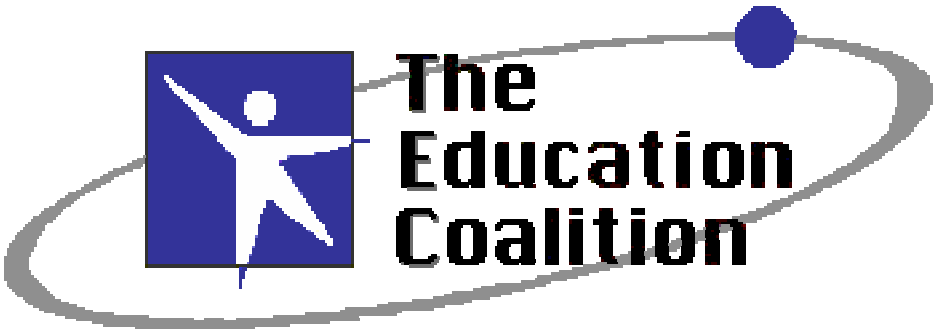

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Implementing Multiple Intelligences and Learning Styles in Distributed Learning/IMS Projects

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New methods to deliver education at a distance are rapidly emerging. One of the most promising is the Instructional Management System (IMS). It is based on international standards, sponsored by EDUCAUSE, is entirely Web based and supports distributed learning. This is the first-generation system that changes instructional design to move into learning objects, and Internet learning environments in a sustainable non-linear way. A number of top firms are developing software applications to support IMS. One of the brightest spots is that IMS provides the pathway to easily prepare and present materials to the student's multiple intelligences and learning styles. It truly provides the software to easily individualize education and training materials for the learner.

The Instructional Management System

The IMS system has as its basic element that learning materials can be broken down to their simplest elements. Think of a learning object as a chunk of learning content. It would likely never be the entire program or module. A group of learning objects would make up a program or module. Developers talk about the granularity of the learning object – how small it can be.

Learning objects can take the form of any type of media that can be digitized and sent across the Internet. This opens up a wide range of materials to the instructional designer – video, print, textbooks, magazines, slides, QuickTime movies, case studies, collaborative activities, e-mail, Web pages, telephone, and any other medium that has yet to be developed. Each learning object will have a meta-data tag that defines its properties. For example, the meta-data tag would contain the name of the learning object, the creator, type of file, interactivity of the content, grade level, cost, copyright information, and appropriateness for types of learning styles in addition to other information that the author may provide.

The meta-data tagging system becomes a sophisticated search tool that will significantly increase our abilities to quickly find materials on the Internet. Large materials libraries will be available to search.

IMS Advantages

There are a number of advantages to the IMS system.

Cost-effective: Previously produced materials can be repurposed and reused by any number of users. Rather than producing new basic content with limited production funding, IMS will provide access and use of existing materials to meet a variety of students' learning styles. When existing materials cannot be used or are not appropriate for some reason, production funding can be used to produce the new content objects. The new content objects can be offered through IMS libraries and sold to users, thus involving others in the production and reducing the cost per student to produce the content. Reusable and new content objects can be combined easily in the same program.

IMS Libraries: Searchable and viewable libraries of content materials will be collected. The meta-data tag will be the method used for the search. All types of materials for all grade levels and training needs will be found in the libraries. Medical, defense, industrial, K-12, and higher education content will be available. The libraries may also contain full programs and modules which can be bought or leased according to the producer's wishes.

Multiple Software Platforms: A number of companies are developing software that will support the IMS system. The software will continue to work on the meta-data tagging system.

Based on International Standards: The IMS system is based on internationally accepted standards which are sponsored by the IEEE (an international engineering group), EDUCAUSE, and a other organizations. The standards have also been accepted by the IMS Developers' Group which is composed of a large number of software companies which are developing the software to support the standards. Members of this group include IBM, Apple, Oracle, Asymetrix and other major companies. A number of prominent universities are also members of the group.

Individualize Materials for Students: While materials can be individualized for classes whose students have the full range of learning styles and intelligences, the material can also be personalized for students with fewer skills, smaller foundations of content knowledge, looped classes where two grades of students are mixed, and other non-traditional educational scenarios. Materials can be selected so that the needs of students can be met who are ahead or behind the rest of the class.

Web Based: While the materials will be available through the Web IMS libraries, and IMS software will be Web based, students will be able to directly access lessons on the Internet or through a LAN server at their school or work. Materials could be downloaded and saved to one classroom computer.

Promotes Self-Directed and Collaborative Learning: While the IMS system will track the students' progress through the material, it will also promote self-directed learning and inquiry learning if the instructional designer includes activities to do this. The right activities will promote collaborative learning as students work on projects together through the IMS software provided by vendors.

Promotes the Use of Facilitated Learning by Faculty: While the faculty can be instrumental in preparing the lessons for students, when students work through the lessons, the faculty of necessity moves into the realm of facilitating learning. This is a major feature for educational institutions that have struggled with the integration of technology into the classroom and curriculum.

New Methods to Meet New Learning Needs

For hundreds of years, most teachers and trainers have presented information to learners in one format—lecture to a whole class. That model has been identified as objectivist and is based on Skinner's behaviorist learning theories where the teacher sets the pace, selects the textbook and resources, and controls the classroom. As students, we sat in seats and have been the target of those seeds broadcast by the objectivist learning theories and the linguistic teaching style. This is the teacher centered learning model, the hope was that the seed would fall upon fertile ground, germinate, and prosper.

For any organization teaching this way, recent research has shown that many learners not only prefer, but need, non-lecture styles to efficiently and effectively learn. They need styles with relevant interpersonal interaction, significant hands-on opportunities, well executed visual-spatial content, and with more self-direction of the pace and path of learning for each style of delivery. This is called constructivist at the K-12 level, and Andragogy at the adult level. In this model, the instructor facilitates the learning, identifies potential resources, and encourages the students to set their own rules, goals, and objectives. Learning contracts may be used to set the scope of work and assignments rather than a typical syllabus. This model is student/learner centered.

Gardner's Multiple Intelligences (MI)

The theory of multiple intelligences (MI) was first described by Howard Gardner in Frames of Mind (1983). Howard Gardner is Professor of Education at Harvard University and holds research appointments at the Boston Veteran's Administration Medical Center and Boston University School of Medicine. Gardner defines intelligence as "an ability or set of abilities that allow a person to solve a problem or fashion a product that is valued in one or more cultures". His most current research indicates that there are eight distinct forms of intelligence: linguistic, logical-mathematical, spatial, kinesthetic, musical, interpersonal, intrapersonal, and the naturalist. Gardner suggests that different intelligences may be independent abilities--a person can be low in one domain area but high in another. All of us possess the intelligences but in varying degrees of strength and skill.

Intelligence Quotient (IQ) theory (based solely on the linguistic and logical-mathematical intelligences) assumes that a person's intellectual potential is a fixed, genetically determined trait, which can be measured early in life and will determine an individual's potential. Gardner's above definition suggests a broad view of cognitive functioning and is in sharp contrast to intelligence as defined by IQ. In other words, Gardner's MI model broadens our perceptions of what is meant to be intelligent. Until Gardner's arrival, this model of intelligence was perceived as the norm throughout most of the world. The MI theory continues to open the minds of educators, psychologists, learners and parents as to how learning and education can be changed so that all persons may be guided to achieve their maximum potential.

It is tempting to equate learning styles and intelligences because there are similarities, but until we have a much better understanding of both, it is best to avoid mixing the models.

Linguistic Intelligence - using words effectively. These learners have highly developed auditory skills and often think in words. They like reading, playing word games, making up poetry or stories. They can be taught by encouraging them to say and see words or to read books together. Tools include computers, games, multimedia, books, tape recorders, and lecture.

Logical-Mathematical Intelligence - reasoning, calculating. Think conceptually, abstractly and are able to see and explore patterns and relationships. They like to experiment, solve puzzles, ask cosmic questions. They can be taught through logic games, investigations, and mysteries. They need to learn and form concepts before they can deal with details.

Visual-Spatial Intelligence - think in terms of physical space, as do architects and sailors. They are very aware of their environment. They like to draw, do jigsaw puzzles, read maps, daydream. They can be taught through drawings, verbal and physical imagery. Tools include models, graphics, charts, photographs, drawings, 3-D modeling, video, videoconferencing, television, multimedia, texts with pictures/charts/graphs.

Musical Intelligence - show sensitivity to rhythm and sound. They love music, but they are also sensitive to sounds in their environments. They may study better with music in the background. They can be taught by turning lessons into lyrics, speaking rhythmically, tapping out time. Tools include musical instruments, music, radio, stereo, CD-ROM, multimedia.

Bodily-Kinesthetic Intelligence - use the body effectively, like a dancer or a surgeon. Keen sense of body awareness. They like movement, making things, touching. They communicate well through body language and can be taught through physical activity, hands-on learning, acting out, role playing. Tools include equipment and real objects.

Intrapersonal Intelligence - understanding one's own interests, goals. These learners tend to shy away from others. They're in tune with their inner feelings; they have wisdom, intuition and motivation, as well as a strong will, confidence and opinions. They can be taught through independent study and introspection. Tools include books, creative materials, diaries, privacy and time. They are the most independent of the learners.

Interpersonal Intelligence - understanding, interacting with others. These students learn through interaction. They have many friends, empathy for others, street smarts. They can be taught through group activities, seminars, and dialogues. Tools include the telephone, audio conferencing, time and attention from the instructor, video conferencing, writing, computer conferencing, E-mail.

Naturalist Intelligence - demonstrates expertise in the recognition and classification of numerous species – the flora and fauna – of the environment. Value is placed on these individuals who can recognize members of a species that are especially valuable or notably dangerous and can

appropriately categorize new and unfamiliar organisms. These abilities come into play more probably with respect to "artificial" items. Discrimination by a teenager with regard to sneakers, cars, sound systems, or CDs also fits the intelligence. To help the categorization process:

- Verbal/Linguistic plays with words
- Visual/Spatial plays with pictures
- Bodily/Kinesthetic plays with moving
- Intrapersonal plays alone
- Logical/Mathematical plays with questions
- Musical/Rhythmic plays with music
- Interpersonal plays with socializing
- Naturalist plays with categories

Canfield Learning Styles (LS)

Everyone has multiple learning styles. Dr. Albert A. Canfield created a learning styles (LS) inventory as most people do not know what their LSs are or that their styles differ from others. There is no one right or best LS. Our styles of learning, if accommodated, can result in improved attitudes toward learning and an increase in productivity, academic achievement, and creativity. We use some styles when learning, but we tend to prefer a small number of instructional methods. Furthermore, evidence indicates that an individual can learn better, smarter, faster and retain more information when material is presented in one's preferred learning style/multiple intelligence. However, research does not support that there will be one right method to teach to a student.

Humans learn in a variety of ways and it is likely that there are ways that have yet to be discovered along with the instructional methods to meet them. Presenting information to students in only one LS does not meet all of the student's needs. A student might have roughly the same preference for learning content through visual and hands-on materials. If the content is presented only to the visual preference, the student would not learn as completely as he/she would if the content was presented by hands-on methods. All students learn differently due to a dominant or preferred LS.

The Canfield LS instrument is easy to use and self-scoring. It provides students with knowledge about their individual LS is and how they differ from others. The instrument is paper based and takes about 30 minutes to complete. It can be submitted before the class begins or the institution may keep the LS scores of all students on record and make them available to instructors. The instrument helps determine preferred learning conditions, areas of interests, modes of learning, and course expectations.

Conditions

Peer: Working in teams; good relations with others; having friends; feeling positive about working and building something together. Clearly a high priority in an organization: Work logically and clearly organized; meaningful assignments and sequence of activities.

Goal Setting: Setting one's own objectives; using feedback to modify goals and procedures; making one's own decisions on objectives. This is an important element of being self-directed and proactive. They need to know how they fit in with the larger company goal.

Competition: Desiring comparison with others; needing to know how one is doing in relations to others. America fosters this - but competing does not automatically foster excellence. Competition is an extrinsic reward ... it is better replaced with an intrinsic reward system.

Instructor: Knowing the instructor personally; having mutual understanding; liking one another. Give plenty of eye contact and positive non-verbals.

Detail: Specific information on assignments, requirements, rules, etc. People who want minimal amounts of detail are right brain conceptual thinkers. They need to understand the concept first ... and then will sit through the detailed explanation - remembering only the details that are important to their conceptual understanding. People who want details in a sequential order are left brain linear thinkers. Take them through the process in an orderly, chronological process.

Independence: Working alone and independently; determining one's own study plan; doing things for oneself.

Authority: Desiring discipline and maintenance of order; having informed and knowledgeable instructors and superiors.

Content

Numeric: Working with numbers and logic; computing; solving mathematical problems; etc. Provide with charts, spreadsheets.

Qualitative: Working with words or language; writing, editing, talking. Provide a report to them prior to a meeting or the need to make a decision. Lengthy question and answer periods will give them time to formulate the idea in their own words

Inanimate: Working with things; building, repairing, designing, operating. Provide a physical model or way to work with the idea in question

People: Working with people; interviewing, counseling, selling, helping.

Mode

Listening: Hearing information; lectures, tapes, and speeches.

Reading: Examining the written word; reading texts, and pamphlet.

Iconic: Viewing illustrations, movies, slides, pictures, and graphs.

Direct Experience: Handling or performing; shop, laboratory, field trips, practice exercises, and hands-on.

Expectancy Score: The predicted level of performance.

Variance in One Class

It is quite useful to show a class all of the scores from the inventory as it helps them to understand that everyone learns differently and that no one way of learning is best (See Table 1). This also helps instructors to think about the LS class mix and how to create activities and assignments that will meet a variety of styles. It provides support for instructional designers who need to learn new ways to design instruction for classes with multiple LS and intelligences. Figures are shown in percentiles so that a score of 95 would indicate the 95th percentile and the learner would have a high need to have this style met. A score of 05 would indicate the fifth percentile – or a low need for the learner.

The Canfield is quite useful in distributed learning as it shows scores for an instructor to provide structure, the independence level of the student, and the need for an authority figure by the student. If the student instructor percentile score is 25, this indicates a low need for an instructor to provide structure; 85 would indicate a much higher student need to have structure imposed from the outside.

If the student's independence score is high, such as an 85 or 95, it indicates that the student is quite independent in learning and probably capable of working well in a distributed learning environment. A low score would indicate that the student is not an independent, self-directed learner and that the instructor will need to provide an intervention to help the student begin movement toward this goal. Students need time to move through the process of becoming independent learners. This may take six months to a year.

If the student's authority figure is low, they are likely to function well in a distributed learning environment and collaborate well with other students. If the figure is high, they require an authority figure to provide the structure and set the rules. The instructor will need to provide an intervention that will the student's reduction of the need for authority imposed from the outside.

These three scores are useful as indicators for the distributed learning instructor of students who will do well in the environment, and those who need interventions to begin movement toward self-directed learning. It is always a temptation to want to help the needy student and provide the structure and authority that they often demand in an instructor. These demands are usually another indication that the student is unable to be self-directed and independent in their learning.

Table 1: Sample Class Learning Style Scores (All Figures are Percentiles)

Student	#1	#2	#3	#4	#5	#6
Conditions						
Peer	65	75	88	82	47	47
Organization	20	60	30	99	99	82
Goals	45	52	35	12	15	03
Competition	75	07	37	37	05	10
Instructor	25	83	38	94	10	65
Detail	17	53	45	65	99	90
Independence	88	55	57	45	01	40
Authority	65	10	65	18	08	10
Content						
Numeric	72	72	52	53	22	90

Qualitative	30	40	90	60	30	30
Inanimate	30	12	55	20	90	90
People	52	62	95	14	71	05
Mode						
Listening	25	80	73	65	12	95
Reading	55	63	40	60	90	47
Iconic	25	25	07	80	01	08
Direct Experience	88	25	87	10	98	10
Expectancy	97	95	75	60	59	89

Table two shows the preferred learning style of the population by percent and age. Observe that the linguistic Intelligence increases with age according to Teele's research while the bodily-kinesthetic intelligence shows a reduction.

Table 2: Teachers' Dominant Intelligences by Age (1995, Teele)

Ages:	**20-25**	**26-35**	**36-45**	**46-55**	**56+**
Linguistic	3.51	3.94	4.22	4.58	4.37
Logical-Mathematical	3.07	3.13	3.06	3.26	3.41
Spatial	4.33	4.34	4.37	4.21	4.15
Musical	3.17	3.36	3.33	3.38	3.33
Bodily-Kinesthetic	4.85	4.40	4.21	3.90	4.11
Intrapersonal	3.13	3.37	3.52	3.69	3.40
Interpersonal	5.80	5.43	5.27	4.95	5.08

Litzinger/Osif LS Theory

Litzinger & Osif (1992, 73) chose to look at LS in differently and describe LS as "the different ways in which children and adults think and learn." They see that each develops a preferred and consistent set of behaviors or approaches to learning. They break the learning process into three segments:

1. Cognition--how one acquires knowledge
2. Conceptualization--how one processes information. There are those who are always looking for connections among unrelated events. For others, each event triggers a multitude of new ideas.
3. Affective--people's motivation, decision making styles, values and emotional preferences will also help to define their learning styles.

Kolb's LS Theory

A number of people have tried to catalog the LS ranges in more detail than this. Kolb is perhaps one of the best known. Kolb showed that LS could be seen on a continuum running from:

1. Concrete experience: being involved in a new experience
2. Reflective observation: watching others or developing observations about own experience
3. Abstract conceptualization: creating theories to explain observations
4. Active experimentation: using theories to solve problems, make decisions

Hartman (1995) took Kolb's LS and gave examples of how one might teach to each style:

1. Concrete experiencer--offer laboratories, field work, observations or trigger films
2. Reflective observer--use logs, journals or brainstorming
3. Abstract conceptualizer--lectures, papers and analogies work well
4. Active experimenter--offer simulations, case studies and homework

Although Kolb thought of these learning styles as a continuum that one moves through over time, usually people come to prefer, and rely on, one style above the others. And it is these main styles of which instructors need to be aware when creating instructional materials.

Implications for Instruction

Where do these lists of learning styles lead us? There are probably as many ways to "teach" as there are to learn. People do not see, hear, or experience the world in the same way. They have very different preferences for how, when, where and how often to learn.

Using multiple types of media (video, audio, data) ensures that all learning styles are met and that significant methods for interaction are provided. This mix of media is available now. With it all learning styles can be reached. It also includes a component that enables students to become self-directed learners and reduce their sense of isolation.

The synergy of technologies available through multiple media and the Internet creates new learning opportunities for adapting learning to learning styles. Annual growth in web-based training, as projected by International Data Corporation, is to be 150 percent per year through the end of the century, as compared to eight percent per year for instructor led training. Unfortunately, this effective use of technology is not happening. Of the 23 sites offering interactive web-based training from software/hardware developers or training developers (such as Microsoft, Ziff Davis, Gartner Group, and Digital Think), none of those providers personalizes training or education by preferred learning style, nor was that criteria even contemplated as a quality measure in the research (Kisa Harris, ED Journal, March 1998). We have arrived at a place where we need to rethink and reinvent how we use learning styles and multiple intelligences to teach effectively using technology.

Most assessments are pencil and paper based and as such are not authentic assessments. They do not assess the learner in the act of doing something, but instead ask the learner to make a choice about what they might do in a given situation. This is not ideal.

Personal Learning Model (PLM) and Profile (PLP)

The Problem: Students learn in a variety of ways. Technology and mediated courses can meet these needs better, however, there is currently no authentic assessment tool that works in an online environment. There is currently no model or tool capable of assessing a student's learning styles, multiple intelligences and media preferences.

The creation of a theory, model and tool will have a profound effect on the adoption of mediated courses because of its interactive, diagnostic, and multiple use components.

The Personal Learning Model and Profile: The Education Coalition, a nonprofit technology consulting group, a for-profit corporation specializing in assessing student performance, has developed and tested the concept for a *Personal Learning Model* to assess the learning styles, multiple intelligences and media preferences of distance learners. The assessment is called the Personal Learning Profile (PLP) which is in development.

Priority Need: The PLM/PLP can be used by any distance educator seeking to develop online courses prescriptive to the needs of different types of distance learners. The PLP assessment tool can be taken anytime or anywhere by a student and will capture their learning needs and create a Personal Learning Profile. The assessment results and the personal profile of the student will be sent directly to the instructor for review and to the instructional management system of the organization for the learner's portfolio. This entire process will occur online in a virtual reality environment.

Instrumentation Strategy: The partnership is developing an online environment capable of assessing a student's learning styles, multiple intelligences and media preferences. It is an authentic assessment as compared to the paper/pencil assessments currently in use. The student will be tracked while moving through multiple tasks developed to specifically assess learning preferences, with results provided to the student and the instructor.

The Personal Learning Model has been developed based upon the learning styles research of Canfield and Gardner's multiple intelligences work. It also draws heavily upon the work of TEC in the application of these academic theories and practices to the use of media for instructional purposes and student media preferences.

The basis of the model is that technology provides a deeper learning experience for students if content materials are presented in their preferred style first, then in his/her second and third styles. Mediated learning materials assist students in learning more quickly and are more engaging for them than traditional delivery methods. The importance of the model is that it will provide individualized learning, although several dozen or hundred distance learners might be enrolled in the same online course. The Personal Learning Profile, generated by the model, will enable educators to plan

effectively and modify curriculum and assignments to contend with each student's individual learning style differences.

Using learning styles for courseware design is gaining national attention and has become a "significant movement" in the training industry (Advanced Distributed Learning Initiative, 1997). Software programs to manage instruction are being developed and marketed by a number of leading vendors and will be deployed throughout educational institutions across the country. Yet none are being developed to assess the student's learning preference, which would make the online courses more effective. The Personal Learning Model fills this void.

The Personal Learning Profile is the application that will provide the assessment results for the student and instructor. After the assessment, the student's preferences will be embodied in a meta-data tag which will always be sent to the instructional management system when the student logs on. In response, the Instructional Management System will create an individualized Web page to deliver materials and content to the student in the student's primary, secondary, and third learning preferences. No other program is being developed to do this, although such a tool is crucial to the next generation of technology for distance learners.

Regional and National Consequences of a Successful Project

Adoption of the Personal Learning Model/Profile are innovative ways for regional and national post secondary institutions to leverage the monies already invested in distance education by delivering prescriptive learning applications.

Goal: To develop fully interactive, high quality asynchronous courseware for anytime, anywhere assessment of a student's learning/intelligences style strengths and place it on the Internet for use by distance learners and distance educators.

Objective 1: Create one Personal Learning Model assessment tool which will assess at a minimum three types of learning styles and the learning modality of students in six areas: visual, auditory, math/logic, musical, interpersonal, and intrapersonal.

Objective 2: Build into the Personal Learning Model one kinesthetic and tactile assessment component through software development and integration of virtual reality and generate the beta version of the Personal Learning Profile.

Objective 3: Field-test the Personal Learning Model and Personal Learning Profile in a minimum of six distance learning environments including K-12, higher education, and training.

Problem	Solution	Anticipated Results
No existing software application that works in a learner-centered method, defines the student's personal learning model, and defines that model through dominant learning style, instructional media, and instructional methods.	Personal Learning Model and Personal Learning Profile for online use	Nationally accepted standardized distance learning assessment tool that is interactive, diagnostic, and suitable for multiple users that can be used anytime, anywhere by any distance learner. Qualitative measurement tool that will contribute to the improvement of online learning. Meets standards set by EDUCAUSE and the IMS Project (Instructional Management System)

The important thing is to recognize that not everybody is comfortable and productive within the same learning style mold. To engage and better instruct learners, one must first determine the individual's learning predominant and secondary learning styles, and then use technology to adapt learning to learning styles.

Strategies for Implementation and Adoption of Distance Learning

While distance learning has been an education and training fixture for decades, there is still little understanding of the entire field of change as it relates to the implementation and adoption strategies which are applied to distance learning. While many organizations embrace distance learning (aka distributed learning and e-learning), there are varying levels of implementation and adoption. Some organizations fully use all types of distance learning technologies and all staff and faculty have fully adopted their use. Other organizations have mixed implementation and adoption patterns.

Varying uses levels, adoption levels, and implementation levels of educational technologies lead one to ask why we are still seeing less than a full implementation and adoption of technologies that are perceived as useful to many users.

The adoption of the innovation of distance learning has a substantial history of research into the adoption barriers. Generally, they have been broken down into general and psychological barriers. Implementation strategies have received less study, but literature reviews show clear patterns where strong implementation strategies have not been planned and/or followed by organizations.

Funding, ongoing professional development for instructors, limited equipment and access to networks, and a naiveté that leads to ignoring the political realities of the organization are some of the root causes for less successful adoption of distance learning. The lack of needs assessment documentation, strategies for adoption, planning instruments, and involving the entire organization in planning are also problems.

While many organizations seem to have taken a careless approach to implementation and adoption of distance learning, there are clearly many other organizations whose leaders are clearly ignoring the change in education and training on all fronts. Instructors are still using traditional teaching methods, no technology exists in the classroom except chalk and a blackboard, instructors do not use computers, e-mail, or have any idea how to present information to students whose learning style may not match their teaching style.

Many of these now point at the educational technology "no significance difference" research as the reason not to use educational technologies. They ask, "Why spend the money, if there is no difference in learning?" A sound management approach, but it is based on a misinterpretation of the research. They are not looking at the use of multiple educational technologies research which does show a significant difference in learning. Learners who have access to resources presented through a variety of learning technologies do show improvement.

General Barriers to the Use of Educational Technology

A number of barriers to the use of educational technology have been identified in recent years. They include:

Lack of information about technology (Baer 1978)
Length of time for widespread use (Baer 1978)
Inappropriate match - technology and service (Lucas 1978)
Panacea approach with technological solution (Benne 1975)
Machine mysticism (Pacey 1983)
    Misperception: Technical advance leads progress
    Myth: Cultural lag occurs everywhere as we try to keep up with progressive technology
    Use technology to answer new patterns of problems
Lack of money (Dirr in Barron 1987)
Lack of faculty commitment (Dirr in Barron 1987)
Lack of trained support staff (Dirr in Barron 1987)
Faculty Concerns (Barron 1987)
    Class size
    Discussion and face-to-face involvement
    Lack of support for faculty from peers/instructors
Hands-on experience for students in subjects such as chemistry
    Reality: More students are performing chemistry and physics experiments before computer keyboards instead of laboratory benches.
Lack of face-to-face interaction
    Perception: Benefits are assumed to accrue from personal interaction

Psychological Barriers to the Use of Educational Technology

A number of psychological barriers to the use of educational technology have been identified. In addition to “It’s never been done that way before,” other psychological barriers include suspicion and fear of change as well as telephobia which is a suspicion of change which involves television. Others fear that they will make a fool of themselves in front of their peers. “People who have watched TV for 20 years have built up all kinds of cultural expectations about people...on the screen. They expect to see a polished performer reading a script without a hair out of place. In contrast, executives or managers on a videoconference

tend to have their ties askew, don't always look at the camera ..and seem unsure of what to say" (E. C. Gottschalk, Jr., Wall Street Journal). Goldstein (1991) says that he is certain that the "move from the tutorial to the lecture that accompanied the rise of the modern university was greeted with similar outcries. I am equally certain that the differences in learning outcomes are as overstated today as they were then."

Education television and videoconferencing have been categorized as only hype or show biz and there is still an unsubstantiated fear that television may only entertain rather than inform. "As long as that attitude exists, teleconferencing will be limited to that use...there must be a recognition that teleconferencing is used not in a show biz environment but in a day-to-day environment, married to applications" (Jack Fox, Western Union).

Distance learning is perceived as being somehow fundamentally different from traditional instruction. What is the difference between a live lecture delivered to 600 students in a campus lecture hall and the same lecture delivered over a telecommunications system? This is an "intellectual trap" that leads us to believe that distance learning is so inherently different from what we have come to define as traditional instruction that it demands entirely different rules or it cannot possibly meet the established standards and therefore it is not worth fixing (Goldstein, 1991).

While distance education has become well established, there is still skepticism within the academic community about whether this form of education is of comparable quality to the more familiar classroom-based learning, as well as opposition from those who regard it as a threat to traditional faculty roles and classroom enrollments (Reilly & Gulliver, 1992). As long as regulators and accreditation agencies continue to apply measures intended for classroom-based instruction to distance education, the skepticism will be reinforced. This uneasiness with distance education is heightened by the sense of a "competitive threat from the entry of an 'outside' institution into a state. The 'Not Invented Here' syndrome reflected in this response is one of the greatest potential barriers to the national expansion of distance education" according to Reilly and Gulliver.

Others noted that TV does not transmit a personal high touch environment, but is a cold, high tech medium which looses body language, chemistry, electricity, does not maintain a long attention span, is not interactive, is known for low quality. Educators have noted that it lacks central grading, testing and measurement elements.

The advantages of educational technology have been noted as being cost efficient, providing access to programming and having the ability to enrich education (Seidman,1986; Wilson, 1987; Lewis, 1985).

Strategic Planning to Implement Distance Education Programs

The literature lists major barriers to implementation (Pearson, 1990). Lack of successful institutional planning for the delivery of distance education programs at educational institutions represents a major barrier to implementation and success. The problem is that there was no validated process for planning for implementation of successful distance education programs. Pearson's study determined what critical factors leaders of successful distance education programs considered to be important prior to, during, and following implementation of the program at their institution.

Thirty administrators in education, distance education specialists and program providers were invited to participate in a three round Delphi to determine the 20 critical factors that should be considered in the planning process to implement a distance education program at an educational institution. The 30 key leaders were asked with each Delphi round to refine and rank those critical factors that they listed. The final round produced 20 critical factors in rank order.

Table 3: Critical Factors in Rank Order

1. Identified need (perceived or real) for the program.
2. Faculty and teachers supportive and given incentives for motivation.
3. Funds for capital costs; production, equipment, facilities.
4. Availability of on-going money for operations and expenses.
5. Quality of the educational content of the program (evaluation).
6. Adequate support staff to produce the program.
7. Ensuring equivalent learning experience to remote students.
8. Enthusiasm and belief by the institution in the overall distance education project.
9. Identification of a visible, spirited key leader/administrator initiating program.

10. Adequate receive sites, facilities, and staff.
11. Availability of appropriate and specialized equipment to deliver the programming.
12. Sufficient time for careful needs analysis; Identify range of services and programmatic needs of students. Example: Number of people, type of courses, ages served, location.
13. Ensuring equivalent status for remote students: i.e., credit, degree.
14. Instructional design/TV production; interactive components, length, frequency, number.
15. Identification of a marketing plan for the network, system or program. Public relations with the public.
16. Cost effectiveness: feasibility and justification for delivery system to students/institution.
17. Identified/gathered support/partners for program: industry, corporate, legislative, institutional.
18. Ensure continued program credibility with the public, faculty, students, and supporters.
19. Knowledge of educational administrators, teachers and staff at educational institutions on what distance education is and how to teach and use it effectively.
20. Ability to accredit courses, offer credit or transfer credit across states or institutions.

Panelists indicated that the factors were dependent upon each other for the ultimate success of the program implementation. The critical factors they generated contained a planning model which included the steps of purpose, philosophy, organizational structure, people, finances, equipment and facilities. Experts indicated that successful implementation depended upon the completion and thorough investigation of each critical factors.

The model set a high priority on human and fiscal resources that can serve as a model for the strategic planning of administrators of new programs in long distance instruction. Planning for the implementation of the program requires a major investment in time, people and funding. Serious consideration should be given to the number one critical factor: "identification of the need for the program." All the experts agree that without this identified need, an institution should not move ahead to purchase equipment, hire people, or even think about delivering a long distance program. Faculty involvement, incentives, motivation and training were ranked as serious issues for these successful institutions. According to these experts, the educator is a high priority in the delivery of long distance coursework. While the fear of teachers being replaced by the technology appears to be an overriding concern and barrier for many institutions, the importance of the teachers remains critically high in the electronic classroom.

Table 4: The Strategic Plan - Steps for Change

I. Decide to Plan for Change: **Awareness**

1. Key Administrators
2. Super Leader
3. Understand Elements of Change
   a) Flexible Environment
   b) Policy
   c) Philosophy
   d) Leadership

II. Recognize a Real Need vs Perceived Need: **Interest**

1. Identify the Recipient
2. Why Have the Program? Who wants and who needs the program?
3. The Competition: Who Else Is Doing It?
4. Is the Program Really Needed?

III. Understand the Real Reason for Implementation: **Advantage**

1. Value to the Organization
2. Political Issues Involved
3. Technology or Need Driven
4. Competition Driven for Competition's Sake
5. Philosophy of the Program
6. Culture of the Organization Affects the programs: Political issues involved

IV. Mission of the Organization: **Evaluation**

1. Does the Programming Fit the Organization's... Goals, Objectives, Quality Standards
2. How Will This Help the Organization? If it won't, don't!
3. What is the Driving Force to Market the Program?

4. Will it Make Money?
5. Will It Be Self Sufficient?
6. How Large Do We Want It to Become?
7. What Is the Return on the Investment ?

V. Plan the Program: **Trial**

1. Time - Take the Time to Plan
2. People - Faculty/Staff
3. Space, Facilities, Equipment
4. Production Capability
5. Money - Now & Later

VI. Review What the Organization Does Now: **Observability**

1. Will Distance Learning Duplicate Services?
   Classes, Staff, Departments
2. Is the Organization Working Well In Training & Education
3. Does the Organization Support Education & Training, Change, Technology
4. Do We Have Enough People and Support to Add Change?
5. What Are the Organization's Strengths and Weaknesses

VII. The Gap: **Compatibility**

1. How Far to Go to Have a Successful Program
2. Will the Organization Be Able to Change
3. Subtract the Difference Between.... Where We Want to Be
   - Where We Are Now
   The Gap
4. Can We Do It?

VIII. Contingency: **Pre-adoption**

1. Trial & Pilot
2. Flexibility
3. Client Needs
4. Institutional Perceptions
5. Success vs. Failure. What happens if...it won't, doesn't, can't, or if it is better or different

IX. Implementation: **Adoption**

Commit to the Ongoing Process

1. Lead People
2. Design Programming
3. Train in...Production techniques and Technology
4. Faculty Support
5. Dollar Support
6. Continued Resources - Finance the Program
7. Plan for Change, Growth and On-going Growth
8. Believe in the Program
9. Garnish Support Again and Again
10. Evaluate the Program

Conclusion

Follow: All Steps of Change and All Conditions of Success

Interpretation of Innovation Adoption by CBAM (Concerns Based Adoption Model)

There are seven Levels of Use identified in the Concerns Based Adoption Model (CBAM), and staff who are adopting an innovation will move up these levels in seven different areas. CBAM is used to determine at which level of use teachers and staff are working. By determining their level of use and the time each takes to move through the levels, it may be possible to plan an implementation strategy that will reduce the time to adopt the innovation of distance learning, and specifically project programming. The levels and areas are as follows.

Table 5: CBAM Levels of Use

Levels of Use	Description
0: Non-use	State in which the user has little or no knowledge of the innovation, no involvement with the innovation, and is doing nothing toward becoming involved.
I: Orientation	State in which the user has recently acquired or is acquiring information about the innovation and/or has recently explored or is exploring its valu orientation and its demand upon user and user system.

II: Preparation	State in which the user is preparing for first use of the innovation.
III:Mechanical Use	State in which the user focuses most effort on the short term, day-to-day use of the innovation with little time for reflection. Changes in use are made more to meet user needs than client needs.
IV A: Routine	Use of the innovations stabilized. Few, if any, changes are being made in ongoing use. Little preparation or thought is being given to improving innovation use or its consequences.
IV B: Refinement	State in which the user varies the use of the innovation to increase the impact on clients within immediate sphere of influence. Variations are based on knowledge of both short and long term consequences for clients.
V: Integration	State in which the user is combining own efforts to use the innovation with related activities of colleagues to achieve a collective impact on clients within their common sphere of influence.
VI: Renewal	State in which the user re-evaluates the quality of use of the innovation seeks major modifications of or alternatives to present innovation to achieve increased impact on clients, examines new developments in the field, and explores new goals for self and the system.

Areas of Concern to Address for Instructors

- Instructor preparation time for telecasts and pre/post activities
- Conflicts in scheduling the program (time zone and organization activities)
- Knowing if the distance learning program is having a positive impact on students
- Conflicts between using the distance learning program and other instructional programs
- Coordination of use of the distance learning program with other staff members
- Understanding the instructor's role in using the distance learning program
- Shared equipment and sharing limited instructional materials for distance learning program
- Use problem solving techniques to adjust the distance learning program use to best meet student needs and use available resources

Table 6: How Concerns May be Expressed at Each Level of CBAM

Type of Concern	Stages of Concern	Expression of Concern
Self	0: Non-use	*Awareness:* I am not concerned about it (the innovation).
	I: Orientation	*Informational:* I would like to know more about it.
	II: Preparation	*Personal:* How will using it affect me, students, department, and organization?
Task	III: Mechanical Use	*Management:* I seem to be spending all my time getting materials ready.
Impact	IVB: Routine IVB: Refinement	*Consequences:* How is (my) use affecting students?
	V: Integration	*Collaboration:* I am concerned about relating what I am doing with what other instructors are doing.
	VI: Renewal	*Refocusing*: I have ideas about something that would work even better.

References

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