to implement more thorough training and follow-up.

2. Intrinsic motivation. (District motivation and teacher motivation are often two separate issues and mutually agreed upon goals must be reached for teacher-ownership. Districts must recognize the difference in motivation among teachers. For some, personal satisfaction and learning is enough, but for others this must be combined with either an indirect or direct financial reward. Aside from union issues, many teachers will not participate unless they see value and relevance and payback for time spent—for these teachers, taking online courses for their own knowledge is not enough because they report they are already very busy. For them, the online course, while convenient, is still seen as an extra imposed activity.

3. Supports are needed to enhance technology skills. More technology expertise than might be expected is needed. Even for teachers in the position of "technology teacher," more ore technology expertise may be needed. District initiatives would do well to provide both initial and ongoing opportunities to extend and support teachers with fewer technology skills. One-shot training is not sufficient. Net hotline or resources should be on call 24/7.

4. Using content as a powerful motivator. Addressing felt needs of teachers in content supports intrinsic motivation. This may be accomplished through the offering or a variety of courses to choose from and also courses that directly apply to the classroom.

5. <u>Exploring collaborative learning further.</u> For districts that want to maximize online professional development efforts, local support and collaborative groups would likely be beneficial. There needs to be a structure to support collaborative learning onsite if it is desired. However participants expressed that the goals of group learning and online instruction are divergent goals in direct opposition to each other as group vs. individual learning.

Conclusion

Online professional development offers the opportunity to engage in content-driven dialogue with teachers across the country, to pursue professional development on the learner's schedule, to have access to substantial, quality content that applies to the classroom, and to become aware of educational and professional development resources available online. Successful online professional development will benefit from considering the strengths of such online programs and integrating online learners' needs within them. Clarity of learner expectations supports a positive learning experience and course completion. Learner support and online access are telling factors in teachers successfully completing as well.

As we continue to explore the possibilities of online learning for professional development, a focus on the needs of adult learners provide vital direction for our efforts. Staying close to the changing needs and characteristics of the learner will likely continue to be a valuable strategy. It is expected the level of technical expertise of the general population of teachers will increase in coming years and that there will be a growing influx of more potential participants. Focus groups and online surveys provide two viable means of gathering this information is we continue to discover the best pathways to quality continuing professional development without geographical or scheduling limitations.

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Reconceptualisation of the Teaching and Learning Process through Computer-Mediated Frameworks

Mohammad Issack Santally and Alain Senteni

Abstract

The University of Mauritius launched its virtual campus in 2001 with an e-Learning platform, Virtual-U developed at the Simon Frasier University with about five online and web-enhanced modules that were delivered to approximately five hundred students. We started with a learning management system and adopted an evolutionary approach to the development of a stable model for e-Learning for the University that we look forward to extend for the Indian Ocean region. We describe in this paper, the important recent technological developments that have taken place in terms of e-Learning infrastructure. We also make an exposé of some pedagogical innovations we brought to the University system in terms of teaching and learning with particular reference to the Master of Science programme in Computer-Mediated Communications and Pedagogies.

Technology-enhanced education as a new teaching and learning (T&L) paradigm

Traditional distance education helped remove many barriers to education due to its relatively low price and high flexibility in the study modes. Nowadays, in this technology driven world, a new concept of distance education has emerged. Different interchangeable terms have been used to denote this concept: e-learning, technology-enhanced learning, web-based learning etc. The concept of web-based learning and the use of the Internet in teaching and learning have received increasing attention over the recent years. One of the main advantages of delivering web-based educational materials is that the same content is delivered to a number of students and can be accessed with no restrictions of time and place. However, there is a wide belief that using the web as only a new kind of delivery medium for educational materials does not add significant value to the teaching and learning process. The integration of technology in learning, needs to address the very important issue of enhancing the teaching and learning process, rather than just being seen as a new flexible delivery medium (Nichols, 2003). The web therefore can be seen as (1) a new delivery medium for distance education materials; (2) a flexible and rich medium (in terms of multimedia) for students to access their learning materials and (3) a medium offering a new paradigm for learning.

A new delivery medium for distance education materials

The most basic form that e-learning could take would be a replacement of the traditional print medium that would be sent over through postal communications to students who are dispersed over the planet. This is a costly and time-consuming operation with a significant administrative overhead. Furthermore, students' learning could be enhanced and supported by computer-mediated communication tools like forums, email, chat rooms and advanced tools like internet-based video-conferencing. Garison and Shale (1990) however, postulate that the notion of independence and autonomy in the educational transaction in distance education seems to

overshadow two-way communication between the teacher and the student. With distance education via the Internet, the different computer-mediated communication tools eliminate this constraint. Students can in fact communicate with peers also and work in collaboration on some tasks thus reducing the feeling of isolation that they used to face in traditional distance learning settings.

A flexible and rich medium for students to access learning materials

E-learning can also be used to offer pedagogical support to on-campus students. This is often defined as technology-enhanced learning. The Internet provides an infrastructure that supports the diffusion of hypermedia courseware elements. This combination of multimedia objects in a hypertext supported environments make the acquisition and comprehension of some concepts easier for students. For instance, a simulation showing the effect of speed of a car and reaction time on the breaking distance is a very efficient approach to improve the understanding of abstract concepts. There has been much research illustrating the benefits of integrating multimedia in instructional materials to enhance the learning experience of the learner. It is also widely postulated that multimedia is a very useful tool to address students with different learning and cognitive styles (Ayersman & Minden, 1995).

A medium offering a new paradigm for learning

Contemporary researchers in education focus mainly on the use of the Internet infrastructure to implement new learning paradigms grounded in more socio-constructivist settings. They insist that the Internet should not be used as only a medium for delivery of electronic materials but should viewed as a medium that supports new learning paradigm, pedagogies and instructional approaches and that facilitates the construction and application of knowledge through authentic and collective activities (Schneider, 2003).

The e-Learning Framework at the University of Mauritius (UoM)

The University of Mauritius launched its virtual campus in 2001 with an e-Learning platform, Virtual-U developed at the Simon Frasier University with about five online and web-enhanced modules that were delivered to approximately five hundred students. The University of Mauritius set itself four main objectives with the setup of its virtual campus namely:

Institutional Framework and Resources

- The aim was to provide a framework in which a range of educational resources and technology required for providing an environment in which a range of educational technologies are made increasingly available to staff and students in order to enable more flexible approaches to teaching and learning.

Training and Knowledge Building

- The University wants to train and build capacity through the design of staff development activities for academics and support staff to implement a range of learning methods and appropriate technologies. There is also the will to support a shift to new methods in the educational practices in place at the University and the workplace by involving the academic staff in the use of these methods and technologies for their own knowledge building.

Pedagogy and student support

- The emphasis was put on the need to develop new student-centered models of learning, learning environments, and pedagogies to better meet the needs of the workplace, society and the Mauritian learner.

Content Development

- The aim is to produce high quality academic e-learning materials, online learning resources and other relevant materials in conjunction with the delivery of courses on a distance education and flexible learning mode.
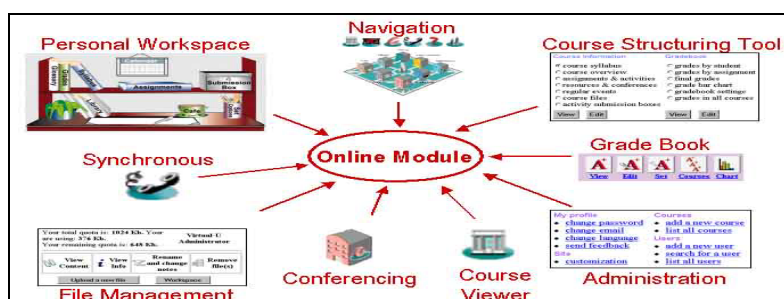
The Virtual-U Learning Management System

Figure 1: The Virtual-U Courseware Management System

The Learning Object Repository (LOR) (http://vcampus.uom.ac.mu/lor)
The motivation behind the development of a learning objects repository at the University is inherent from the objectives that were set and the project is viewed from a perspective of providing the blueprint to lay the foundations of the institutional framework for sharing and exchange of resources in Mauritius and with the external world.

Metadata Standards and the need for adaptation to the local context

Standards are necessary for internetworking, portability and reusability. With standards, there is no confusion about what is being communicated by a particular expression. There are many standards in the literature such as ARIADNE (Alliance of Remote Instructional Authoring and Distribution Networks for Europe), DUBLIN CORE, IMS and LOM (Learning Object Metadata). For the UoM LOR project, the LOM was chosen to document the learning objects.

However, we found the learning object metadata keywords list is inadequate from a local educational point of view. Consultations have been made with the tertiary education commission (TEC) of Mauritius to extend the original keywords list of the LOM. We therefore use the LOM standard to conserve the reusability and interoperability features of the UoM LOR with other repositories and the TEC keywords list is used for metadata exchange within the local context.

The Courseware Authoring Framework

The Courseware tool has been developed as a second phase development and integrated in the UoM LOR interface as an extended functionality. The system consists of three main core parts:

- A user-friendly interface for the user (lecturer) to create a course, search for relevant learning objects and to add them to his course.

- Populate an XML document dynamically for each course that is the actual package of the course. A purely object-oriented system has been built and an XML database.

- Transformation of XML document through XSLT applications into HTML format to be hosted on the virtual campus so that other users can view it.
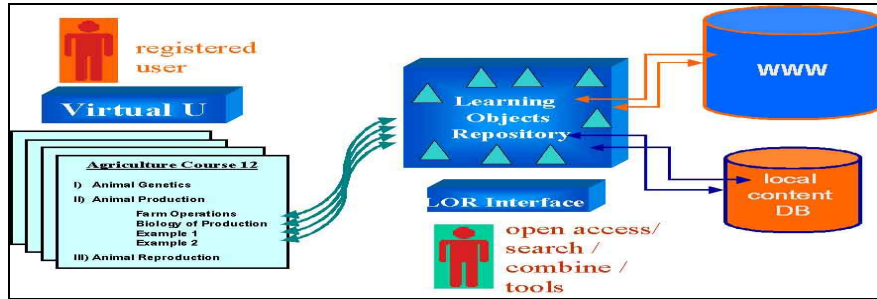

**Figure 2: Integrated Architecture for Courseware Authoring
and the Virtual Campus**

The student support model

The model comprises of two main components: the *technical support* and *academic/pedagogical support*. It is very important to separate and make a clear distinction between them since they are of completely different nature with different actors involved. On the one hand, we have technical assistants and virtual learning support staff who help the student to get going with the virtual campus infrastructure and systems so that they can access the course contents and media facilities while the academic support will be mainly delivered by tutors, instructional designers and academics who will help the students achieve the learning objectives through well designed instructional activities and through computer mediated pedagogical communication.

The importance of a model lies behind the fact that it is believed any educational intervention needs to have an underlying assumption, philosophy and theoretical models that will guide the support activities and The model is illustrated in figure 3.
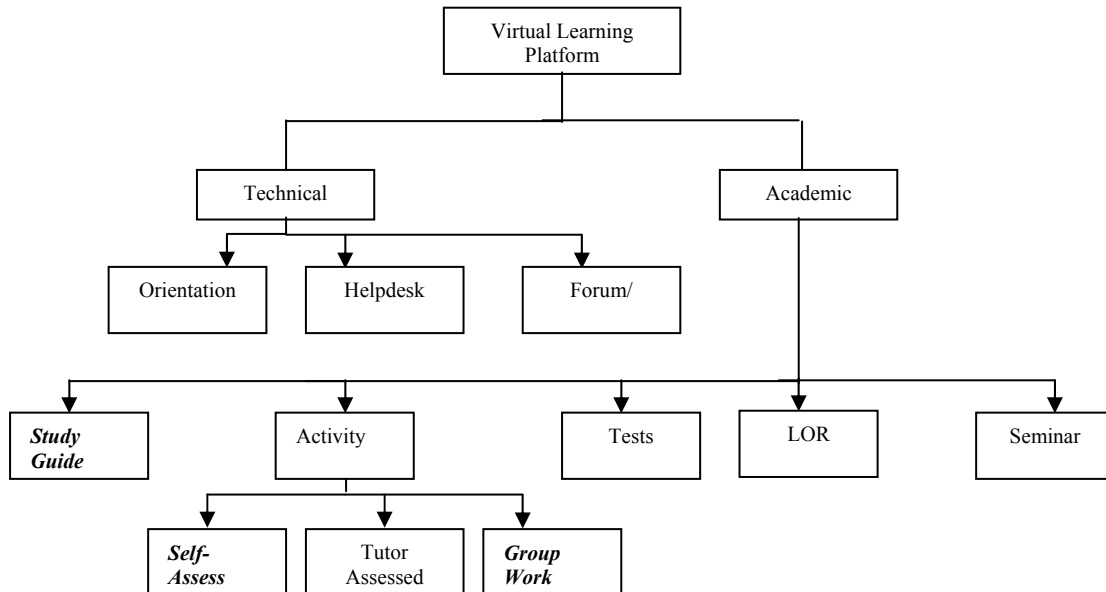

Figure 3. UoM Learning Support Model

The UoM Online Test Center

The VCILT Test Centre (http://vcampus.uom.ac.mu/testcentre) is an online assessment and student performance monitoring tool offering academics of the University of Mauritius the opportunity of carrying out curriculum-based multiple choice class tests using automated marking techniques. The ability to administer and score an assessment quickly is one of the main strengths of computer-based assessment (Hasselbring, 1984). Curriculum based Measurement and Online Assessment Strategies have similar theoretical strengths, which facilitates combining the two for a more streamlined and time efficient process of evaluating student progress within a particular curriculum.

Theoretical background for online tests: curriculum-based measurement

The main characteristics of Curriculum Based Measurement (CBM) include its focus on direct, repeated measurement of student performance in the curriculum using production-type responses (Marston, 1989). CBM is based on a major premise that assessment and decision-making are curriculum referenced (Fuchs *et al*., 1983), meaning a student's performance on a test should indicate the student's level of competence in the local school curriculum. CBM allows the examiner to reference the student's performance in four ways (Deno, 1985):

1. Individually, in comparison to how the same student has done recently on other similar tasks;

2. To a goal, how the student is progressing toward a long term goal;

3. Instructionally, before or after adjustments in instruction have been made; and

4. Normatively, in comparison to a local group such as the classroom or grade level.

Online testing allows for the same comparisons, since each student's performance can be recorded and stored. By recording and storing student performance on CBM tasks, online assessment provides the teacher more information without additional time commitment. This data can be saved and analysed in a variety of ways using basic statistics at a future time.

Pedagogical strategies used for online tests

Since the introduction of online computer-based class tests is a new concept to students (just as e-learning is), the right pedagogical strategy needs to be adopted to prevent students from stress and frustration that can affect their performance and willingness to take online tests. Moreover, it has been taken into account that students are not familiar with IT tools especially web-based assessment systems.

In this respect, mock test sessions are organised for the students to familiarise themselves with the system and its functionalities. It is scheduled one week before the test under the real exam conditions. Students are also be informed at different time intervals about the time remaining for them to complete the test.

As a result, rules/procedures are clearly documented in order to run the test and to ensure there are no confusion amongst the students and invigilators/assistants. Clearly, the normal examination rules of the University of Mauritius are applicable but some of them need to be adapted/re-asserted to this new context. In this respect, the annexed set of rules/procedures has been devised to adapt to the new context.

The integrity of the class test is very important to the lecturer since the feedback will provide for an assessment of what the students have grasped so far in the course. Plagiarism and copying are strongly discouraged and the system achieves this purpose by having the questions on the screen randomised. The test paper will be the same for each student but the questions will not appear in the same order.

Approaches to Teaching & Learning Online:
Content-based or Activity-based?

The concepts of virtual learning platforms and learning portals

Learning platforms are mainly web-based integrated information systems that have administrative tools, pedagogical and communication tools to support online activities of a group of persons implicated in a teaching and learning task. E-Learning platforms typically serve as a delivery medium for distance education materials over the web since they are basically web-based environments. Most e-Learning platforms currently available are generic software not specifically tailored for a particular pedagogy or university's needs. They have basic communication tools like forums, wikis and web logs that support collaboration. A major limitation of such platforms is that they guide the instructional design of the course to be delivered since we need to make sure our design fits in the framework provided by the system.

Brockbank (2002) on the other hand, emphasizes on the concept of "learning portals". He postulates that e-learning is critical to the success of individuals, organizations, communities, and economies, and e-learning portals top the list of effective training and educational strategies. Schneider (2003) defines such environments as content, community and collaboration management systems (C3MS). As Gilroy (2001) has pointed out: "The emphasis of most e-learning programs to date has been on the accumulation, organization, and delivery of content". Schneider postulates that C3MS systems are efficient learning tools to support socio-constructivist approaches such as project-based learning in a virtual environment. In a portal environment, Schneider (2003) argues the new teacher's role as manager, orchestrator and facilitator. He has to be present in the environment as well as the students. This so-called concept of 'social presence' is often overlooked in classic e-learning platforms where forums are used just as a communication tool.

Content-based e-learning courseware: the CSE 1010e experience at the UoM

The CSE 1010E (Introduction to Information Technology) was initially delivered through print-based distance education mode and it became the first module to be delivered online at the University of Mauritius on a very large scale (~ 1000 students). The CSE 1010E module (Figure 4) has now been delivered without any major problems, for approximately two academic years now. The module is hosted by the University of Mauritius Virtual Campus, which provides the technological infrastructure and pedagogical tools to enhance the teaching and learning process.
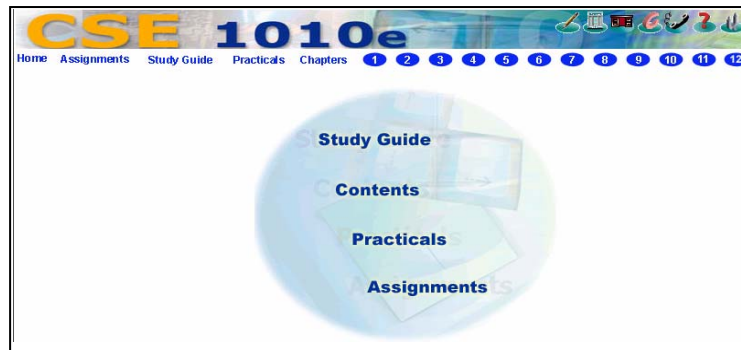

Figure 4: The Cse1010e Homepage

Students have an online study guide (also available in print format) where they have access to an instructional plan that helps them in their learning. They get instructions about chapters to read and exercises to carry out. The contents section provides students with a multimedia learning

material arranged in a hypertext structure that helps them to understand concepts easily. Students also have access to a range of self-assessment questions for each chapter. The assignments and practical sections contain necessary information about continuous assessment and hands-on activities to be carried out in the lab. Students also have access to online discussion forums where they can discuss concepts and topics related to their module with peers and tutors. Participation on online forums counts as part of the continuous assessment. This acts as a motivation factor for students to participate.

An evaluation of the module from a cognitive perspective (Santally & Senteni, 2004) revealed that the module was only an electronic version of print-based distance education materials that were previously delivered to students. The module was rated average from the evaluation since it was obvious that the instructional design process for print-based material cannot be directly applied for e-learning courseware design. Even when the module migrated in an online environment, the contents, assignments and evaluation modes remained the same. In short, the behaviorist approach was still prevailing. Students, in this case would prefer to print the materials to read since the content-based chapter-wise approach was used in the design of the module. As a result, it was not seen to be adding to the learning process.

Re-engineering for an activity/competence-based pedagogy: The MSc Computer-Mediated Communication and Pedagogies (CMCP)

The principal objective of this Postgraduate Programme is to train professionals, who after a minimum of two years of studies and industrial placement, will be able to master the engineering of e-learning content development, communication and pedagogies to benefit companies and public administrations. Beyond the response to significant needs and the creation of an economic niche on a national level, it is also a question of consolidating a process of regional development which, taking into account the infrastructures of technology, should end up in the integration into a network of schools, as the one currently created in the EU (European Union). The intention is to create special links with businesses, making it possible to offer them specific support for retraining of their staff while developing promising niches of activity. Moreover, the "practical" approach chosen as a teaching model is intended to fill the skills deficit, as expressed by professionals.

An innovative approach to teaching and learning at the University

The programme will be delivered neither through the traditional classroom-based delivery nor through the classic e-learning approach. We firmly believe that classic e-learning through well-structured platforms, diffusion of contents online with structured chapters and classic activities such as open-ended questions and Multiple Choice Questions defeat the purpose of using e-learning to foster innovative pedagogies and to promote knowledge construction and autonomous development of the student (Santally & Senteni, 2004).

The programme is more centered towards knowledge construction, socialization and collaboration based on a set of authentic activities (Fig 5) that will help the student develop an understanding of the subject matter, formulate personal learning goals depending on their professional interests and to use a set of pedagogical and technological tools to support them in the process. The instructional design of the programme has been done with contemporary models. We applied the MISA (*Méthodes d'Ingenierie de Systèmes Apprentissage)* framework for instructional design and used the modeling tool MOT (*Modélisation Objet Typés*) (Paquette, 2003) to create prototypes of learning activities.

Another prototype activity includes the online collaborative editing of a glossary of terms related to the module they are studying using for instance, wikis. A Wiki is a piece of server software that allows users to freely create and edit web page content using any Web browser. Every student needs to have a wiki as his web log, which we call journal where he records all the

activities, problems, and other issues related to his learning experience in the course. These activities form the core of the students' continuous assessment that mainly focuses on the targeted competencies and skills that the student needs to demonstrate using higher order cognitive skills.
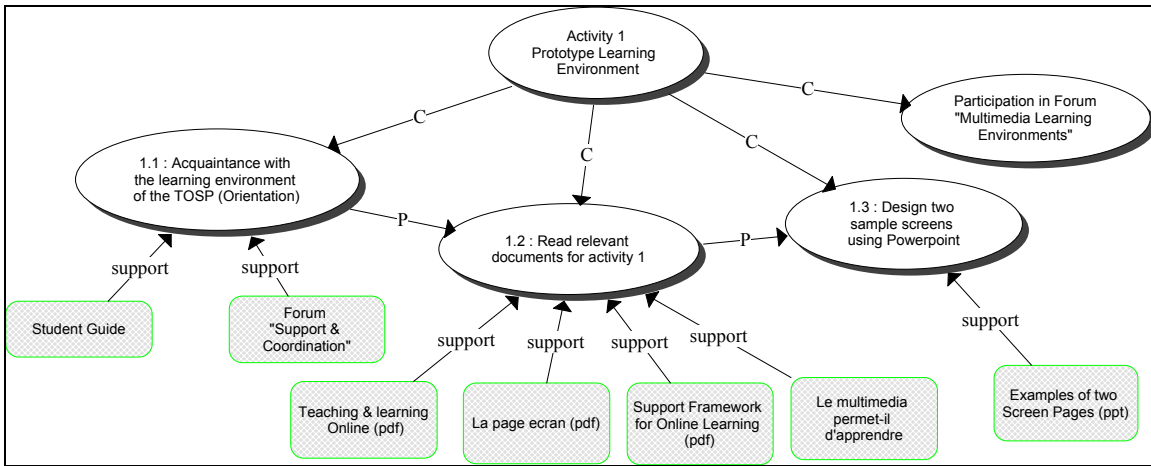

Fig 5: Model of an activity using MOT

Observations from the Field with the CMCP Programme

It is currently the fifth week of the semester for the Masters programme in CMCP and 18 students are presently enrolled. The students come from various academic backgrounds such as French, Agriculture, Computer Science, Physics, Math and Engineering. Most of them are primary school teachers and secondary school education officers. The first session of the course was a face-to-face one and most of the students were very motivated to follow such a non-conventional course. They were delighted with the fact, that there will be no formal lectures and classroom attendance is not a pre-requisite to sit for the exams. The principle is that attending classroom lectures does not guarantee successful learning, which is different from passing an exam.

We define the occurrence of successful learning in our programme as a three phased activity: (1) Knowledge Acquisition phase; (2) Knowledge Application Phase; (3) Knowledge Construction through Sharing and Reflexive Practice. The students carry out the first two phases after going through the detailed activity guidelines and the third phase normally has an overlapping component with the other two phases. This is normally carried out online through collaborative learning tools such as a discussion forum and it is a continuous process of negotiation, sharing and reflection with the peer community. We define this system of activity as an educational ecology, is a (micro)-educational system linking an educational (virtual) community and shared resources, through technologies. The activity of the community consists of interactions between its members and also with the external world to produce new knowledge and resources for capacity building (Fig 6):

- Community mutualizes human resources.

- Technology is the instrument.

- Shared resources are available locally but also elsewhere through an external community of *proxies* (close friends, physically not so close).
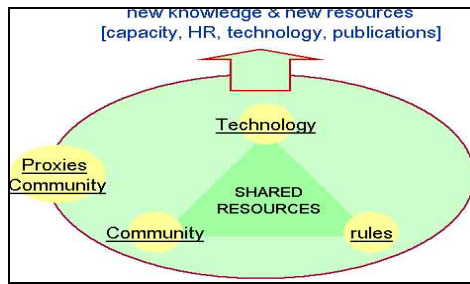
**Fig 6.0: Structure of an Educational Activity,
inspired from Engestrom (1987,2001)**

At this stage, the students started to realize one important aspect of the course that was completely mismatched with the reasons of their rejoicing for not having classroom lectures. Their workload has greatly increased through this new learning paradigm and they realized the importance of good time management. They were not devoting enough time to read the guidelines for the activities and this was affecting their confidence. As a result, some of them wrote to ask for weekly face-to-face sessions. This would however defeat the very purpose of the course. Our answer to that was very simple and it was in fact a question that made the students reflect on what they have asked. How can we teach you not to teach through classroom lectures by having classroom lectures?

There were many reasons for a student's apprehension at this stage. First, some are not familiar with internet environments and approaches. However, this experience is part of learning from the web and is an important objective of the programme. Some students find it difficult to plan and manage their learning. This is also an important objective of the programme. Some students have problems expressing themselves through computer-mediated tools and/or do not read messages and emails that would guide them. As a result, progress is impeded or deadlocked. Use of web tools and interactions was an important objective. These obvious problems show that students are still exam-oriented and lack skills and confidence in elearning. Our task now was to reassure the students and to get them back on track. Here comes the importance of the blended approach. We arranged a face-to-face seminar and let the students express about their concerns. We stressed that this is not only a change of teaching and learning methods but it touches the roots of the existing teaching and learning culture and they are among the first ones to experience this effect.

Implications on Instructional methods and design

The need for innovative and more flexible methods

A comparison of the two programmes, the Computer-Mediated Communications and Pedagogy and the Introductory Course in Information Technology (Cse1010e) shows an obvious difference in the instructional design methods that have been employed. For instance, ensuring that a manual is well structured so that students can easily understand what they need to do would correspond to usability issues related to human-computer interaction principles while designing an online course. Hypertext is an attribute of web pages that provides interlinking of documents together in a web site or across web sites. Print manuals do not have this facility. When properly used it facilitates exploration and research; inexperienced students can easily become *lost in hyperspace* while browsing the courseware materials and become disoriented.

Designing for the online environment therefore needs a blending of Information Technology and pedagogical skills. The architecture of an online course can be viewed as three-level one (Paquette, 2003). It consists ideally of a pedagogical infrastructure, a media infrastructure and the information technology infrastructure that supports the other two infrastructures. The real concern

for teaching and learning is at the pedagogical infrastructure where the pedagogical strategy guides the course toward a content-based or activity-based approach. As we have already postulated, the web can be used as a very good environment to support (socio)-constructivist activities that emphasize knowledge construction and sharing processes rather than passive knowledge acquisition.

The implications on the instructional design process directly imply a role shift for the conventional instructional designer. Along with a courseware re-engineering, traditional instructional designers need to be trained to evolve in such novel situations. Many instructional designers have very limited information technology skills and sometimes it becomes really difficult for them to get going in the new work environment. Instructional designers need to be able to depart from their well-structured instructional design methods to respond to ad-hoc situations that arise during design and delivery of an online course. The elements of flexibility and adaptability from the design to delivery phase of an online course are crucial to ensure successful learning and minimum disruptions during the semester.

Assessment methods are also an important issue in the reconceptualisation process. While the focus is laid on knowledge construction, application, sharing and reflection based on authentic activities, traditional examination methods show clear limitations in providing for a fair and reliable assessment. Project-based approaches are very good alternatives to written exams where students may have *viva voce* presentation, participation in online forums and in virtual seminars. The problem here is the integrity of assessment methods since with the Internet, plagiarism is often a big risk to the integrity of assessment methods based on socio-constructivist approaches.

The shift in the role of the teacher and that of the learner

As we have seen in previous discussions, the instructional methods to be used in socio-constructivists web-based environments no longer position the student as a passive recipient of knowledge and the teacher as the one who will transmit the knowledge. The student becomes an active agent in the teaching and learning process who continuously seeks for new information and experiences under the guidance of the teacher. This paradigm shift also implies in some cases, the loss of authority of the teacher in the classroom and this has been the main reason behind the reluctance of teachers to adopt the innovative methods. Migrating to the online environment does not only have an effect on the learning culture of students but also on the teaching culture and the educational conceptions of teachers. The loss of authority is however, not a direct implication of the new mode of teaching and learning. In fact, there should not be any loss of authority of the teacher, but instead the student should be given more autonomy. As we have seen with the MSc CMCP, if as teachers, we had lost our authority, then we would have already reverted to the traditional classroom teaching when students requested it.

The reality is that during reconceptualisation of the learning process, the roles of the teacher and the learner change, which simultaneously increases the load of both actors. While students did not realize these implications, many teachers started to feel the burden after their courses started. In fact, the load is directly proportional to the motivation level of the students to actively participate in the virtual environments. The need to respond to students challenging questions and thinking based on fresh Internet documents involve lots more research work from the lecturer.

Conclusion

We have seen how computer-mediated frameworks can bring about new horizons for the improvement of the teaching and learning process. There are however, many issues involved such as the need to adopt new instructional methods, the need to re-shape the teacher and student roles and assessment methods, and the continuing need to coach students. The transition should be a gradual process. The ultimate challenge is to change the learning culture that has been prevailing

for decades in order to reap the benefits of the new paradigm. At the University of Mauritius, our framework is based on the educational ecology concept where teaching and learning is re-conceptualized as an activity framework governed by the following rules:

- ***Self-Reliance****:* Act using the resources available locally using for example our learning object repository.

- ***Empowerment***: Enable subjects to react immediately to changing circumstances by having access to decision-making.

- ***Interdependence***: Obtain resources elsewhere in order to act, to mutualize [human] resources using Internet, and peer-networks.

- ***Asynchrony***: Enable subjects to operate as quickly as possible, given local circumstances.

- ***Reflexivity***: Enable critical thinking and creativity to continuously improve current practices.

- ***Commitment***: Regulate social interaction, reciprocity and collaboration for knowledge construction and sharing.

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Assessing Student Needs
in Web-Based Distance Education

Pamela A. Dupin-Bryant and Barbara A. DuCharme-Hansen

Abstract

Over the past decade, distance education programs have developed at an extraordinary rate. Web-based distance education has emerged in higher education as a means for providing a variety of educational opportunities to a diverse community of individuals. As the number of participants continues to increase, so to does the importance of providing effective instruction that focuses on the needs of learners. Successful distance education is believed to revolve around a learner-centered system of instruction designed to meet the needs of individual learners. The first step in developing a learner-centered system of web-based instruction is to determine the needs of students. Assessing student needs provides instructors with information necessary to select appropriate technology and instructional strategies to develop an online learning environment that is appropriate, responsive, and beneficial for both the learners and the instructor. The goal of this paper is to provide direction for evaluating student needs in web-based distance education courses by identifying necessary assessment areas and outlining a process for assessing student needs.

Keywords: student needs assessment; web-based distance education; online education; needs assessment process; learner-centered education; distance learning; electronic learning; e-learning; computer skills; learning styles; available resources; learner's desired outcomes; prior learning experiences

Introduction

Over the past decade, distance education programs have developed at an extraordinary rate. Web-based distance education has emerged in higher education as a means for providing a variety of educational opportunities to a diverse community of individuals. As the number of participants continues to increase, so to does the importance of providing effective instruction that focuses on the needs of learners. Successful distance education is believed to revolve around a learner-centered system of instruction designed to meet the needs of individual learners (American Council on Education, 1996; Dillon & Walsh, 1992; Granger & Bowman, 2003). Many believe that technology nurtures educational customization in which the unique learning needs of individuals can be fulfilled (Farmer, 1997; Gardner, 2000; Granger & Bowman, 2003). Yet, how can instructors refine their teaching approach to meet the unique needs of students if they unaware of their students' needs?

The first step in developing a learner-centered system of web-based instruction is to determine the needs of students. Assessing student needs provides instructors with information necessary to select appropriate technology and instructional strategies to develop an online learning environment that is appropriate, responsive, and beneficial for both the learners and the instructor. The goal of this paper is to provide direction for evaluating student needs in web-based distance education courses by identifying necessary assessment areas and outlining a process for assessing student needs.

What is Student Needs assessment?

Student needs assessment for web-based instruction includes the collection, synthesis, and interpretation of data about learners that can assist the instructor in matching student needs with the demands of the online learning environment (DuCharme-Hansen & Dupin-Bryant, 2005). The main purpose of student needs assessment is to give the instructor the tools and information necessary to make solid decisions about how to best facilitate the educational experience from start to finish. This information will assist in setting learning objectives, selecting appropriate technology, deciding on curriculum content, and determining strategies for effective learning. The overall importance of web-based student needs assessments is to establish, facilitate, and maintain an environment that is learner focused.

Assessment Areas

So what areas need to be assessed? Unfortunately there is no definitive answer to this question. To determine assessment areas, instructors must ask themselves "What do I want to know about my students that will help me determine what to teach, how to teach, what technology to employ, and where to start the educational experience?" While there can be numerous assessment areas, a number of areas are essential when planning web-based learning, including:

1. Computer skills

2. Learning styles

3. Available resources

4. Learner's desired outcomes

5. Prior learning experiences

By looking at these five areas at varying depths and degrees, instructors will gain a holistic view of the group and the individual learners who compose that group. The following sections describe the importance of each assessment area and introduce strategies for implementing the assessment results into the web-based education environment.

Computer Skills

To succeed in web-based courses students must have adequate computer skills. These computer skills include basic computer operation, file management, web browsing, and email operation. Computer needs must be identified so that students may be provided with options for improving their skills prior to or during the course. "Researchers have indicated that early intervention to compensate for limited technical skills is important" (Hannafin, Hill, Oliver, Glazer, & Sharma, 2003, p. 247). There are a number of methods for assessing students' computer needs. Introductory email observations, focus groups, student interviews, and survey instruments are available to assess computer skills. A variety of instruments related to specific platforms and software can be found on the Internet.

Once computer skills have been assessed, the instructor will need to determine the range of computer skills and the collective group needs. Although computer skill development is now being taught in kindergarten classrooms, instructors can not assume everyone is computer literate. "Until the use of technology is as innate as listening, reading, and writing, we cannot assume students are 'tech-ready' " (Duncan & Wallace, 2002, p. 29). Therefore, based on the computer skills needs assessment, instructors may decide to provide a general technology review at the beginning of the semester. This review could include computer concepts, computer terminology, or simply the computer skills needed to succeed in the specific course.

In adding a technology review to a web-based course, the instructor may fear that precious time is taken away from content time, but this does not have to be the case. Computer skill development

does not need to detract from curriculum. By tying skill development to lesson content, both skill and content can be addressed. Computer skill development for students is highly linked to the demands of the course. If instructors expect students to submit assignments via email or participate in communication activities via synchronous or asynchronous technologies, those skills should be addressed at the onset of a course. The key is to incorporate computer skill development activities as soon as possible, thus paving the way for student success throughout the remainder of the course.

After conducting the computer skills needs assessment, an instructor may find that there is an individual or a very limited group of learners who lack basic and necessary computer skills. Instead of requiring technology reviews for the entire group, the instructor should incorporate individual assignments for student who need additional computer help. Common tools for helping students are supplemental online tutorials, a CD-ROM of basic computer operation, and video short courses. Please note, if an instructor is going to require different or additional assignments for individuals but not all students, this needs to be identified in the syllabus. For example, an instructor might state: "based on assessment results and the desire to create an environment that is focused on individual student success and learning, the instructor may ask individuals within the class to complete additional activities."

Learning Styles

Assessing student learning styles can be a valuable tool in planning course activities that complement student learning needs. Anderson (2004) suggests that "developing quality education systems requires that educators have a deep understanding of how individuals and groups of students learn" (p. 239). With an understanding of student's learning styles, an instructor can select teaching methods to match and in turn create an environment that will support student success (Bonham, 1989). Although "learning style characteristics do not typically predict whether the student will succeed or fail in a distance environment" (Hannafin, et al., 2003, p. 249), assessing learning styles can help instructors recognize that each student learns in a variety of ways. Consequently the learning style assessments can help instructors integrate an assortment of activities that match various learning styles.

Although there is no all encompassing, agreed-upon definition of learning style several frameworks have been proposed to organize the various approaches to assessing learning styles. James and Gardner's model of learning styles is defined "as three distinct but interconnected dimensions" (1995, p. 20) including: (a) perceptual dimension mode (physiological or sensory), (b) cognitive mode (mental or information processing), and (c) affective mode (emotional or personality characteristics). A variety of learning-style instruments are available to help instructors assess students in these areas. James and Blank (1993) compiled an excellent summary that instructors should review before selecting an instrument. Their summary provides a general overview of each instrument including validity, reliability, and instrument cost. After selecting and administering an instrument, instructors can use the results to decide on teaching methods to match the individual needs of learners. In addition, many instruments provide practical guidelines for implementing methods, activities, and strategies based on the instrument's unique results.

Instructors may select from a variety of learning style instruments to help generate learning initiatives that match learner needs. However, instructors should be careful not to pigeonhole students based on the results of an instrument. All assessment results should be used to enhance learning and it is important to remember that all students can benefit from participating in learning activities that match various learning styles. Dillon and Greene (2003) suggest that "our most important task as educators is indeed to help learners build a repertoire of approaches to learning so that they can learn under the variety of circumstances that life will surely bring" (p. 239).

Available Resources

As obvious as it may sound, students must have access to the Internet and must have appropriate computer hardware and software to successfully complete a web-based course. Yet, since web-based learning is a new experience for most students, these access requirements may be unclear to many prospective students. Perkins (1991) suggests that resources are an important component of all learning environments. Therefore, instructors should undertake a student needs assessment related to available resources prior to the course. Once technological deficiencies are identified, students can be notified and assisted in obtaining necessary resources. Assisting students in this area will help break down barriers to learning and will diffuse a potential learning environment rife with frustration. Data can be easily collected with a survey including questions related to availability of hardware and software resources.

In an ideal educational setting this type of student assessment and subsequent assistance would be conducted and provided by administrative services (e.g. continuing education department or online enrollment specialists). However, web-based instructors should not assume this is the case. Instructors should seek to be proactive in identifying student resource deficiencies and consequently provide students with necessary assistance.

Simplicity plays a crucial role in effective web-based education. Instructors should therefore try to keep resource requirements to a minimum. Requiring the use of an obscure piece of software or hardware, for example, could exclude students from participation or hinder their success. Keeping resources streamlined will help eliminate barriers to participation, will simplify distance learning processes, and will help decrease some of the issues that may disrupt the flow of a course and of student learning.

A common assessment result for many students might simply be the lack of appropriate software. With freeware and shareware programs available for educational purposes, software can be easily downloaded and updated for the student. If the assessment proves that students are unable to participate due to hardware-related issues, students should be notified immediately of their resource limitations and what hardware they will need to successfully complete the course.

Learner's Desired Outcomes

Understanding what a learner desires as an educational outcome gives the instructor the needed information to ensure congruency between course goals and student goals. Instructors should seek to find out why learners have elected to participate, what they want to learn from the course, and how willing they are to be part of the learning process. Of all the student assessment areas, understanding learners' desired outcomes is pivotal to student success and learning. When privy to this information, the instructor can match course objectives with those of the students. Within the constraints of higher education settings, it is understandable that specific objectives must be taught; however, these mandated course outcomes can match the desired learning outcomes of the learners. Web-based courses can incorporate activities that will help students achieve both institutional mandated outcomes and the general learning outcomes identified by the majority of the students in the course. This inclusion gives the learner responsibility and allows the learner to help set course objectives, which can lead to deep learning.

A clear articulation of student learning goals can help the instructor select appropriate instructional strategies to achieve these mutually benefiting goals (Wiggins & McTighe, 1998). For each student in a web-based course, the instructor can focus on adapting activities to match specific needs. For example, if a student in a research methods course indicates she would like to learn how to analyze her company's research and development data – she may be encouraged to incorporate this into her final project. The student could meet the same learning objective as her classmates (learning to read, analyze, and critique research methods) but she could do so by

analyzing her company's work. Knowing what students desire to learn from the course, will help the instructor craft a customized and relevant learning experience for each student.

Prior Learning Experiences

Prior experience and success in the use of computer-based applications is important to success in technologically mediated learning environments (Hannafin, et al., 2003). Assessing a student's prior learning experiences with web-based distance education will result in the collection of valuable information. If the students are novices to the web-based process, demands, and technology requirements, instructors can begin the course with activities that address preliminary issues in order to build a foundation for success.

With information about prior learning experiences, instructors may opt to use learning activities that require students to use all technology avenues within the first two weeks of the course, thusly building skills at the onset of a course. Instructors can also incorporate activities such as support networks (i.e. pairing learners who have had prior experiences with novice web learners). Collecting data on prior experiences can range from a tally response to a short written student self-report so that the instructor can have an understanding of the depth and extent of experiences. A data review may reveal a link with computer skills or available resources. Such areas could be jointly addressed through a variety of activities that give novice learners experience with the learning environment, build computer skills, and expand resources at the same time.
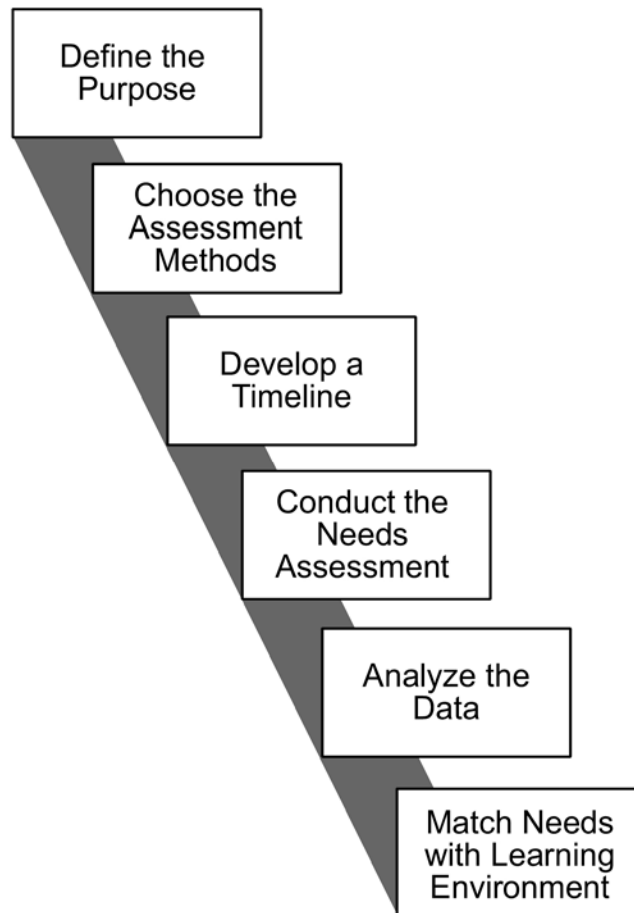
The Student Needs Assessment Process

Figure 1 Sequential components in the student needs assessment process.

The necessity for student assessments is easily justified and commonly supported as an important endeavor. Unfortunately, understanding the importance does not guarantee the success of the venture. Implementing a student needs assessment may be disastrous without the assistance of a well-organized plan. When conducting needs assessment, planning is central. Galbraith, Sisco, and Guglielmino (1997) identified a sequence of events for successful needs and interest assessment at the program planning level. A similar sequence of events should be conducted for web-based courses (DuCharme-Hansen & Dupin-Bryant, 2005):

1. Define the purpose

2. Choose the assessment methods

3. Develop a timeline for data collection

4. Conduct the student needs assessment

5. Analyze the data

6. Match student needs with the learning environment

Define the Purpose

The first step in conducting a needs assessment is to identify the purpose. Five common needs assessment areas were identified in the previous section including computer skills, learning styles, available resources, learner's desired outcomes, and prior learning experiences. While comprehensive in nature, these are not the only areas an instructor may decide to assess. As long as an instructor can justify the purposefulness of an assessment, there is a high probability that the assessment will benefit the instructor, the learning environment, and in turn the learner.

Choose the Assessment Methods

Once the instructor has defined the reasons for the student needs assessment, the next step is to select the methods for data collection. Qualitative methods play "a discovery role, while quantitative research plays a confirmatory role" (Gall, Borg, & Gall, 1996, p. 29). Therefore, qualitative methods may be more useful to an instructor who has little information about students and seeks to discover themes and relationships. Quantitative methods might help an instructor who wishes to validate those themes and relationships for the entire class. Whether conducting a needs assessment with qualitative methodology, quantitative methodology, or a combination of both, it is imperative that the methods result in valid and reliable data.

Develop a Timeline

After the purpose is identified and the method is selected, the instructor can develop a timeline for data collection. The timeline should take into account the time it will take to distribute the assessment, the time it will take students to complete the assessment, the time for receipt of the assessment, and finally, the time to analyze the data and match it to the course methods. For example, when conducting a computer skills assessment (with the idea that if the students lack a skill they will need prerequisite training) the instructor will need to conduct the assessment with ample cushion time prior to the course. In higher education, however, a professor typically does not know the individual students who are taking the course until the day the course begins. In this common case, a student needs assessment can still be conducted. The importance of a written timeline becomes even more critical since it will help streamline the time it takes to conduct an assessment at the beginning of the course when time is of the essence.

Conduct the Needs Assessment

Conducting the needs assessment can be done in a variety of ways. The instructor may combine various assessment areas into a general assessment or may simply choose to conduct each area as an individual assessment. Common collection methods for both general and individual

assessments include telephone, email, and web-based surveys. Interviews can be conducted via the telephone although this is time-consuming and costly. Questionnaires, standardized tests, and informal questioning via email and web-based methods are inexpensive and can provide immediate feedback. They can also provide data for assessing computer skills and available resources. That is, if students respond to an email survey they have a necessary computer skill and technology resource.

Analyze the Data

Many methods exist for analyzing needs assessment data. If an instructor selected a quantitative method, instruments and standardized tests usually come with a scoring procedure and analysis guide. Qualitative data can be interpreted systematically by first identifying major themes and then categorizing individual responses according to the major theme. Most instructors intuitively analyze qualitative data in a quasi-structured fashion. Instructors should follow their intuition when analyzing the data and should note both specific group needs and individual needs in their analysis.

Match Student Needs with the Learning Environment

The final and most important step in the needs assessment process is to match student needs with course strategies, methods, and activities that will facilitate learning in the web-based environment. The instructor has two main tasks related to matching student needs. The first is to create a plan that meets group needs and the second is to verify that the plan embraces the individual student needs within the web-based distance education environment.

The concept of matching the learning environment and educational methods with individual learner needs is based primarily on progressive and humanistic educational theories. These philosophies highlight the unique nature of human beings. Lindeman (1961) stated "if we take for granted that human nature is varied, changing and fluid, we will know that life's meanings are conditioned by the individual" (p. 8). In the same vein, due to the flexibility offered by web-based distance education environments, it is easy to see how this environment attracts and supports unique and diversified learners. Therefore, in an educational environment that has more than one person, the environment is laced with subject matter differences, situational differences, individual learner differences as well as individualistic goals and purposes for learning. The value of matching the learning environment and educational methods with individual learner needs is that if educators believe learners have differing personalities and backgrounds and as such differing needs, then there is no one best way to teach or to learn. Rather, the best way of teaching and learning is what is best for each individual learner at that moment in time.

Focusing on the uniqueness of each student becomes paramount to effective web-based education. By obtaining information about students through the needs assessment process, instructors can focus on individual learners and become facilitators of learning, rather than using the "easy method of giving the same dose to more individuals" (Lindeman, 1961, p. 4). Successful web-based instructors seek to prescribe for individual student needs within a group setting while maintaining the depth of content learning that embraces the diversity of the individuals in the group. Fundamental to the assessment-match process is its cyclical nature. Assessment-match should be conducted before the web-based experience as well as during the experience. Assessment gives the instructor the tools and information necessary to make solid decisions about how best to facilitate the educational experience from start to finish.

Summary

Web-based education requires an upfront investment from both the instructor and the learner. The instructor needs comprehensive and accurate student needs assessment information in order to prepare, facilitate, and adapt learning strategies as online education unfolds. Without this vital information, distance education becomes a game of trial and error without the probability of high success. This paper outlined and described the student needs assessment process as well as five essential areas in which to conduct student needs assessments. Each piece independently is important, but not as important as the information gained when all the pieces are interlocked to reveal the true needs of the individuals as well as the group. Knowing student needs is just the first step. The second step requires the instructor to be committed to adapting and modifying instructional strategies to match the needs of both the group and the individuals in the group.

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Editor's Note: When we focus on the mechanics of goal setting, instructional design, production, implementation, and evaluation, we should not overlook an important aspect of human learning and development – creativity. It is important to involve the learner in the process of discovery and make his own interpretation of what is learned. This paper explores ways to stimulate creativity in an online learning environment.

Encouraging Creativity in Online Courses

Stephanie A. Clemons

Key Words: creativity, brain-based learning, learning, online, theory, creative ideas/techniques, adult learning

Introduction

"It is easy to consider the essential role of creativity in bringing joy and meaning to the human condition – without creativity we have no art, no literature, no science, no innovation, no problem solving, no progress." – Starko, 1995, p. vii.

Creative people are in high demand in today's world (Stevens and Burley, 1999). If adults are to be successful and prosper, innovative thinking and behaving must be encouraged. Therefore it is imperative that students continue to receive opportunities to develop divergent thinking skills (e.g. thinking outside the box) (Slavkin, 2004).

Creativity is an important component of problem solving, other higher cognitive abilities, social and emotional well-being, and academic and adult success (Slavkin, 2004). "Creativity is important to society but it traditionally has been one of psychology's orphans" (Sternberg & Lubart, 1999, 4).

It is still common that traditional classroom educators -- due to demands on time, support issues, and/or curriculum requirements -- hold to the tenet that "learning is a mechanistic experience" (e.g. input/output) (Slavkin, 2004). Therefore, students may lack the opportunity to think abstractly or creatively.

Are there strategies, techniques or methods that can encourage student creativity in online courses? This paper explores creativity and offers reminders concerning the tips and strategies available for online educators.

Review of Literature

Creativity Begins in the Brain

The frontal lobe of the brain focuses on processes such as decision-making, judgment, planning, creativity, and problem solving (Sprenger, 2002; Lucas, 2004). Brains need time to digest and adapt new information. One thing that attracts the brain is novelty, it may be the result of the brain dealing with survival (Sprenger, 2002). Something new and different is examined by the brain to make sure it is safe (Carper, 2000). Novelty and curiosity can boost attention (Lucas, 2004).

Brain-based theory advocates the need for enriched environments (not necessarily physical environments) to encourage learning. Research performed by neuroscientists has indicated that enriched environments encourage the growth of dendrites, which relates to learning (Sprenger, 2002). Neuroscientists have offered learning principles to enhance enrichment in the classroom such as:

- Give the brain something to do that it is capable of doing

- Provide repetition (consistently and with some intensity) so that brain neurons fire repeatedly enabling them to become more efficient

- Give timely feedback

- Adapt learning to the student (Tallal, 1999).

Enriched environments engender student self-confidence, which leads to creativity.

Learning Theory Supports Creativity

Contemporary learning theory acknowledges human learning to be a complex, constructive process with learners building onto their own knowledge similar to a contractor building a house (Starko, 1995). Learning in pursuit of a goal makes the learning purposeful. Tying information to prior knowledge and understanding can make it meaningful. Since connections created by each student must be original and goal-oriented, learning must by definition be appropriate (meeting the goal) (Starko, 1995). Each learner builds an individual cognitive structure that is unique and full of personal associations. Meaningful learning is viewed as essentially creative (Caine & Caine, 1991).

Creativity: Definition, Theories, Myths, Virtues

Although a standard definition for creativity is still not agreed upon, a common definition is found or inferred from a wide range of studies (Slavkin, 2004). It involves the production of original, useful products as determined by that field (Sternberg & Lubart, 1999). Perkins (1988) defined creativity as a result that is both original and appropriate with appropriateness related to the cultural context in which the creativity is based (Sternberg, 1990). Czikszentmihalyi (1990) proposed that creativity was not a characteristic of people or products but an interaction among an individual, product, and environment. Gardner professed that individuals are "creative" in a particular domain-specific ways. He advocated that the creative individual was a person who regularly solved problems, designed products, or defines new questions within a domain that was perceived novel but ultimately became accepted in that particular cultural setting (Gardner, 1993).

Implicit theories of creativity include themes of originality and utility (Sternberg, 1985). Jung (1972) advocated the importance of personal experience and the unconscious mind in framing creative production. The Creative Problem-Solving Model (Osborn, 1963) proposed a theory and a process to determine ways to use creativity appropriately. Each version of the process included a series of steps that involved both divergent (finding many ideas) and convergent (drawing conclusions, narrowing the field) stages (Starko, 1995).

Creativity is both a communication tool (e.g. literature) and a technique for problem solving (e.g. inventors of modern lighting). In fact, the identification of a problem or "problem finding" underlies all types of creativity (Starko, 1995). Myths and stereotypes of creative individuals include 1) people are born creative or uncreative, 2) creativity is limited to the arts and music, 3) creativity is intertwined with negative aspects of psychology and society (e.g. to be identified as creative the individual must be made, weird or neurotic), 4) creativity is a fuzzy, soft construct, 5) constraints inhibit creativity, 6) a person must be relatively young to make significant creative contributions, 7) creativity is enhanced with a group, and 8) creativity should not be marketed (Slavkin, 2004).

There are two different types of creativity: real-time and multi-stage. Real-time creativity is improvisational, impromptu, and spur-of-the-moment. Multi-state creativity involves the passage of time; students need sufficient time to generate and select ideas (Mau, 1997).

Psychologists and educators have discussed virtues of creativity and its relationship to the intellectual, educational, and development of intellect and talent in children (Slavkin, 2004). Contributions of creativity have been noted in areas as diverse as workplace leadership (Tierney, Farmer and Graen, 1999), healthy coping and emotional growth (King & Pope, 1999) and the maintenance of healthy relationships (Livingston, 1999). Creativity can reduce conflict and violence while promoting conflict resolution (Kovac, 1998). Creativity research related to technology has also been garnering more attention (Kappel & Rubenstein, 1999). Students enrolled in a variety of online classes may pursue this breadth of applications.

Creativity: Challenges and Benefits to Students

Giving students opportunities to be creative means allowing them to find and solve problems and communicate ideas in "novel" and "appropriate" ways (Starko, 1995). Learning occurs best when learners are involved in setting and meeting goals as well as linking information to their experiences in unique ways. To encourage students to find and solve problems in ways that facilitate original ideas, students need tools to communicate novel thinking to enhance their learning.

Inviting innovation from online students may be met with psychological roadblocks. Some students are not ready to think in a different way. To challenge their beliefs and worldviews may be a source of frustration. Other students begin the class with poor self-esteem concerning their creativity. They may have been told by teachers or significant others that they are not creative (Slavkin, 2004). When asked to demonstrate creativity, students may need to reconstruct their own definitions of creativity through hands-on activities, interviews, experimentation, and play to see their potential and personal innovativeness (Slavkin, 2004).

One way to begin an online course and engage the student is to request they assess their creativity. Such an assessment can help understand student perceptions of their creativity level the online classes. An example of such an assessment tool is available at this website: http://www.adventuresincreativity.net/mag5.html .

Students can benefit from creativity exercises, showing greater self-efficacy and improved ability to identify and express creativity within him- or herself (Slavkin, 2004). Findings from a pre/post-creativity exercise survey indicated that an overwhelming majority of students felt that the coursework gave them greater insight into themselves and their abilities to tap into unappreciated and underutilized aspects of self. This newly-recognized part of their personality carried over into other classes, into the workplace and into their personal relationships (Livingston, 1999; Stokes, 1999). In addition, students believed that their leadership abilities were enhanced (Tierney, Farmer, and Graen, 1999)

Tips for Online Educators

Perrone (1994) describes common elements of learning activities that most engage students intellectually. Coincidentally, they echo key attributes of creativity: finding interests and problems, looking in new ways, communicating personal ideas, and creating new products and solutions to problems. Perrone's elements include:

- Students help define content of course

- Students had time to wonder/determining a particular direction that interests them

- Topics had a "strange" quality – something this is common but seen in a new way to evoke lingering questions

- Teachers encouraged different forms of expression and respected students' views

- Teachers were passionate about their work. The most meaningful activities were "invented" by the teacher or student.

- Students did something.

- Students sensed that results of their work were not fully predictable.

Michalko (2001) developed nine strategies for enhancing student creativity that are applicable to the online environment. They include:

- Making your thoughts visible – think in terms of visual or spatial forms rather than mathematical or written lines of reasoning.

- Knowing how to see – the first way to look at a problem is too biased toward the usual way of seeing things. Take a different perspective.

- Thinking fluently – generate quantities of ideas rather than holding onto one.

- Making novel combinations – permit ideas and thoughts to randomly combine

- Connecting the unconnected – change your thinking pattern by connecting your subject with something that is not related.

- Looking at the other side – rather than looking at boundaries, look for the solution outside the assumptions.

- Looking in other worlds – lateral thinking that allows one ideas from one world solve a problem for another (e.g. biomimicry http://www.biomimicry.org/intro.html and http://www.annonline.com/interviews/971218/).

- Finding what you're not looking for – creative accidents take place when you are not looking for them. Embrace!

- Awakening the collaborative spirit – share and discuss ideas without thought of condemnation or judgment; have freedom to propose ideas, without risk.

There are thousands of ideas to encourage creativity that can be used in an online environment. Even encouraging students to investigate various creativity websites or discover their own can communicate the perception that creativity is valued in the online course. See this website for the many ideas: http://www.mycoted.com/creativity/techniques/index.php. Following are three suggestions: introduce novelty, plan for problems, and divergent thinking strategies.

Novelty

Novelty can be explored from the instructor's perspective and/or the student's perspective. It can be introduced from the beginning of the online class with openers such as exciting stories, appropriate jokes, startling facts, interesting visuals (Lucas, 2004).

There are many researchers and educators who have developed unique ways to generate creativity in the student or adult learner. Following are a few novel tips to help students develop a different way of looking at the presented problem in the online course.

- Multiple perspectives. Da Vinci espoused that until a problem was looked at from three perspectives, a basis for understanding was truly not in place. (e.g. when designing the bicycle, he looked at the problem from three perspectives: inventor/investors, rider/consumer, and municipalities where the bicycles would be used.)

- Take on a different role. Ask online students to respond to questions such as: "How would the leader in your field write it? How would a precocious child write it? How would a politician write it?"

- Imagine you are the problem. This is a favorite technique used by T.A. Rich, famous inventor at General Electric. (e.g. think of yourself as a light being hurtling through space.)

- Switch gender (Michalko, 2001).

- Note: Too much novelty causes stress and perhaps brain shrinkage. Stress is known to kill brain cells.

Plan for problems

Present broad areas of concern in the online course within which to identify and frame individual problems. Problems can be to research questions, activities, themes, an aesthetic or idea. Remember to divide the problem-solving process into four parts: exploring the environment (internal or external), investigating ideas and materials, recording ideas, and experimenting with production (Starko, 1995).

- <u>Exploring the environment</u> includes: beginning to "look." For art that would mean art materials and tools; for writers that would mean scenes, moods and characters; for scientists that would mean patterns and related variables.

- <u>Experimenting with ideas</u> includes: free play, multiple hypotheses, several sketches, explorations. This is a great phase to use groups in the online class.

- <u>Recording ideas</u> includes: inventor's notebooks, writers' journals, artist's sketchpads as well as technology tools.

- <u>Experimenting with production</u> includes: sculpture, technical journalism articles, animation clips, and experiments (Starko, 1995).

Divergent Thinking Strategies

Free thinking, divergent thinking, brainstorming, or creative processing can assist students in make unique connections between prior knowledge and unsolved problems (Slavkin, 2004). The common definition of divergent thinking includes Guilford's (1986) Structure of Intellect (SOI) model: fluency (thinking of many ideas), flexibility (thinking of different categories or points of view), originality (thinking of unusual ideas), and elaboration (adding detail to improve ideas) (Schlichter, 1986). For more information see this website:
http://homepages.which.net/~gk.sherman/mbaaaaab.htm

Of all the strategies for generating ideas, brainstorming is one of the most familiar and is based on Osborn's (1953) principle of deferred judgment: avoiding the evaluation of ideas until a number of them have been produced. Brainstorming rules are: criticism is not allowed; freewheeling is welcome; quantity is wanted; combination of ideas is sought (Starko, 1995). See following website for brainstorming information:
http://www.innovationtools.com/resources/brainstorming.asp

Another strategy for online educators is to use SCAMPER. SCAMPER is an acronym developed by Eberle (1977) who took some of Osborn's key questions to enhance divergent thinking and made them into an acronym. See website for more information on SCAMPER.
http://www.in2edu.com/edulinks/discover%20learning..%20learning%20styles%20etc_scamper%20thinking%20technique.htm The acronym with its identifiers is as follows:

- S = substitute something new for the existing

- C = combine parts or ideas

- A = adapt from old ideas

- M = modify or changes in the existing product or situation

- P = put to other uses or "How can I use this in a new way?"

- E = eliminate or omit unnecessary processes, items, problems

- R = rearrange or reverse to develop a different sequence or new parts

Synectics is another technique to use in the online class to encourage divergent thinking. It is quite useful to enhance brainstorming and is easily used in threaded discussions. Synectics is a metaphor/analogy-based technique for bringing different elements together in a search for new ideas or solutions (Starko, 1995). It has been used in business settings, think tanks, and research organizations. The basic premise is to "make the strange familiar" and "make the familiar strange" (Prince, 1968, p. 4). To make the strange familiar, the familiar is combined with a new problem or situation in order to solve the problem or some to a new understanding. To make the familiar strange, something new or strange needs to be combined with something familiar to gain new insights or perspectives on the already familiar idea. This process is facilitated through various types of analogies. http://www.writedesignonline.com/organizers/synectics.html or http://www.nexus.edu.au/teachstud/gat/forster2.htm

Authentic Assessment

Many of the skills associated with creativity are vital parts of authentic assessment. The goal of assessing creativity is not to generated creativity scores or to divide students into "creative" and "not creative" but instead to recognize creativity when it occurs and to create conditions to allow it to develop (Starko, 1995). Assessed creativity can expand understanding of human abilities (particularly how creativity related to traditional views of intelligence), provide baseline data that may be used to diagnose student needs, and evaluate efforts to enhance creativity (Starko, 1995).

It is important that students learn to assess the creativity of their own ideas, as creative individuals must not only generate original ideas but recognize which ideas are original (Runco, 1993). Self-evaluation requires students to measure their efforts against some scale or criterion and make judgments about the quality of the final product (Starko, 1995).

Three modes of assessment are commonly used. They are 1) paper and pencil tests when assessing learned knowledge and skills, 2) performance assessment to evaluate the process of learning and creating, and 3) personal communication (or in the case of online courses, threaded discussions) (Mau, 1997). Other ideas may be to 1) direct students to create a new kind of test that has never been given yet will accurately assess concepts covered in class (Sprenger, 2002); this enhances a "democratic classroom" where students believe that everyone can successfully learn but never at the expense of anyone else (McDermott, 1999) and 2) request some type of performance assessment such as the creation of videos, hypermedia presentations, puppet shows, interviews, surveys, or graphic organizers. These encourage curiosity and risk taking (Sprenger, 2002).

Conclusion

Structuring online courses to enhance creativity can be a slippery goal. A teaching activity that produces an enjoyable outcome does not necessarily enhance creativity unless the students have the opportunity for creative thinking (Starko, 1995). In other words, if the exercise is original but the student's input is fairly routine then it may not have been a success.

Teaching to enhance creativity has a different focus for the online educator; the creativity is on the part of the student. It is important to provide students the knowledge, skills, and surroundings necessary for their own creativity to emerge (Starko, 1995). Giving students opportunities to be creative means allowing them to find and solve problems and communicate ideas in "novel" and "appropriate" ways (Starko, 1995).

Providing online students with multiple forums for creativity will allow them to find unique outlets and avoid domain- and task-specific expression. Teachers should remember that creativity should be emphasized, but not at the expense of maintaining high standards and expectations (Slavkin, 2004).

Music and arts programs are being forced out of K-12 curriculum throughout the country due to funding cuts. This action opens doors to recognize that as a phenomenon, creativity can support innovation in such subjects as social studies, science, and language arts. It is important to recognize the interconnectedness of knowledge and the importance of how ideas from various areas of study can nurture understanding in disparate knowledge bases (Slavkin, 2004).

Online educators navigate technology challenges that traditional classroom teachers rarely do. However, their goal of enhancing student learning through an enriched environment is the same. Through use of the Internet, other technologies, and navigational tools, creativity can be enhanced in ways unimaginable a few years ago. The creative process can be an extraordinarily personal thing; one that can be explored and assessed safely and appropriately through online environments.

"Imagination is more important than intelligence." – Albert Einstein

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Improving Retention in Distance Learning Classes

Judy A. Serwatka

Abstract

Much has been written about retention in distance learning courses. Authors have different ideas about what causes students to drop out of these courses. Some of the issues include lack of instructor training, poor course design, lack of student interaction, and personal commitments. Few actual studies have been done to provide evidence for these assumptions. This paper provides possible solutions to the problem of retention and offers suggestions for improvement in the entire field of distance education.

Introduction

Retaining students is a number one priority in higher education. One way to improve overall retention is to reduce the withdrawal rate in on-line courses. The format of a course can have significant impact on student retention. Simply putting the same material that was used in an on-campus class on a web site and expecting the on-line students to learn at the same level as their on-campus counterparts is not logical. Distance learning requires a new pedagogy and alternative teaching tools to enable the learner to grasp material without the benefit of an instructor's lecture.

On-line discussion boards are one way to provide interaction between instructor and students, and between students and students. Other forms of on-line learning can be used, however, to enhance the learning experience. Searching the Web for appropriate teaching materials and on-line simulations can be time-consuming and frustrating. The sheer volume of Web sites is overwhelming and a search that returns thousands of potential Web sites for a particular subject is enough to discourage anyone from trying to find Web-based materials for courses. Project MERLOT (**M**ultimedia **E**ducational **R**esource for **L**earning and **O**nline **T**eaching) is an effort to try and minimize the number of Web sites searched and provide a way to find quality instructional materials in a minimum of time.

Background and Purpose of Project MERLOT

Project MERLOT was initiated by faculty and administrators at several universities across the United States. The leaders for the project are located at California State University. The project was originally implemented by continuing an NSF project titled "Authoring Tools and An Educational Object Economy" at the Center for Distributed Learning (CDL) of California State University. Because of the interest generated by the initial project, the CDL invited other institutions and higher education systems to participate in order to expand MERLOT. The project is currently sponsored by the NSF Digital Library Project and endorsed by NLII/EDUCAUSE.

The purpose of Project Merlot is to develop a place where faculty can share instructional materials for all forms of on-line teaching. Material on the MERLOT Web site can be reviewed and downloaded by anyone, at no cost. Downloads are not limited to university faculty. This unlimited access provides the opportunity for more faculty and instructors to become involved in on-line teaching without "reinventing the wheel" each time the same topic is taught. Of course, this means that contributors must agree to allow their material to be use by other faculty.

Currently, 12 disciplines are included in the MERLOT project including Biology, Business, Chemistry, Foreign Languages, Health Sciences, History, Information Technology, Mathematics, Music, Physics, Psychology, and Teacher Education. The sites listed in each discipline are reviewed and rated by a team of faculty reviewers for that discipline. The faculty who were chosen as reviewers have been identified as outstanding educators in their discipline and have demonstrated expertise in using the Internet as part of their courses.

The web site for Project MERLOT (www.merlot.org) encourages contributors to submit course modules on specific topics. The contributor chooses which discipline under which to list the module. For instance, an instructor teaching a course in Computer Information Systems might submit a tutorial module on token-ring networks. Such a module could consist of lecture materials and a self-study quiz. A module submitted in Physics, currently on the site, illustrates the concept of Thermodynamic Equilibrium, using a Java Applet to show how gas particles move based on their temperature. Projects such as these, which are modules limited to a single topic, are the most useful for the Project. Many different types of modules can be submitted, ranging from tutorials to simulations. Anything that an instructor would find useful is acceptable.

A problem that has surfaced with on-line courses is the perception that they are not of the same quality as traditional courses because there has been no peer review process in place for the materials. Faculty who teach distance education courses have found that their institutions require peer review of their materials for promotion and tenure. Project MERLOT provides such peer review of the materials posted on its Web site. Before reviewing modules, the faculty reviewers scan the lists of submitted modules and determine which ones are eligible for review. This process is known a 'triage' and the team in each curriculum does this on a regular basis to ensure that the site has only good materials. The Merlot system also has a mechanism for updating out-dated links. The original contributor is contacted when an old or bad link is discovered and is asked to either update the link or eliminate it from the database.

Review Process in Project MERLOT

Each discipline team is made up of two team co-leaders and several faculty reviewers (the author is a member of the Information Technology team, made up of 12 faculty). Before the review process started, the teams are given the task to find Web-based modules and post them on the MERLOT Web site under the appropriate discipline. Because of this, the faculty reviewers have become contributors as well as reviewers. When the project first began, it was important to populate the site with as many modules as possible. The current focus is to find high quality sites and then post them for review.

After a sufficient number of modules have been identified and posted, the team members choose the sites they wish to review. In Information Technology, we divided our team into sub-teams, since there are so many different areas of expertise (programming, databases, networking, etc.). Each team then chooses sites from the MERLOT site to review, or the team leader chooses sites to review. An important aspect of the review process is the use of a single review form by all members of a review team. Project Merlot has developed an on-line review form that each discipline team now uses to ensure that the reviews are equivalent.

The formal review process consists of informal reviews by individual team members, sharing the review forms among the team members, then a walk-through of the site with all members involved in analyzing the merits and problems with a particular site. Prior to the formal review, a letter is sent to the author of the module, indicating that the site has been posted to MERLOT and asking permission to review the site and post the reviews for all faculty to see. If the author denies permission, then the review process ends, and the site will remain on MERLOT with no posted reviews. If the author agrees to the review, the final review is posted on the MERLOT web site, with a 1 to 5 star rating, similar to that used by the motion picture rating system. The author is also sent a letter that contains comments by the reviewers along with suggestions for improvement of the module, if needed. We have found that authors sometimes request that the reviewers postpone their review of a particular module until a later date because the site is undergoing upgrades. If this occurs then we respect the author's request and delay the review.

The review process provides benefits to faculty in several ways. The author is provided with a peer review of the material by faculty from across several universities. The perspectives and teaching experiences of several people are incorporated into the review, giving it a better review than could be done by an individual reviewer. Evaluating a course module in this manner is very valuable. As accrediting bodies take a close look at distance learning programs and individual courses, obtaining peer review of the teaching materials will be an important benefit to those developing the materials. In addition, the promotion and tenure process often requires that non-tenured faculty provide evidence of teaching effectiveness and this process often requires peer review of teaching materials. The MERLOT review process and the letters sent to the author can provide evidence of such a review.

Another benefit to faculty of the MERLOT review process is the public posting of the reviews. By browsing the MERLOT Web site, an instructor can find materials for specific topics. When someone searches the site for a specific item, modules that meet the criteria are listed with the highest ratings first, giving the searcher the benefit of finding the highest quality modules very quickly. The reviews can provide an efficient way to determine if the materials are appropriate for a specific class or a specific group of students. The rating system also provides a quick review of the quality of the material in the module. Comments by reviewers are included in the posted review as well.

Future of MERLOT

The success of MERLOT depends both on the willingness of faculty to spend the time to review the modules, and the time taken by those who seek out and post modules to the site for review. Anyone can post a module on the site. Reviews can only be posted, however, by those who are designated as faculty reviewers. MERLOT is not a repository for the actual modules, but instead is a database of URLs with links to the actual modules. Thus, if a module changes, the MERLOT web site does not need to be changed. This keeps control of the module in the hands of the author.

The ultimate goal of this project is to hand over review of modules to professional organizations in the various discipline areas. The faculty chosen as reviewers have made a two year commitment to this process, so a permanent solution to the review process is needed. Since professional organizations are made up of faculty who are interested in the educational needs of their disciplines, it is logical that they should take over this review process. One way to achieve this is to introduce the organizations to the concept of Project MERLOT as often as possible. The discipline team members are encouraged to write about and make presentations at their institutions, professional conferences and other venues to introduce Project Merlot to as many faculty as possible.

In order to further the discussions about peer review of the online materials, the First International MERLOT Conference was held in August 2001 and was open to anyone interested in this topic. The conference, titled "Faculty Approaches to Instructional Technology: Content, Collaboration, and Community" was designed for those interested in learning about shared content, peer reviews, learning objects, standards, and online communities. The conference was a good way for all reviewers and others to come together to discuss issues relating to the peer review of on-line teaching materials. Subsequent conferences in 2002, 2003, and 2004 have continued the discussion of the peer review process in order to improve the quality of submissions on the Merlot Web site.

The Issue of Retention

Project Merlot is an excellent resource, as long as faculty make use of it, as well as any other technologies that are available to make an on-line course interactive and interesting. Faculty must also take into account the differences in students in an on-line class. When we teach a face-to-face class, after a few weeks the instructor can get a feel for which students are lagging behind and those who are keeping up with the material. We don't have that luxury in an on-line course. And no instructor can design a class to meet all learning styles (Palloff and Pratt, 2003). Addressing learning styles is at the heart of retaining students in on-line courses.

The generation of students that we now have in college was brought up working with computers; they have them in their homes and in their elementary and high schools. As faculty, we have a different mindset, one that is not so technically oriented, and thus our teaching methods match our mindset. Modifying the presentation of course material to fit with today's students is necessary to retain these students. Students today process information differently than we did, so we need to take advantage of that when creating on-line courses.

Faculty interaction with the students has also been cited as a reason that students drop out of on-line courses (Olgren, 2004). Specifically, it is not the type of interaction that is the problem, but rather the lack of interaction. The faculty that teach in this relatively new form of education should be given instruction in how to manage the class and the training should stress the importance of faculty interaction with the students. It is not unreasonable for a student to expect a response within 24 hours from a faculty member. The response may be to an e-mail or to a discussion posting. In order to set the stage for this interaction, it is very important for the faculty member to specify at the beginning of the course how responses will be handled. While it is important to respond quickly, it is also important to tell the students when responses cannot be expected (for instance, I always tell my students that I check e-mail at least once over weekends and holidays, just so that they don't always expect a response within 24 hours during those times). If guidelines are set up early, and posted when students can check them, the students' frustration level will be greatly reduced.

Student retention can also be addressed by the format of the course. A form of learning in which the students come to campus or to a learning center for a limited number of meetings during the course, called hybrid or blended courses, may be better than courses that are offered entirely on-line (Rovai and Jordan, 2004). Such a course can give the students the reassurance they need to see the instructor and ask questions in person, along with the convenience of not meeting on a bi-weekly or weekly basis. Such courses fit better into a student's life when family or employment demands prevent the attendance in a regularly scheduled class.

One theory on distance learning says that discussion forums and debates are the main method that should be used to engage students and keep them interested in a course (Pallof and Pratt, 2003). However, this is only one form of interaction that can be used. One must also keep in mind that students may not be comfortable with such interaction. Most traditional students and adult students have spent the majority of their school years in environments in which lecture was the

primary tool for disseminating information (Conrad and Donalson, 2004). Trying new techniques may be difficult at first. Using exercises that provide an 'ice breaker' may help students get used to interacting with their peers. One method of doing this is to provide an informal discussion area. The instructor can invite the students to share personal information about themselves or their careers. Most people like to talk about themselves. Such an exercise will give the students a chance to know more about each other and to practice writing to a discussion board and responding to others. Making the students feel comfortable in the learning environment is an important part of retaining them in the class. The instructor should strive to create a sense of community among the students so they care about one another and are interested in what others have to say.

Once the students have become familiar with each other, various forms of discussion boards can be used. The teacher can post a case study with questions to be answered. This activity can be done as an entire class project, or the class can be divided into groups, with a group leader, and the discussion can take place among the smaller group of students. An instructor may use a real-life case scenario where a group of Computer Technology students are given a project, such as creating a Web-based business, and they must use all the talents in their group to decide on a business model, design the site, and possibly even program it. Another activity could be virtual field trips, using on-line resources available for a specific discipline. Some examples include China Virtual tours, Virtual Tour of the Ear, and Historical Tour of the White House (Conrad and Donaldson, 2004).

When planning alternative activities for an on-line course, Project Merlot is a good place to start. Materials found at Merlot may be the foundation to use to start the discussion on a topic, or to be used as background material for a discussion on some other topic. While creating on-line courses does require much research up-front on the part of the instructor, the value to the student is immeasurable. And, making the material fun and informative can engage the student and give them an incentive to complete the course and go on to others toward the completion of a degree.

Conclusion

Solving the retention problem in higher education is of primary interest to faculty and administrators alike. Providing on-line courses that are interesting and informative is one way to help retain students.

Project MERLOT is a concept that is desperately needed in the world of distance learning. Anyone who has faced the possibility of developing an on-line course from scratch will appreciate the help that such a Web site provides. The support the faculty members receive from their individual institutions in this project will determine the ultimate success of failure of the project.

One problem that has been identified is the additional work that this has put on the faculty reviewers. One reviewer indicated that she had been given what she called "virtual release time" to work on the project. Even though on paper she had a release for Project MERLOT, in fact she had been asked to teach an extra class during the same semester so the release time was really non-existent. Support for this project is needed in order to have quality reviews. The only way this will happen is if the faculty involved in the project have time to work on it. Those who are involved in this project are dedicated to improving the materials available for distance learning instructors. The importance of this form of teaching is evident in the number of commercial ventures that have been developed. The success of MERLOT will be measured by how well it helps faculty develop and improve their distance learning courses.

Better training for instructors may also be a key to improving student retention. A teacher that is well-suited to the classroom environment may or may not be a good on-line instructor. In

addition, the format of the on-line courses should be studied. A blended course may serve the students needs and provide some face-to-face contact to give the students the instructor contact they want.

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Distance Education Brings Deaf Students, Instructors, and Interpreters Closer Together:
A Review of Prevailing Practices, Projects, and Perceptions

Becky Sue Parton

Abstract

Distance education is becoming increasingly common in the general population – a trend that is mirrored in programs for students and professionals involved in Deaf education. A review of the literature reveals three distinctive target groups within Deaf education for which distance education serves to advance learning agendas: Deaf students, instructors, and interpreters. This paper will first endeavor to identify and describe the ways in which distance education is positively contributing to Deaf education and training. As a secondary goal, the special considerations and modifications necessary for successful implementation of a distance-learning module targeted toward Deaf students will be discussed. Videoconferencing designed especially for Deaf elementary and high school students, appears to be the most common and successful form of distance education currently since it accommodates American Sign Language communication.

Keywords: deaf, hard-of-hearing, distance education, video conferencing, American Sign Language, interpreters, distance learning, computer technology, special populations, deaf education teachers, captions, instructional technology.

Introduction

Distance education is becoming increasingly common in the general population – a trend that is mirrored in programs for students and professionals involved in Deaf education. Hubbard (1999) extols the virtues of this medium, "Education of the deaf can benefit from distance learning fully as much, if not more, as education of the hearing" (p.6). Distance education can be defined as technology-aided instruction occurring when teachers and students are physically separated (Eilers-Crandall, 2000). A review of the literature reveals three distinctive target groups within Deaf education for which distance education serves to advance learning agendas: Deaf students, instructors, and interpreters. Each of these groups has experienced successful instruction through a variety of distance techniques including videoconferencing and web-based initiatives. The purpose of this paper is to review prevailing practices, projects, and perceptions regarding distance education in the realm of Deaf education. It will first endeavor to identify and describe the ways in which distance education is positively contributing to Deaf education and training. As a secondary goal, this paper will discuss the special considerations and modifications necessary for successful implementation of a distance-learning model targeted toward Deaf students. By gaining a broad understanding of these issues, the interested reader will be better prepared to conduct investigations into specific areas of interest within this discipline.

Target Groups and Projects Identified

Deaf Students

Deaf students from elementary age to college age are experiencing the additional opportunities that distance education affords them. Many projects and approaches are underway. Researchers agree that, in particular, videoconferencing is beneficial for Deaf students due to its visual nature (e.g., Hazelwood, n.d.; Juhas, 2001). At the Texas School for the Deaf (TSD), videoconferencing grants students the opportunity to explore via virtual fieldtrips to museums, zoos, and other sites. Students can collaborate with peers in their native language, American Sign Language (ASL) versus exchanging comments through written English (Hazelwood, n.d.). Additionally, Deaf children and teenagers are exposed to Deaf adults. These role models may serve as mentors or experts to assist in job interview role-playing or to depict the art of ASL poetry for example. Students at TSD share presentations, present ASL stories, and debate all at a distance. They can receive instruction on a wide-variety of topics, even the study of other languages, such as Spanish, by using the document camera to display a written representation of the foreign language (Hazelwood, n.d.). At the Colorado School for the Deaf and Blind (CSDB), Deaf students use videoconferencing to connect with Deaf adults who answer questions about life in the 'real-world' including relationships and employment (Rose, 1999). Although many of the activities permissible through videoconferencing at these and other schools are not unique to Deaf students, it is the dramatic improvement to communication that is noteworthy. Text-telephones (TTYs) and email rely on written English, but Eilers-Crandall (2000) states, "Videoconferencing provides remote participants with face-to-face familiarity that comes with physical presence, including facial expressions, body language, and eye contact" (p.10). The National Technical Institute for the Deaf (NTID) – a school within the Rochester Institute of Technology (RIT) in New York - arranged a panel discussion between students, Gallaudet University, and the Greater Los Angeles Council on Deafness (GLAD). NTID also participated in a joint venture with the Rochester School for the Deaf (RSD) whereby high school students at RSD took college-level science and math class from NTID through videoconferencing during the 2000-2001 school year (Robinson & Aidala, 2002). An initiative entitled the Shared Reading Video Outreach Project (SRVOP) was initially developed by Gallaudet University and has subsequently been adapted by states such as Washington to fit the needs of the community. SRVOP is a reading enhancement program that promotes literacy by presenting stories from children's books to Deaf students. These families, who live in remote areas of the state, might otherwise not have the chance to meet and participate with Deaf adult storytellers (SRVOP, 2003).

Videoconferencing is but one method of implementing distance learning. Web-based is another approach that is gaining popularity. The familiarity of the Internet to most students makes it a comfortable medium (Eilers-Crandall, 2000). At NTID, some programming courses are now offered on-line and were specifically designed for Deaf students. They integrate captions and signed videotaped lectures (NTID, 2003). In the broader community of RIT however, Deaf students often elect to take courses for which an interpreter traditionally translated the discourse. When the format of some of the aforementioned classes became web-based, they were made accessible to the Deaf students through text-based dialogue. A recently conducted survey posed questions regarding Deaf students embracement of this approach. Hearing and Deaf students did equally well statistically and rated many contributing factors to success similarly. Long (2003) reflects:

> . . . *most deaf and hard of hearing respondents felt that the on-line learning format provided important communication-related advantages. Compared to a more traditional class, students were less dependent on interpreters to capture the important concepts in class and then present them in sign, in a way that was comprehensible to the students (p.397).*

It is worth noting that the Deaf students did not necessarily indicate that they preferred text material over ASL, but rather that they preferred first-hand information over messages filtered through interpreters. One student summarized the essence of this concept by saying, "Now through distance learning I get the exact same material presented in the exact same way as everyone else in the class" (Long, 2003, p.398). This statement would support the notion of leveling the playing field - an inquiry of the research project – at least among students with an excellent command of written English. Another strategic advantage of the web-based courses was the flexible pace at which students could address course discussions and content. Ninety percent of the students enjoyed being able to read, review, and process material prior to participating in on-line meetings. Students also had the option of seeking live tutoring from professors or peers – a service that Deaf learners valued more than did their hearing classmates (Long, 2003).

Conversations with the lead researcher, led this author to hypothesize that the derived benefit from these live tutoring sessions was explanations given in ASL. A similar, but somewhat different approach by DeSales University is to modify, primarily through captioning, their current MBA on-line program to accommodate Deaf students (Mangan, 2001). Gallaudet University, the world's only liberal arts college for the Deaf, is also at the forefront of distance education delivery. Their online learning system is called the Gallaudet Dynamic Online Collaboration (GDOC) and encompasses tools, such as Blackboard, to offer web-enhanced and web-based courses. Seventy percent of the students and forty three percent of the faculty are using this system (King, 2002).

For schools not accustomed or attuned to the needs of Deaf students, however, the tendency may be to produce inaccessible on-line courses. Kessler (1999) writes, "The ADA [Americans with Disabilities Act] does not mandate that distance-learning programs be provided, but where they are offered, the accessibility requirements are no less stringent than for standard educational programs" (p.44). Therefore, the National Center for Accessible Media (NCAM) and the Massachusetts Institute of Technology (MIT) have teamed up for a three-year project involving "Access to PIVoT" (Physics Interactive Video Tutor). The research team will, ". . . issue a set of guidelines recommending procedures for creating Web-based educational resources" (Freed, 2001, p.3).

Other educational entities have either combined, expanded, or taken a different approach to educating their Deaf students through distance learning. SOAR-High (Science, Observing, and Reporting-High School) ". . . is a web-based earth systems science course involving collaborating teachers and deaf students at high schools in California, Washington DC, and Indiana" (Barman & Stockton, 2002, p.5). In this hybrid environment, students continue to meet in person with their own teacher and classmates, but the course materials and activities are web-based. By its very nature and design, SOAR-High increased students' exposure not only to the science content but also to technology. The students learned to use digital cameras, scanners, videoconferencing, web search mechanisms, web page development tools, and on-line courseware for discussions, quizzes, and research exchanges (Barman & Stockton, 2002; Ellsworth, 2001). Barman & Stockton (2002) find, "All of the ISD students seemed to feel that they had learned to be more independent as a result of the SOAR-High project" (p. 8). These skills will endow a broader range of students to be more successful in mainstream on-line courses in the future (Ellsworth, 2001).

Although low-ability English readers had difficulty with some of the units, studies have shown that students are motivated by the technology and will attempt reading tasks on a computer that they would find daunting in a text book (Juhas, 2001). At the post-secondary level, NTID has a variety of distance learning approaches. They adopted a hybrid approach including videotape-supplemented instruction, in sign language, as far back as the 1960s. The disadvantages of this medium include the requirement to physically keep track of the tape, the lack of uniformity between video players around the world, and the inability to index the material (Mallory, 2001).

Recently, instructors have experimented with a new approach – video streamed instruction delivered via the web. Video streaming can be defined as the progressive download of a video file that is either live or prerecorded. Mallory (2001) forecasts, "Although streaming video with captioning is not quite perfected and is not yet widely used on the web yet as a stand-alone instructional tool for the deaf and heard of hearing audience, it will be soon" (p. 6). NTID hopes to entice working adults in remote areas to receive training in this manner. Video streaming is becoming more viable in part due to friendlier editing software, inexpensive digital camcorders, and high-speed Internet connection. Having separate streams for the signing instructor, the audio, the captions, and the computer displays is preferred due to limited bandwidth considerations (Mallory, 2001). Still there are disadvantages such as the cost and complexity of production and the clarity required for readability of sign language. Mallory (2001) summarizes, "There is a trade off between what file size is adequate to be able to understand sign language and the instruction when it is streamed to the user's desktop and what is a practical file size to store and stream video over a broadband connection" (p. 5).

Outside the United States, a recent study was conducted at the Open University in the United Kingdom to compare the perceptions of academic quality of a distance education program between hearing students and students with a hearing loss (Richardson and Woodley, 2001). The distance-learning courses were distributed primarily through broadcast television. Although both groups rated the quality of those classes high, the group with a hearing loss was not reflective of a typical Deaf student in that only three percent listed signing as their preferred language. The diversity of the various distance education projects discussed thus far is impacting schools around the nation and around the world. When implemented correctly, Deaf children and adults appear to benefit from these scenarios.

Instructors

Just as Deaf students themselves are participating in distance learning ventures, so are their current and prospective teachers. Teacher preparation programs and in-service initiatives have interwoven the distance-learning dimension into their agendas previously, but only recently on a large scale. In 1992, a survey was issued to remote graduate Deaf education students taking courses via videoconferencing (a.k.a. interactive video) from the University of Kansas (Luetke-Stahlman, 1994). Of the thirteen students, twelve were hearing and one was Deaf. Luetke-Stahlman (1994) finds:

> *Subjects generally agreed that the camera and monitor were not distracting, that being on "TV" did not make them feel self-conscious, that it wasn't hard to ask questions during class, that the professor didn't spend too much time attending to the "other" group, that the audiovisual materials were presented adequately, and that they didn't find it difficult to concentrate (p.100).*

Thus the program was a successful experience for these teachers-in-training and a preferred alternative to correspondence study due to the live interaction. This study did not address the communication method of the one Deaf student.

To gain a sense of the current state of distance teacher training and professional development, two nationwide, influential projects will be examined. The need for said initiatives is established by the declaration, "The primary problem in Deaf Education is not a lack of information, innovation or effort, but rather a persistent and growing problem in achieving critical mass of individuals, knowledge and resources" (Join Together, n.d., ¶ C). The PT3 Deaf Education Catalyst grant was subsequently awarded to the Association of College Educators – Deaf/Hard-of-Hearing (ACE-D/HH) and links the nation's 70 Deaf education teacher preparation programs through the Internet. The overall goal of the grant is to: "Establish a seamless on-line community of learners that collaboratively share information, resources, and opportunities for the common purpose of

recognizing excellence and enhancing performance within the field of Deaf Education." (Join Together, n.d., ¶ B). Membership enrollment at www.deafed.net is over 4,300 and includes pre-service teachers, mentor teachers, college professors, and parents. A typical exchange of knowledge between "Cyber Mentors" might consist of a teacher in the field sharing 'real-life' anecdotes and in return receiving contemporary literature on a topic from a pre-service teacher (Join Together, n.d.). Additionally, the grant has begun investigating the potential use of Internet based videoconferencing including its ability to render signed conversation adequately. At a bandwidth of 384 kbs, the technology is capable of performing the required tasks and will be used to connect expert teachers of the deaf with teacher preparation programs. Presently, 54 Polycom ViaVideo systems are in place throughout 21 states with more to be added (Join Together, n.d.). A future hope of the project is the expansion of the community of learners to include state schools for the Deaf, large public schools with Deaf education programs, deafness related national organizations, and selected corporations. With additional funding, the Deaf Education Network could also facilitate the recruitment of individuals to become Deaf educators, setup a "Virtual Professional Network" for statistical tracking and mentorship, and create a "Virtual Learning Environment" for Deaf students and adults to broaden their learning and collaborating opportunities (Join Together, n.d.). In general, this network fulfills and facilities a previously untapped source of national networking opportunities.

A second project that spans multiple states and is impacting Deaf educators and students alike is the Star Schools Project. This five-year grant, which began in 1997, is one of seven from the United Star Distance Learning Consortium (USDLC). According to Rodgers (2003):

> [It is] one of the most comprehensive, education-focused research and development projects in the history of deaf education . . . The ASL/English Bilingual Staff Development Project effectively applied engaged learning principles and a technology-based learning community approach to increase teacher and staff knowledge and skills related to bilingual approaches for deaf students (p. 3218).

The primary school, the New Mexico School for the Deaf, along with eleven other residential schools for the Deaf and several university teacher-training programs have been impacted. The learning community that has developed out of this venture includes researchers, parents, dormitory personnel, mentors, and teachers. They share materials through web-based lessons, videotapes, CD-ROMS, videoconferencing, and other avenues (Rodgers, 2003). Hubbard (1999) concurs, "Distance learning and videoconferencing are especially useful for making subject matter experts available to students and for enabling collaboration and staff development activities over distances" (p. 1). One example on the student side was the connection of Deaf youth and a panel of veterans who had served the country. During the course of the five years, distance learning took place in staff/mentor meetings, seminars, and classroom instruction and moved from a precursory use of the Internet for such tasks as email to an in-depth use of complex, broadcast technologies such as videoconferencing and online instruction (Rogers, 2003). The project, which also sparked international interest, has generated self-sustaining practices that can continue to develop even after the official grant comes to a close.

In the same spirit, other smaller-scaled initiatives have followed suit in the race to keep educators and support personnel connected and informed. In 1997, Gallaudet University initiated an in-service project called THREADS (Transformations for Humanistic and Responsive Education for all Deaf Students). Theories of multicultural education and constructivist methodology were presented live during a one-week summer course and subsequently reinforced throughout the school year via distance education (deGarcia, 1997). CSDB has used their videoconferencing capabilities not only for the student-centered activities discussed previously, but also for workshops on bilingual-bicultural pedagogy methods, conference planning, audiology meetings, sign class distribution, and more (Rose, 1999). At NTID, a new outreach effort under the auspice

of the distance education department, is labeled "COMETS" (Clearinghouse on Mathematics, Engineering, Technology, and Science). It is an online educational resource and network for pre-service and in-service development programs aimed at both K-12 and college instructors (NTID, 2003). The project is funded by the National Science Foundation. NTID also uses their videoconferencing capabilities for staff development and recruitment efforts. Finally, SKI-HI (Sensory Kids Impaired Home Intervention) is:

> *a specialized in-service training model to prepare early interventionists, special education teachers, and related service personnel to provide family-centered programming to infants, toddlers, and preschoolers who are deaf or hard of hearing and their families. The in-service course was specifically designed for practicing professionals and paraprofessionals (SKIHI, n.d.,¶ Home).*

The distance education distribution methods for SKI-HI include two-way audio conferencing and videotape correspondence shared in three 10-week units. This paper suggests that the time has come for teachers to stop reinventing the wheel and start getting plugged into the ever-increasing community of distance collaborators that can propel Deaf education forward in terms of success and influence.

Interpreters

The last group of people involved in Deaf education that this paper will address is interpreters. The Distance Opportunities for Interpreter Training (DO IT) Center offers a three- year program, at a distance, for sign language interpreters who work in K-12 classrooms (Johnson, 2001). Of the 70 interpreter training programs, only two offer specialization in educational interpreting. The rationale, therefore, for this program is that school districts, especially rural ones, often must hire individuals who are 'under-prepared' for the task. Thus, "Educational interpreters who have limited or no opportunities for professional growth are able to access state-of-the-art information via technology without compromising jobs or families" (Johnson, 2001, p. 9). The program, as of 2001, had over 200 students from twelve states with an expected increase in subsequent years. The learning approach by DO IT incorporates a wide variety of distance techniques. Courses in the fall and spring are typically six weeks long and are sent to students in a "Box" format that includes a study guide, video and audiotapes, readings, teacher insights, assignments, and other information. Seventy percent of the courses are actually based in WebCT, but students still receive the "Box" with initial material. Students then converse through email and web discussions with their instructors, reportedly creating more interaction than common in traditional classrooms. Most importantly, "Distance learners are not left in isolation to struggle alone with academic content" (Johnson, 2001, p. 11). During each course, there is usually one three-hour videoconference as well. "[These] synchronous presentations by instructional staff members can be made to enhance or clarify instructional content; panels can be recruited with members from various states to provide multiple perspectives on an issue; modeling of specific assignment expectations can be done", states Johnson (2001, p. 11). The videoconferencing session does require travel, sometimes of over a 100 miles, on the part of the student. Besides the academic content, there is a mentorship component of the program (comprised of master interpreters and Deaf individuals) that is delivered totally at a distance by exchange of videotapes through the postal system and of comments through electronic mail (Johnson, 2001). Finally, there is a three-week, mandatory, in-person summer session. Johnson (2001) finds:

> *The on-site segment proves that personal interaction adds a valuable dimension to the educational experience. Without it, the distance interactions might well remain more impersonal and less appealing; with them, both students and faculty look forward to the on-going distance interactions with little notice of the distance dimension (p. 13).*

The DO IT Center has future plans to videoconference to home computers, add computer-assisted sign language enhancement to the courses, and provide an on-line resource for continuing education. In summary, "It [The Educational Interpreting Certificate Program] illustrates that distance education is an effective means of providing interpreter education. It is possible to teach interpreting at a distance" (Johnson, 2001, p.13).

A closely related group, students taking ASL as a foreign language, share a common goal with interpreters - to become proficient in signed communication; therefore, a brief look at programs addressing this subset is required. In 2001, at the University of Wisconsin-Milwaukee (UWM), ASL was delivered through the blended technologies of the Internet, videoconferencing, and streaming video (Lehman & Conceicao, 2001). The researchers asserted, "ASL is highly visual and interactive and, therefore, an excellent type of content for videoconferencing." (Lehman & Conceicao, 2001, ¶ Implications). Similarly, the Baxter School for the Deaf employees a Deaf instructor to teach ASL to other high schools in Main (Kessler, 1999; Mara 1999). The course is distributed over a high-speed, asynchronous transfer mode (ATM) network at speeds of 45 megabits per second – the equivalent of 30 telephone lines. The exchanges are high quality and instantaneous. Mara (1999) explains, "ATM is especially good at carrying video, voice, and data simultaneously because it can prioritize different kinds of information and manage them efficiently. Other wide area technologies, like ISDN or T1 lines, don't have this capability" (¶ Infrastructure). The videoconferencing equipment and the ability to now offer courses such as ASL, is hoped to increase enrollment at the rural high school by enticing neighboring cities without high schools to choose Baxter for their students.

Implementation Considerations Identified

Having now reviewed the various projects for the students and staff involved in Deaf education, this paper's focus shifts to the practical strategies and suggestions for creating or modifying distance learning in this context. Johnson (2001) establishes, "Effective distance education requires a new perspective on learning and teaching, and new approaches to preparing teaching materials" (p.9). Eilers-Crandall (2000) concurs and asserts, "Educators of Deaf students have a definite advantage when it comes to distance education in that they already know how to adapt teaching for visual learning" (p. 14). Implementation considerations are broken down into two main categories – videoconferencing and Internet-based planning.

Videoconferencing

Hearing presenters must be instructed to not use 'voice-over' with their visuals. Deaf students cannot attend to the visual image and the interpreter at the same time; therefore, they must be allowed to look at it first and then pay attention to the discussion. Neither can Deaf students attend to a task, such as a web search, while listening to the presenter (Hazelwood, n.d.). However, "For Deaf participants, chromakey takes the place of 'voice-over'", continues Hazelwood (p. 10). In order to implement this technique, one needs a mixer with a chromakey generator and a background (typically a blue or green screen) so that the presenter can be superimposed over an image from the document camera or computer. A mixer is also critical because it allows an interpreter and hearing presenter to be spliced together to be displayed to the Deaf audience and recorded to tape for future viewing.

Juhas (2001) notes "Lack of visual clarity and latency or lag time can be problematic for hearing users but is an even greater disadvantage to deaf users" (p. 2). The lag time referenced above is due to technical limitations, but lag time, more accurately termed 'processing time', also manifests itself as a delay between original and translated language utterances. Thus it behooves the Deaf educator to explain to hearing presenters that students cannot, for example, answer questions immediately because both the equipment and the interpreter have to "catch-up" (Hazelwood, n.d.). Researchers have found that internet-based videoconferencing such as 'Cu-

SeeMe' delivered through web cams do not currently produce high enough quality output to have a normal ASL conversation (Eilers-Crandall, 2000; Hazelwood, n.d.). The recommendation, therefore, is to use a T1 or ISDN-based network with a minimum of 384kbps and a preferred 512kbps. Especially, at the former rate, signers must slow down their communications, especially fingerspelling (Hazelwood, n.d.). Regardless of the rate the deaf students have available, if the museum or other school is only wired at 128kps, the signing will not be clear; it may be jerky or blurry (Juhas, 2001; Rose, 1999). Hence, Juhas (2001) recommends:

> *Due to the lag time that is inherent with videoconferencing, and the fact that sign language is not smooth and natural at 128 kbps, it is essential that the interpreter be located with the deaf audience members and not in the customary place, which is a the side of the presenter (p. 3).*

However, even in the past couple years since much of this research began, there has been an increase in the speed and quality of connections consequently clearing the path for viable internet-based videoconferencing. For example, traditionally, Deaf and hearing persons have experienced phone conversations through a text relay process, but video relay interpreting (VRI) is growing in popularity. The logical progression to engaging remote interpreters even for in-person courses is one of the topics to be addressed by Gallaudet University and the University of Tennessee should they be awarded a new federal grant (Gallaudet University, 2002). The grant would also provide funds for creating a 'cookbook' of best practice guides and training for distance education.

Taking a more technical approach to combating the issues of transmission clarity, Muir & Richardson (2002) conducted a study to determine what portion of the signer a person looks at most. They found, "It may be possible to make better use of available transmission bandwidth by selective optimization of key features of the video sequence" (Muir & Richardson, 2002, p. 650). Through tacking of gaze point and eye movement data, the face was found to be the region of the image that was attended to most often and thus needed to be the sharpest quality. From a practitioner viewpoint, some more simplistic ideas to maximize readability include selecting appropriate contrasting colors for clothing and background and properly framing the shot (Lehman & Conceicao, 2001; Lightfoot, 2002). Establishing a few preset camera positions is best so that camera zooming is minimized as excessive visual movement is disorienting to Deaf audiences (Robinson & Aidala, 2002; Lehman & Conceicao, 2001). Finally, signers need to see themselves to ensure they stay in their sign space, but students often find it distracting to see their images so the protocol for videoconferencing may vary based on individual cases (Hazelwood, n.d.; Juhas, 2001). Juhas (2001) summarizes, "The value of these learning tools is dependent upon the strategies employed in planning and preparing for interactive and experiential learning" (p. 5).

Internet-based

Eilers-Crandall (2000) suggests that a transition time is necessary as web-based distance education instruction is introduced to Deaf students since it signals both a change in technology dependence and a change from guided to more independent learning. A professor at DeSales University, states, "For most Deaf … students, the language we're going to use – mostly text-based, supported with graphics – is a second language for them. We need to think of these students the same way we think of international students who have another first language" (Mangan, 2001, p.A39). Modification of content to include more visual components is thus a recommendation. At NTID, Dr. Mallory creates innovative web-based distance education programs and asserts, "My teaching style has been to take distance learning to a more personal level, trying to create the same atmosphere that I am able to create in the traditional classroom" (COMETS, n.d.). That personal level for some NTID courses, means adding streaming video to the web presentations so that instruction can be given in ASL. As mentioned earlier in this text,

the tradeoff for clearer video is larger file size so both factors must be considered. A recent teleconference in February of 2003, distributed by PEPNet (The Postsecondary Education Programs Network), detailed some of the design considerations and technical issues pertinent to on-line learning involving Deaf students that have been addressed in this paper (PEPnet, n.d.).

Conclusion

"Research studies clearly demonstrate that, properly executed, distance learning is, at least, as effective as traditional pedagogical approaches," reflects Johnson (2001, p. 9). 'Properly executed' is the key word in that statement and the focal point for much of the contemporary research regarding Deaf studies. But is there one right answer? This paper takes the position that Deaf learners are a heterogeneous group comprised of individuals with unique backgrounds and skill sets necessitating different distant instructional approaches. Videoconferencing designed especially for Deaf elementary and high school students, appears to be the most common and successful form of distance education currently since it accommodates ASL communication. In examining college and career age students, however, the issues are more dynamic. As long as students have a certain level of proficiency in the language of the instructor – whether that be English or ASL - they appear to prefer to receive the information first-hand. Future research should address how to determine the pivotal point in terms of age, grade level, or language skill at which students develop this preference for direct instruction over their preference for instruction in their native-language. It is the same type phenomena that occurs when a hearing person would rather watch a movie in the original foreign language than with English dubbing because the payoff of receiving the nuances of the original outweigh any deficiencies in comprehension of the secondary language. With this type of data, educational entities would be in a better position to make accommodating implementation decisions such as captions versus interpreters. It would be interesting to research the connection between students who prefer interpreters versus real-time captioning in traditional classrooms and students who prefer text-based web-courses versus interpreted videoconferencing. However, a majority of the available research is descriptive, focusing on individual projects, rather than empirical studies. It is evident from that body of literature that a wide range of programs and strategies can be employed with positive results not only for Deaf students but also for the instructors and interpreters that serve them.

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