e-learning - A Review of Literature

Prepared by
Tim L. Wentling
Consuelo Waight
James Gallaher
Jason La Fleur
Christine Wang
Alaina Kanfer

Knowledge and Learning Systems Group

September 2000

Funded by
Allstate Insurance Company
Sears, Roebuck and Company
Eastman Kodak Company

NCSA™
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Table of Contents

A Review of Definitions

Economic, social and technological forces continue to change the global economy, and the way of life in organizations and the world. In specific, these forces have and continue to revolutionize teaching and learning in organizations. Urdan & Weggen (2000) related that technology, the rapid obsolescence of knowledge and training, the need for just-in-time training delivery, and the search for cost-effective ways to meet learning needs of a globally distributed workforce have redefined the processes that underlie design, development and delivery of training and education in the workplace. In addition, Urdan &Weggen related that the need for different learning models due to skills gap and demographic changes and demand for flexible access of life-long learning have played upon teaching and learning. In this teaching and learning evolution, however, several terms have been attached to characterize the innovation and creation that has been occurring. Some terms are: e-learning, distributed learning, online learning, web-based learning and distance learning. The purpose of this section is twofold. First, to review and summarize definitions related to e-learning. Second, to solidify a working term and definition for the NCSA efforts.

Zahm (2000) described computer-based training (CBT) as usually delivered via CD-ROM or as a Web download and that it is usually multimedia-based training. Karon (2000) discussed the convenience factor of well-designed computer-based training by saying that any well-designed computer-based training- whether it's networked based or delivered via the Internet – is more convenient than traditional instructor-led training or seminars. Karon went on to say that self-paced CBT courses are available when learners are ready to take them, not just when the seminar is scheduled or the instructor is available. Hall (1997) incorporated both Zahm (2000) and Karon (2000) definitions by underlining computer-based training as an all-encompassing term used to describe any computer-delivered training including CD-ROM and World Wide Web. Hall further explained that some people use the term CBT to refer only to old-time, text-only training.

Like CBT, online training was classified as an all encompassing term that refers to all training done with a computer over a network, including a company's intranet, the company's local area network, and the internet (Gotschall, 2000). Gotschall supplemented that online training is also known as net-based training. Urdan & Weggen (2000), related that online learning constitutes just one part of e-learning and describes learning via internet, intranet and extranet. They added that levels of sophistication of online learning vary. It can extend from a basic online learning program that includes text and graphics of the course, exercises, testing, and record keeping, such as test scores and bookmarks to a sophisticated online learning program. Sophistication would include animations, simulations, audio and video sequences peer and expert discussion groups, online mentoring, links to materials on corporate intranet or the web, and communications with corporate education records. Schreiber & Berge (1998) agreed with Gotschall (2000) and purported that online learning is any technology-based learning, that is, information currently available for direct access. They added that this usually implies linkage to a computer.

Given the broad definition of online training, it would seem safe to assume that web-based training is online training. Hall (1997) defined web-based training as instruction that is delivered over the Internet or over a company's intranet. Accessibility of this training, related Hall, is through the use of a web-browser such as Netscape Navigator. Hall and Snider (2000) define e-learning as the process of learning via computers over the Internet and intranets. Hall and Snider extended that e-learning is also referred to as web-based training, online training, distributed learning or technology for learning. Distance learning, however, was not included in the e-learning definition and was defined as its own entity as a learning process meeting three criteria: a geographical distance separates communication between the trainer and participant; the communication is two way and interactive; and some form technology is used to facilitate the learning process.

Hall (2000) contends that e-learning will take the form of complete courses, access to content for "just-in-time" learning, access to components, a la carte courses and services, and the separation of "courses" to acquire and test knowledge vs. content as an immediate, applicable resource to resolve an immediate, perhaps, one time only problem. Learning is and will continue to be a lifelong process, that could be accessed anywhere at anytime to meet a specific need or want. Hall added that more links to real-time data and research would become readily available. Given the progression of the definitions, then, web-based training, online learning, e-learning, distributed learning, internet-based learning and net-based learning all speak of each other (Hall & Snider, 2000; Urdan & Weggen, 2000).

Similar also to e-learning and its related terms is technology-based learning (Urdan & Weggen 2000). Urdan & Weggen shared that e-learning covers a wide set of applications and processes, including computer-based learning, web-based learning, virtual classrooms, and digital collaborations. For the purpose of their report, they further customized their definition to the delivery of content via all electronic media, including the Internet, intranets, extranets, satellite broadcast, audio/video tape, interactive TV, and CD-ROM. They warned, however, that e-learning is defined more narrowly than distance learning, which would include text-based learning and courses conducted via written correspondence. Like Hall & Snider 2000), Urdan & Weggen (2000) have set apart distance learning and e-learning in their glossaries, making, however, e-learning inclusive and synonymous to all computer-related applications, tools and processes that have been strategically aligned to value-added learning and teaching processes.

Berge (1998) explained the difference between distance education and distance learning. Distance education was seen as the formal process of distance learning, with information being broad in scope, for example, college courses. While, distance learning was seen as the acquisition of knowledge and skills through mediated information and instruction, encompassing all technologies and other forms of learning at a distance. This may be why most educational institutions used the term distance education. In reviewing five institutional definitions of distance education, these were the main tenets: historically, it meant correspondence education, it is planned teaching and learning,

connects learners at a distance, designed to encourage learner interaction, uses audio, video and computer technologies as delivery modes, delivery modes evolve as technology expands and grows.

Gotschall (2000) described distance learning as a broadcast of lectures to distant locations, usually through video presentations. Hall & Snider (2000), as mentioned above, characterized distance learning with three criteria; they are: a geographical distance separates communication between the trainer and the participant; the communication is two way and interactive, and some form of technology is used to facilitate the learning process. Willis (1994) in his definition of distance learning identified the acquisition of knowledge and skills as another criterion and supported the former three criteria by saying that distance learning occurred through mediated information and instruction, and encompassed all technologies and other forms of learning at a distance. Porter (1997) shared that distance learning was education or training offered to learners who are in a different location than the source or provider of instruction. Porter went on to say that the technologies used in distance learning, the structure of a course or program, and the degree of supervision for a distance learning course can be varied to meet a particular's group's needs or interests.

Reverting to Halls (2000) contention of e-learning in all-inclusive form, distance learning as planned interactive courses, as the acquisition of knowledge and skills at a distance through various technological mediums would seem to be one of e-learning possible disguises. Interestingly, Urdan & Weggen (2000) saw e-learning as a subset of distance learning, online learning a subset of e-learning and computer-based learning as a subset of online learning. Given the review of definitions on all these terms 'subset' does not appear to be the most likely word to describe the relationship among these words and their forms. The definitions show a great depth of interdependence among themselves. While one person may narrowly define a term, another person could give it the all encompassing power. This communicates that e-learning, if given the all encompassing form, can be the larger circle of which all other terms would be overlapping at different times and extents given their user's intention. Another rationale for this choice is that "just-in-time" learning is a major advantage of e-learning but not of distance learning. Distance learning purports planned courses, or planned experiences. E-learning does not only value planned learning but also recognizes the value of the unplanned and the self-directedness of the learner to maximize incidental learning to improve performance.

The NCSA e-Learning group definition:

- e-learning is the acquisition and use of knowledge distributed and facilitated primarily by electronic means. This form of learning currently depends on networks and computers but will likely evolve into systems consisting of a variety of channels (e.g., wireless, satellite), and technologies (e.g., cellular phones, PDA's) as they are developed and adopted. e-learning can take the form of courses as well as modules and smaller learning objects. e-learning may incorporate synchronous or asynchronous access and may be distributed geographically with varied limits of time.

Strategic Importance of e-Learning

The present and projected needs of business organizations amidst today's global trends, communicate the viability and strategic value of e-learning. This section addresses the strategic importance of e-learning by first looking at the trends driving e-learning. Second, it looks at the business forces that surface given the trends. Third, it looks at the e-learning benefits.

The concept of the learning organization (Marsick & Watkins, 1993) has grown exponentially with the technological era. Mcrea, Gay & Bacon (2000) related that today, corporate learning and the corporate learning organization have ascended to a position of strategic prominence in the context of managing and growing the enterprise. Urdan & Weggen (2000) identified the knowledge-based economy, the paradigm shift in the way education is viewed and delivered, and huge knowledge gaps as significant trends that have given rise to e-learning. In addition they mention that the second largest sector of the U.S economy is the $772 billion education industry. The increase in complexity and velocity of the work environment brought about by technological changes are also major issues that have fueled the demand for e-learning. Mcrea, Gay & Bacon (2000) presented the shift from the industrial to the knowledge era, rapid technological change, the ever shortening product developmental cycles, lack of skilled personnel, enterprise resource planning, and migration towards a value chain integration and the extended enterprise as being prominent contributors to the e-learning value chain. Mcrea, Gay and Bacon (2000) also recognized the robust economy and the increasingly competitive global business environment as central to the e-learning movement. Ticoll, Lowy & Kalakota (1998) related that the competitive environment requires companies to work together to create online networks of customers, suppliers, and value-added processes – that is, an e-business community (EBC).

The trends discussed above have given birth to several business issues that need to be quickly addressed if companies are to retain their competitive edge. Ticoll, Lowy & Kalakota (1998) mentioned that an e-business strategist must anchor on the following forces when analyzing an e-business community. First, the redefinition of value must be addressed because wealth creation, communication, commerce and distribution converge on common digital, networked platforms. Industry boundaries blur, causing providers to rethink the basis of value creation. Second, digital knowledge economics must be understood well because hoarding knowledge is typically counterproductive and nearly impossible. In the digital economy knowledge must be shared. Third, information technology is driving change everywhere. Thus, every executive, in every industry, must embrace the pace and dynamics of the information technology industry. Fourth, jobs, business processes, companies, and even entire industries face elimination or digital transformation. This means that customers will be gaining both tangible (quality and cost) and intangible benefits (information, control, relationships) while they contribute ever more value to the system. Lastly, the digital implosion drives disaggregation and

specialization, undermining the economic rationality of the vertically or horizontally integrated firm.

Digital knowledge reduces the time and financial costs of information and coordination. Ticoll, Lowy & Kalakota (1998) added that it is now economically feasible for large and diverse sets of people to have the information they need to make safe decisions in near real time. Thus, companies can increase wealth by adding knowledge value to a product through innovation, enhancement, cost reduction, or customization at each step in its life cycle.

The e-business forces discussed above set the stage for e-learning's strategic importance. As companies digitally transform their businesses, knowledge and training become rapidly obsolete, just-in-time training becomes a basic survival need, and identification of cost-effective ways of reaching a diverse global workforce becomes critical (Urgan & Weggen, 2000). Additionally, new learning models are needed given the skills gap and demographic changes. Flexible access to lifelong learning is highly desired. Mcrea, Gay and Bacon (2000) added that managing organizational competency, providing employees with competency roadmaps, distributing latent knowledge within the organization, aligning business objectives and learning outcomes, and extending learning to value chain partners are bottom line e-business issues. Validating outcomes directly with increased ROI, providing on-demand task related resources, rationalizing duplicative training, and reducing delivery costs and increasing organizational efficiency are also e-business related issues that write out the strategic importance of e-learning (Mcrea, Gay and Bacon, 2000).

Along with the e-business forces, Urdan & Weggen (2000) related that there are several factors that facilitate the strategic importance of e-learning. Internet access, for example, is becoming a given at home and work. Second, advances in digital technologies have and continue to enrich the interactivity and media content of the web. Third, increasing bandwidth and better delivery platforms make e-learning feasible and attractive. Fourth, a growing selection of high-quality e-learning products and services is now available. Lastly, technology standards, which facilitate compatibility, and usability of e-learning products are emerging. Mcrea, Gay and Bacon, (2000) believe that the internet and its distributive architecture will, for the first time, give corporations the power to combine a series of discrete, unlinked and unmeasured activities into an enterprise-wide process of continuous and globally distributed learning that directly links business goals and individual learning outcomes.

With the strategic importance of e-learning being unsurpassed by the old corporate learning paradigm, the projected benefits are highly attractive. Hall and Karon (2000) capitalized on the accessibility of courses via intranets and internet, training can be self-paced, availability of training at any time and place, training being less expensive, and reduced or eliminated travel time. Urdan & Weggen (2000) added that a higher retention of content through personalized learning is possible because technology-based solutions allow more room for individual differences in learning styles. Furthermore, they highlighted improved collaboration and productivity among students as the online

environment offers case studies, story-telling, demonstrations, role-playing, and simulations among other tools. Along this line, Urdan and Weggen also commented that online training is less intimidating than instructor-led courses. Online learning, they say, is risk free environment that supports trying out new things and making mistakes.

Therefore, if training and development underline discrete activities, off-site classroom based on "just in case" learning, misalignment with business objectives and outcomes, unknown competency gaps, 'one size fits all' philosophy and the training department is in the back office – organizations are far from achieving the strategic importance of the digital economy and digital learning. Their organizational culture is in desperate need of change.

Organizational Culture – An Important Consideration

Organizational culture is critical to the fruitful inception, growth and success of e-learning in any organization. This section will first discuss definitions of organizational culture. Second it will present the importance of organizational culture to e-learning. Third, it will conclude with a review of the information presented.

Kotter & Hesket (1992) related that it is helpful to think of organizational culture as having two levels that differ in terms of their visibility and their resistance to change. At the deeper and less visible level, Kotter & Hesket related that culture refers to values that are shared by people in a group and that tend to persist over time even when group membership changes. At the more visible level, culture represents the behavior patterns or style of an organization that employees are automatically encouraged to follow by their fellow employees. Notions, then, of what is important in companies varies; Kotter & Heskett identified money, technological innovation and employee well-being as being possible values that may underline organizations. Nahavandi & Malekzadeh (1993) discussed assumptions as being the third level of culture. This, they said, is composed of basic assumptions resulting from an organization's success and failures in dealing with the environment. These assumptions encompass an organization's basic philosophy and worldview, and they shape the way the environment and all other events are perceived and interpreted. Values, behavior and assumptions combined with organizational leadership nurture the bond and identity that unites the members of organizations. Nahavandi & Malekzadeh (1993) shared that leaders influence culture by being role-models; by controlling reward systems and hiring decisions; and by deciding on structure, strategy, and physical setting of the organization.

Indeed, having a careful understanding of the three levels of culture and their functional influence in your organization precedes an e-learning strategic plan. The strategic importance, previously discussed, is embedded in a risk free environment. Thus, an e-learning strategic plan that hasn't addressed its organizational culture has little viability. Harreld (1998) related that in 1997, the Meta Group reported that 32 of 41 organizations surveyed had measured substantial returns on their investment in intranets and two companies were close to breaking even. Among the seven corporations where Intranets were not delivering value, the survey revealed that the work environment was a

major inhibiting factor. The report related that the organizational culture placed high value on information possession and control and that these organizations found the basic nature of the Intranet is in direct conflict with their basic business. Huseman and Goodman, (1999) warned that the path to becoming a knowledge organization is not easy. It requires new types of investments, new systems and viewing employees and customers differently. Huseman and Goodman go on to say that, as always, risks are proportionate to rewards, the most serious risk for corporate leaders is not to make decisions that will move them to becoming a knowledge organization. Harreld (1998) extended that imposing new technologies and management processes on a culture that is not prepared to embrace them is futile; knowledge management requires people to behave in some fairly counter cultural ways such as, sharing your know-how with everyone else, making your mistakes public and spending a lot of time exchanging information.

Nurmi (1999) emphasized that knowledge-intensive firms do not work properly as a structured, departmentalized, hierarchical organization. Knowledge-intensive firms work best as process, network, culture, and marketplace for mutual learning and knowledge. Additionally, Nurmi mentioned that strategy cannot work from above, but emerges by way of strategic learning and grows into a core competence, where the know-how of the company and the needs of its customers meet. McCrea, Gay & Bacon (2000) in discussing business to business e-learning industry recognized that employee value is not simply measured by the ability to execute strategy and manage teams, but also their residual pool of on-the-job knowledge they have amassed during their tenure. They go on to say that until recently corporate managers were still failing to harness the value of tacit learning.

Recognizing that the technological capability of the organization is only but one part of the equation. Having an organizational culture that supports and rewards the self-directedness of employee to continually use and apply learning resources to improve performance is the other. For this to have occurrence, Harreld (1998), identified the following as some major issues when reviewing the organizational fabric's conduciveness to e-learning and knowledge management. First, leadership must encourage knowledge sharing through behavior. At Chase Manhattan, for example, the executive vice president in charge of middle market banking periodically reviews customer accounts through the bank's relationship-management system. Because a question from the executive vice president may come at anytime, managers down that line make sure that they know the system well. Second, related Harreld, is the need for process. The organization must find a way to integrate technology with day-to-day work activity. Third, is the need for operating standards. Standard terminology is particularly critical when communicating across functional lines. Project teams are not fruitful when the marketing experts, and 'techies', for example, speak their own jargon. This becomes even more critical with global e-learning. Fourth, is the need for quality controls. If an organization expects employees to dedicate time to knowledge sharing and learning, the organization must ensure that their time is well spent. Technologies must be easy to navigate and be resources that deliver value. Fifth is the need for measures. Measuring the effectiveness of a knowledge management program serves two purposes: to motivate individuals to keep using the program and second, to persuade managers to keep funding

it. Harreld related that IBM has created a scorecard that combines quantitative and qualitative assessments of Intellectual Capital Management (ICM) system return on investment. Lastly, Harreld (1998) identified the need for incentives. Integrating knowledge management and e-learning to compensation and reward systems is desirable and has more persuasive power. Harreld (1998), warned that while knowledge learning and sharing require a revisit of organizational culture, care must be taken not to take the alternate road of structure, strategy and process extinction.

Khajanchi and Kanfer (2000) in their review of knowledge management found that in creating an environment that encourages knowledge sharing the most important key is creating processes and an organizational culture. Creating such an environment would require careful integration of culture and incentive systems with business strategies. Khajanchi and Kanfer (2000) recognized that every business organization may have a unique solution depending on its business needs and present environment; thus, the following findings:

- Xerox used a "people driven" approach in designing its systems.
- The users of Eureka at Xerox were recognized for authoring and validating useful repair tips.
- HP gave away airline miles for contributions to its Trainer's Trading Post.
- Sun gave rewards and recognitions to encourage sharing. The company wants to make knowledge sharing a part of the annual review of the employees.
- Ernst & Young's senior management provided strong support for knowledge management as a key competitive advantage. Consultants were evaluated in part on their knowledge sharing.

Whether it is e-learning or knowledge management, organizational culture plays an important role in their livelihood. The strategic importance, global issues, and the development and evaluation of e-learning reviews in this report heighten the significance of organizational culture in fostering and maintaining e-learning in organizations.

Trainers in an E-Learning Era

The technological innovation is constantly and pervasively altering the way in which work is done, which, in turn requires that workplace learning and training to occur on a just-in-time, just-what-needed and just-where-it-needed basis (Basssi, Cheney, & Van Buren, 1997). E-learning is becoming a norm for corporate training (Chute, Thompson & Hancock, 1999; Galagan, 2000).

While there is a lot of learner-related information, limited studies have explored required trainers' roles and skills in an e-learning scenario (Abernathy, 1998). This section reviews and discusses trainers' roles and competencies.

Trainers' Roles

Many researchers agree that technology will never replace trainer or instructional designers, but technology brings with it more demands for teamwork and collaboration among a diverse group of workers (Wagner, & Reddy, 1999). Trainers, in specific, will need to take on new roles as their work design and environment changes. The following is a review of the trainers' roles.

The traditional trainer roles include instructional designer, instructional developer, trainer, and materials supporter. As an instructional designer, the trainer performs the initial analysis and instructional design tasks. He or she also advises on course exercises and revision. As an instructional developer, the trainer writes course materials, exercises, and auxiliary materials and develops overheads. A trainer also does course development, becomes familiar with course flow, and learns how to use the technology. As a materials supporter, the trainer produces the training materials, manuals, overheads, graphics, exercises, and so forth (Abernathy, 1998). Lastly, a trainer also facilitates.

In addition to the existing roles, trainers are now involved in technology support, facility support, and distant-site facilitating (Chute, Sayers, Gardner, 1999). In doing technology support, the trainer may choose the technology and help install the equipment. Trainers may also learn how to use the technology. As technology supporter, the trainer may also coordinate technology issues with the facility supporter and distant site facilitators. As facility supporter, the trainer may ensure that distant sites are set up and operable. The trainer, as distant-site facilitator, coordinates all distant-site setup and ensures that the technology works, welcomes students to class, and is available to students in case there are problems. When the trainer works hand in hand with the student support services personnel, the learners' personal comfort zone increases, allowing students to focus more on the content and less on the technology. Distant-site facilitator may also assist other trainers with exercises, distribute work, collect materials, and administer tests (Abernathy, 1998).

It has also become essential for trainers to use new technologies in working with participants. Instructors become an orchestrator of multimedia technologies. Much like a conductors of symphony orchestra, the instructor calls up inputs from various media sources to enhance the presentation effectively (Davie & Wells, 1998; Weinstain, 2000; Chute, Thompson, & Hancock, 1999). Some technical skills include: platform skill; communication skills via computer technologies, authoring, html, and web-research skills. (http://www.click2learn.com).

In addition, technology-enabled learning fundamentally changes the locus of control from the trainer to the learner. Trainers are no longer seen as the providers and creators of knowledge. This is more than a major philosophical change; it has tremendous practical implications. If the Human Resource (HR) and Human Resource Development (HRD) personnel cannot give up control of the learning process, then technology is just a way to shove the same old thing through new channels (Galagan, 2000). Giving learners more control of the learning process does not mean losing value of corporate education.

Rather, it indicates that when a learner can sit at a computer and publish a course with the help of an authoring tool and a public portal, the role of the trainer is changing.

With the advent of content providers, training management systems, portals, delivery systems, authoring tools and integrated solutions, the trainer is also becoming the coordinator between internal and external training resources. As companies outsource their training (Bassi, Cheney, & Buren, 1997) trainers are expected to coordinate and create structures to support networks of internal and external providers. Leonard (1996) describes the new trainers' roles as someone who facilitates, mentors and guides employers and employees to use the best and most timely training available. The goal of the corporate trainer, Leonard says, is to find, interpret and assess a wide range of information and technologically sophisticated products.

Even though trainers are expected to play multiple roles, they cannot do e-learning alone. E-learning is labor intensive and is dependent on an array of skills. Thus, a team approach is a more likely choice for the institutionalization of an e-learning program. Team members could include graphic designers, network managers, server installers, end-user support personnel, programmers, instructional designers, and content experts (Driscoll, 1998).

Trainers' Competencies

Given the changing nature of trainers' roles, their competencies are critical. Four competency categories will be discussed. They are: understanding adult learners, instructional competencies, personal competencies (Weinstain, 2000) computer skills, business and strategic planning skills.

All trainers are expected to have some knowledge on adult learning. In specific, trainers are expected to understand the following: (1) adults want practical knowledge, not theory; (2) adults have preferred learning styles; (3) adult learners are diverse and unique; (4) adult learners are motivated and curious; (5) adult learners already have much knowledge and experience; and (6) adult learners need problem-solving skills.

In reference to instructional competencies, trainers are expected to: (1) develop expert knowledge and experience; (2) know about participants' work places; (3) organize materials carefully; (4) keep ideas simple; (5) establish an appropriate climate; (6) use various teaching methods; (7) develop questioning skills; (8) improve research skills; (9) work on the writing skills; (10) facilitate to educate; (11) improve presentation and platform skills; (12) polish group skills; (13) focus on feedback; and (14) be an effective evaluator.

Personal competencies are inclusive but not exclusive to: (1) love learning; (2) show respect for learners; (3) motivate learners; (4) communicate effectively; (5) work your network; (6) take time for reflection and (7) be a good team player.

Computer skills cannot go unmentioned. Trainers are also expected to know about and be able to use computers. Johnson, Palma-Rivas, Suriya & Downey (1999)

related that instructors need to know basic operation of word processing and presentation software, multiple web browsers, and HTML editors. For synchronous activities, Johnson, Palma-Rivas, Suriya and Downey also highlighted that instructors need to be able to broadcast and archive live audio and use text chat to interact with students.

With e-learning being aligned with the organizational, business and human resource strategic plans, and with e-learning being performance-oriented and enterprise related, trainers are expected to dominate at least basic business and strategic planning knowledge and skills. McGrea, Gay and Bacon (2000) related that learning organizations are under direct scrutiny to demonstrate direct contributions to the bottom line. Managers, then, must focus their efforts on learning initiatives with financially quantifiable outcomes. As discussed later in this report, in the past few years there have been a measurement renaissance for all corporate staff functions, including the human resource and training and development functions (Hackett, 1997). Chief executives are increasingly concerned with the impact of training on "the bottom line" (Phillips, 1997), thus, training is no longer viewed as simply a cost associated with doing business. Organizational leaders want to now how training is impacting organizational effectiveness and competitive position. According to Holton (1995) pressure is being placed on HRD and training departments to demonstrate that interventions and programs are contributing to "the bottom line" of the organization. In order to determine training value, training professionals must provide evidence that the expenses associated with designing, developing, and delivering a given training program will add value to the organization. This value, however, has its roots in the initial inception of e-learning which is – the strategic planning process. Hence, trainers and managers, alike, need to have the business and strategic planning competencies to facilitate a value-added enterprise e-learning system.

Trainers represent the major link between the old and new training paradigm in organizations. For trainers to continue being champions of employee training and development, new roles and competencies are desirable and inevitable. While, a review of new roles and competencies have been presented they by no means are exclusive as roles and competencies will continue to be dynamic as they respond to the external and internal environmental changes affecting the new economy.

Online Learners

Like trainers, the role of the learner is changing. Traditionally, students meet instructors face-to-face in a physical setting, with e-learning, students meet instructors virtually via electronic media. Certain learner-related issues must be discussed when considering an e-learning platform in any organization.

This section reviews and discusses the following issues: learning styles; learner's attitude towards using technology; desirable learner's skills; online interaction and communication. This section concludes with an overview.

Learning Style and Computer-Mediated Learning

Learning style has been defined by Keefe (1979) as "the characteristic behaviors of learners that serve as relatively stable indicators of how they perceive, interact with, and respond to the learning environment." There are many learning theories and corresponding learning style measurements. Different learning style theories and measurement focus on different levels of a person's characteristics. It is helpful to organize these learning theories by Curry's (1983) metaphor of an onion, in which the layers of the onion are analogous to the different levels of a person's characteristics or style. At the core of the onion is style related to basic personality traits. Measurement developed within this research area assesses the influences of basic personality on preferred approaches to acquiring and integrating information, such as Herman Witkins' Group Embedded Figures Test (GEFT)(1971), which measures the extent to which a person is influenced by a surrounding field. The next layer, information-processing, is the individual's preferred intellectual approach to assimilating information. One well-known instrument is David Kolb's Learning Style Inventory (LSI) (1976, 1985). Social interaction, the third layer, addresses how students interact in the classroom. The Grasha-Reich Mann Student Learning Style Scale (LSS) (Grashna, 1972) analyzes this layer. The LSS asked students questions concerning their attitudes toward learning, their views of the instructor and/or peers, and reactions to classroom procedures, revealing three contrasting styles: dependent-independent; competitive-collaborative, and avoidance-participant. Finally, the outer layer of the onion is concerned with instructional preference and the individual's preferred environment for learning. Canfield's Learning Style Inventory (1980) is such an example.

Although there are no universally accepted learning theories, Kolb's experimental theory of learning integrates many of the competing perspectives (Bostrom, Olfman, & Sein, 1990) and has become one of the best-known learning style theories. Kolb's Learning Style Inventory (LSI) (1985) contains 12 sentence stems, each having four sentence completers to be rank ordered. This inventory is psychometrically rated as strong in regard to reliability and fair in terms of validity (Hickcox, 1995) and is widely used in computer-mediated learning studies. It draws ideas from Dewey's (1938) experience-learning theories that stress the need for learning to be grounded in experience; Lewin's perspective that emphasizes the importance of being active in learning; and Piaget's (1985) emphasis on intelligence as the result of the interaction of person and environment. For the purpose of this review we will discuss Kolb's experimental learning theory.

Kolb's (1984) experiential learning theory conceives of learning as a four-state cycle starting with concrete experience, which forms the basis for observation and reflection upon experiences. These observations are assimilated into concepts and generalizations about experiences, which, in turn, guide new experiences and interactions with the world. This model reflects two independent dimensions: Concrete Experience (CE) – Abstract Conceptualization (AC); and Active Experimentation (AE) – Reflective Observation (RO). These two dimensions form four quadrants reflecting four learning styles: Accommodator, Diverger, Assimilator, and Converger. Active experimentation with concrete experience comprises the Accommodator learning style. Accommodators

have the ability to learn primarily from "hands on" experience. Reflective observation with concrete experience comprises the Diverger learning style, which view concrete situations from many different perspectives. The Assimilator learning style is comprised of reflective observation with abstract conceptualization. Assimilators are good at understanding a wide range of information and putting it into concise, logical form. Active experimentation with abstract conceptualization describes the Converger learner, who tends to find practical uses for ideas and theories.

Learning style is purported to have relatively stable characteristics; however, some change or development is also expected (Loo, 1997). Kolb (1984) sees individuals progressing from concrete to reflective observation to abstract conceptualization to active experimentation. Few studies have empirically examined changes in style by using Kolb's LSI and even those that have, have presented mixed findings. For example, Sims et al. (1986) reported a high number of subjects who change style classification from one administration to another. A study by Ruble and Stout (1991) found that 56% of respondents maintained the same learning style classification and interpreted this finding as an indicator of modest classification stability. They also report that 16% of participants changed to opposite categories. However, some other studies, with different sample sizes (152, 55, 176) and during different intervals (10 weeks, 1 year, 3 years), have reported significant positive test-retest correlations of LSI scores, and have concluded that learning style is stable in categories, four subscales and two dimensions (Loo, 1997; Pinto & Geiger, 1991; Rakoczy & Money, 1995). Unfortunately, these studies focused on evaluating the measurement itself and failed to control the learner's learning environment. Clearly the effective learner is the person who adapted his or her learning style to the demands of the situation. Therefore, we have reasons to doubt whether learning style could maintain stability in a computer-mediated learning environment. Very few studies have examined this issue.

Roy B. Clariana (1997) studied learning style in computer-assisted learning (CAL) by using Kolb's LSI among three age groups: 13-14 years, 19-21, and adult education majors. For the 13-14 years age group, he found learning style dimensions changed during a 5-month period from abstract conceptualization (AC) towards the concrete experience (CE) and from reflective observation (RO) towards active experimentation (AE) dimensions. The same shift pattern was found for the other two age groups in a 5-week period of exposure to CAL. Clariana believed the results were due to the fact that learners were encouraged to try new things and have more hands-on activities in CAL than in traditional classrooms. Hence, concrete experience and active experimentation were more evident than abstract conceptualization and reflective observation. The magnitude of the shift appeared to vary with learner ability and extent of exposure to CAL. The longer students study in CAL, the greater the change. Students with high abilities shift more greatly than those with low abilities.

A study by Cohen (1997), though, does not indicate a learning style change after one year. He investigated whether learning styles will change after a year of schooling in a learning environment where computers are used as cognitive tools and are dedicated to a constructivist approach to learning. Although the results failed to show a change after

one year, they suggested that learning style is clearly affected by factors within this technology- rich environment. It must be mentioned though that in this study, Cohen applied Dunn and Dunn's Learning Style Inventory instead of Kolb's LSI.

By adapting Kolb's experimental learning theory and LSI, Gunawardena and Boverie (1993) study the interaction between adult learning style and computer-mediated classes compared with non-equivalent traditional classes. They focus on the interaction between learning styles and the media, methods of instruction and group functioning in a distance learning class using audio-graphics and computer-mediated communication. They find that learning styles do not impact how students interact with media and methods of instruction, but does affect satisfaction with other learners. Accommodators being the most satisfied and the Divergers the least satisfied with class discussions and group activities. In 1991, Sein and Robey also used Kolb's LSI to study the interaction between learning style and efficacy of computer training methods. They concluded that Converger subjects who combine active experimentation and abstract conceptualization perform better than subjects with other learning styles. This suggests that students' learning outcome when using computer application software may be affected by the style of the learner, regardless of the training methods. However, in an endeavor to seek the relationships between learning style preference and the effectiveness and acceptance of Interactive Video Instruction, Larsen (1992) finds no significant differences between learning style groups and suggests that both effectiveness and satisfaction are independent of students learning style preference.

Other studies that applied different learning style measurements also have mixed results. Orr and Davidson (1993) failed to find any significant interaction between learning style and performance and attitude in group computer-based instruction by using Murphy-Meisgeier Type Indicator (MMTIC) (Meisgeier & Murphy, 1987). Brenner (1997) concluded that cognitive style does not impact student success in asynchronous distance education by applying Field-dependent and Field-independent Inventory. Adapting Dunn and Dunn's (1989) Productivity Environmental Preference Survey (PEPS), Gordon (1995) does not find any learning style difference between on- and off-campus students. Some studies, though, indicated a strong link between an individual's cognitive style and their reactions to computer-assisted instruction (CAI) or to computers in general(Whyte, et al., 1995). Moldafsky and Kwon (1994) indicated that cognitive style could be responsible for an individual's skill in information processing, decision-making attitudes toward computers and computer anxiety. Hsu, Frederick and Chung (1994) found that individuals with a particular cognitive style significantly outperformed others in recalling their computer-based instruction content. Rowland and Stuessy (1988) in matching alternative modes of CAI to cognitive style found that cognitive style, in this case holistic and serialistic, interacts with various modes of CAI to influence student achievement.

While the review reflects limited and inconclusive research on learning styles and CAI, it can be said that learning styles do play an important role in adult learning. Adhering to learning styles when planning, designing and implementing online training is

one way of communicating to adults that they are valued assets to the learning process and the organization itself.

Learner Attitude towards using Technology

Learners' perceptions about the characteristics of instructional delivery media and their ability to learn using these media have been shown to be key determinants in predicting student motivation and success in traditional classrooms (Coggins, 1988; Gee, 1990). These perceptions may also be equally important when implementing computer technologies as the major source of information transfer to students in computer-mediated learning environments.

Few empirical studies indicated an interaction between learning style and attitude toward computer technology. According to Reiff and Powell (1992), their reflective observation subjects had a negative attitude toward computers. They suggested that for students whose learning styles are concrete and experimentation-activity oriented, computer-assisted instruction would be an appropriate option, while when reflective learners are introduced to this method of instruction, they may feel uncomfortable and frustrated. Similarly, a study by Enochs, Handley, and Wollengerg (1984) found that "… students with more interest in objects or things (concrete experience) and less interest in working with people learned better using computer-assisted instruction.".

Smith's (1982) Learning-How-To-Learn (LHTL) theory suggested that learners rely on a "bag of tricks" which included prior learning strategies and tactics, as well as things that worked in other situations to make sense of a new environment. Eastmond (1995) indicated that prior learning experience, among other factors, is important for students to adjust to online learning. Al-Kodmany et al's (1999) case study on using Asynchronous Learning Networks (ALNs) to teach students on two different campuses found that without prior exposure to the technologies involved, the technologies used in the course became barriers to learning. One of their suggestions for online instruction is not to attempt teaching the technology and the course at the same time, rather, impose certain prerequisites on technologies that are used in the course or include a mini-course on the technologies that are part of the course itself. Researchers have also argued that the successful implementation of any new technology depends on factors related to users' attitudes and opinions (Davis, Bagozzi, & Warshaw, 1989; Zoltan & Chapanis, 1982). For instance, Webster and Hackley (1997) studied teaching effectiveness in technology-mediated distance learning and found a positive relationship between students' attitudes toward technology and their learning outcomes. It seems, then, that being knowledgeable about technologies and knowing how to use them is key online learning outcomes.

Desirable Online Learners' Skills

Several researchers have identified individual characteristics that seem to describe a successful online student. Gibson (1996) found that it is critical for distance students to be focused, better time managers, and able to work both independently and as group members, depending on the delivery mode and location of the distance course. Other studies suggested strong self-motivation, self-discipline, independence, and assertiveness

as important characteristics of online students (UI Online program: http://www.online.uillinois.edu/index.html; Hardy & Boaz, 1997; Baker, 1995).

Eastmond (1995) pointed out that self-directed learning is a desirable trait and function of not only learners but also of instructional facilitators and the sponsoring institution. Indeed, this is important if e-learning is to encompass formal, informal, planned and unplanned learning. For an organization to be conducive to the sharing of tacit knowledge, for example, self-directed learning is crucial. Self-directed learning is the impetus of organizational learning at all levels.

Khan (1997) highlighted that if learners are to employ these skills, the learning environment must be supportive and rewarding of these behaviors. Learners should be given full access to a wide range of information (i.e. objectives, learning strategies), and communication options, both synchronous and asynchronous that can be used in large group, small group, and one-on-one settings. In addition, learners should be given feedback and the opportunity to provide feedback on the learning process and content. This gives learners buy-in power and improves the learning architecture.

Given the dynamic nature of e-learning and technology, online learners' skills are bound to change and grow; thus, there are many that were not and have not been captured here. In addition, given the inter-lapping nature of this report, online learners' skills will either appear directly or indirectly in other discussions. The following is a summary of what was discussed here:

- Needs of distance learners: access to information, communication and advising needs.
- Several factors that seem particularly important in distance learning situation: high levels of student motivation, a strong work ethic, and intensive student support measures often results in success for learners in distant classrooms.
- Special sets of skills: strong motivation to learn; self-disciplined strong time management.

Online Interaction and Communication

Another form of empowering online learners is by providing multiple forms of interaction and communication opportunities. Davie & Wells (1991) related that a sense of mastery and community are two elements that support personal power. While a sense of mastery entails acquisition of skills for participation in the electronic classroom, a sense of community is the feeling of belonging to a supportive group of individuals working together to make meaning, combat mutual isolation as distance learners, to provide support for and challenge one another and to learn to value the contributions of oneself and others. As facilitators, trainers are encouraged to increase interaction with students because instructors that are aware of their students as unique individuals are in a strategic position to support a sense of mastery and community.

Another empowering opportunity is synchronous and asynchronous learner-learner interaction. Collaborative learning techniques driven by the course content and

process or informal techniques established by the students and enhanced by collaborative technologies are excellent mediums for interaction and communication. Soo & Bonk (1998) in asking experts to rank types of interactions found that asynchronous learner-learner interaction was rated the most important type of interaction. Soo & Bonk, however, also noted that technology seems to be the factor that both enables and constrains the learning we want to instill in these online environments. Neal (1997) accentuates Soo and Bonk's concern, by saying that multiple technologies provided richer communication than any one technology alone. Each technology promoted a different type of interaction and used different senses. Neal also added that each technology proved effective for different students' learning styles.

Overall, learning styles, attitude towards using technology, online learner skills and online interaction and communication are some important factors that need critical consideration when planning, designing and implementing an e-learning system. Learners need to be valued and taking time out to review the issues discussed above is just the beginning of the valuing process and of your e-learning program's success.

Evaluation of E-learning

"In the past few years there have been a measurement renaissance for all corporate staff functions, including the human resource and training and development functions" (Hackett, 1997). Chief executives are increasingly concerned with the impact of training on "the bottom line" (Phillips, 1997). Training is no longer viewed as simply a cost associated with doing business. Organizational leaders want to now how training is impacting organizational effectiveness and competitive position. According to Holton (1995) pressure is being placed on HRD and training departments to demonstrate that interventions and programs are contributing to "the bottom line" of the organization. In order to determine training value, training professionals must provide evidence that the expenses associated with designing, developing, and delivering a given training program will add value to the organization. In many organizations, evaluation is identified as the most appropriate method for demonstrating how training adds value (Preskill, 1997).

The impetus for measuring the value of training has primarily been reactive measures. Some organizations have reacted to reengineering and downsizing efforts; while others have needed to measure improvements from radical new processes (Hackett, 1997). There is also a movement toward a proactive measure of intellectual capital as a non-financial asset and training and development is a key component in measuring intellectual capital (Hackett, 1997). Finally, in many organizations the status of the training and development function has been heightened in recent years. For many, training has become an integral part of competitive strategy. This enhanced visibility requires more accountability, hence organizations have increased efforts to measure and evaluate the success of training (Phillips, 1997). As a result of the above-mentioned forces, evaluation of training and development programs and interventions are, among others, the most critical issues facing training professionals today.

Organizations use a variety of methodologies to evaluate training programs. The methodology should be driven by the purpose of the evaluation. There can be multiple reasons to evaluate a training program. Phillips (1997) outlines ten broad purposes and uses of evaluation:

- To determine the success in accomplishing program objectives.
- To identify the strengths and weaknesses in the HRD process.
- To compare the costs to the benefits of an HRD program.
- To decide who should participate in future programs.
- To test the clarity and validity of tests, cases, and exercises.
- To identify which participants were the most successful with the program.
- To reinforce major points made to the participant.
- To gather data to assist in marketing future programs.
- To determine if the program was the appropriate solution for the specific need.
- To establish a database that can assist management in making decisions.

One of the most common training evaluation approaches is the Kirkpatrick model, which was first established in 1959. Kirkpatrick's model is a four level process used to determine the effectiveness of training in order to improve future programs and to eliminate programs that are ineffective. In a study of training and HR executives of Business Week's 1,000 companies, 51 percent of respondents indicated that their organization used the Kirkpatrick evaluation model (Hackett, 1997).

Kirkpatrick (1996) defined the four levels of evaluation as follows: Level 1 evaluation, Reaction, involves measuring how participants react to or feel about a training program. This is basically a measure of customer satisfaction. "Smile sheets" provided at the conclusion of a training event are an example of evaluation at the reaction level. Level 2 evaluation, Learning, measures the extent to which participants' knowledge, skills, and attitudes change as a result of training. The use of pre and post tests to measure learning is an example of a level two evaluation design.

Level 3 evaluation, Behavior, examines the extent to which change in behavior has occurred because of attending a training program. In essence this level attempts to measure on-the-job changes in performance resulting from training. Using a control group in order to assess behaviors prior to and following completion of training is one of the best ways to gather data at this level. Finally, Level 4, Results, can be defined as the final results that occurred because employees attended the training program. Results may include increased production, decreased costs, improved quality, reduced turnover, higher profits and return on investment. As the level of evaluation increases so does the difficulty and costs associated with the evaluation.

While Kirkpatrick's model is commonly accepted by trainers it is rarely fully implemented and its applicability in today's organizations is increasingly questioned (Holton, 1995; Hackett, 1997). As organizations rethink the role of training, they are also rethinking how to evaluate training. Methods used to measure training effectiveness are

changing to meet a workplace where learning has become an integral part of daily work activities (Hackett, 1997).

Training Effectiveness In E-learning

The use of technology in education and training is transforming the way that people learn in today's academic and corporate settings. According to the 1999 Training Industry Report, technology training budgets in the corporate setting increased 13% from 1998 to 1999. While stand-up classroom instruction is still the most common delivery method for training, web-based training is quickly gaining ground (Bernstein and Auerbach, 1999). The shift from traditional face-to-face classroom instruction to technology-based instruction is expected to continue at an accelerated pace into the new millennium.

The rapid growth and integration of e-learning programs has prompted experts, authors, and researchers to question how best to evaluate the effectiveness of such programs. The change in training delivery methods comes at a time when corporate training departments are increasingly charged with demonstrating how their efforts add value to the organization (Hackett, 1997; Phillips, 1997; Holton, 1995; and Parsons, 1995;). Regardless of the delivery method, organizations are looking to training professionals to identify how training helps the organization. Instruction delivered via electronic mediums, like any other instructional process or procedure, requires the use of evaluation to measure its effectiveness. Hence e-learning initiatives are subject to the same effectiveness measures as traditional training programs.

Many questions regarding the effectiveness of e-learning have surfaced. One of the most common questions raised is simply "How effective is it?" (Thompson, 1998; Edwards and Fritz, 1997; Chute, Thompson, and Hancock, 1999). Measuring the overall effectiveness of e-learning requires a multilevel evaluation approach that requires systematic analysis of different sources and types of information. According to Chute, Thompson, Hancock (1999) both scholarly research and practical experience have shown that distance learning is educationally effective, offers business value, and is in many cases more cost-effective than other approaches. They suggest ten key points to a successful distance learning program:

- Determine needs up front.
- Look to distance learning as a way to revitalize and innovate existing training programs.
- Use multilevel evaluation approaches.
- Keep the focus on what is learned, not on the technology that is helping you learn.
- Market distance learning programs internally and externally.
- Use on-site coordination.
- Obtain local field manager commitment.
- Make sure the instructors are well trained.
- Design programs specifically for distance learning.
- Use reliable equipment.

Determining which sources of information are most relevant and important is critical. Hence, this portion of the paper will highlight measurement variables frequently mentioned in the literature as being important to e-learning effectiveness. The variables examined include learner satisfaction, technology satisfaction, measuring learner outcomes and cost effectiveness. To examine these variables, studies on the effectiveness of e-learning will be reviewed.

Learner Satisfaction. The proliferation of distance learning courses and delivery methods has caused extensive monitoring of quality- related learner experiences (Sherry, Fulford, and Zhang,1998). Learner satisfaction has been found to be an important component in the effectiveness of e-learning systems, thus, the importance given to learner experiences (Chute, Thompson, and Hancock, 1999; Smith 1998). The learners' level of satisfaction with the media and processes used to create the learning environment plays upon the learners' desire to participate in future e-learning courses. Because learner satisfaction is a major component of successful training and particularly important to e-learning courses, careful analysis of the different aspects of learner satisfaction is an important component of evaluating e-learning courses (Chute, Thompson, and Hancock, 1999). Wisher and Curnow (1998) suggested that while favorable reactions to training alone do not necessarily indicate that learning has taken place, they are useful to collect for three primary reasons:

Positive reactions help to gain or maintain organizational support for training. Reaction measures can serve as a source of immediate feedback to training providers, including instructors, production staff and training event organizers.
Insight can be gained from subgroup analysis, allowing for analysis of training impact across subgroups.

Like traditional classroom-based instruction, e-learning courses have multiple aspects that impact the learner's experience. Level of participation and interaction, the amount and quality of feedback, the learning environment, and technology are frequently mentioned in the e-learning literature as aspects which have a significantly impacted the learner experience and level of satisfaction.

Participation and Interaction. Communication and interaction among learners in a educational or training course is a very important component of effective instruction. Interaction allows students to learn from one another and from the instructor. Thompson (2000) suggested that procedures for out of class communication between learners and instructor is important, because students are potentially geographically dispersed in e-learning courses. Special attention must be focused on building interaction and communication into course design. In a study of a university distance learning course, Smith (1998) discovered that the interpersonal relationships and interactions of learners affect the distance learning experience. He suggested that instructor-to-student and student-to-student interactions are critical components of the distance learning experience. Smith goes to state that remote learners are not satisfied with interactive activities perceived as irrelevant, regardless of the time and effort required. However,

when making efforts to include online learners, instructors must be cautious not to create problems for on-site learners.

Thomas (2000) related that potentially inadequate levels of human interaction should be considered as a critical factor in the success of technology-based learning. Development of strategies for reducing the psychological distance and increasing interaction between participants in e-learning courses is very important. The need for communication and interaction can be analyzed from two primary perspectives, learner-to-learner and learner-to-instructor.

Thompson (2000) also discussed the importance of social presence in distance education. Social presence is defined as "the degree to which an individual is perceived or experienced as a "real" person." Thompson goes on to suggest that the instructor ability to create a high level of social presence contributes significantly to instructional effectiveness and learner satisfaction. Additionally, social presence can impact motivation and learning.

In an analysis of a Human-Computer Interaction course delivered via Lotus LearningSpace, Neal and Ingram, (1999) suggested that the teacher-learner feedback loops that allow teachers to measure how the class and particular students are progressing were largely absent in an asynchronous environment. This made it difficult to measure learning until the end-of-course evaluation process was completed. They suggested the integration of real-time discussions and chats will help to better facilitate learner-to-learner and instructor-to-learner communication. Neal and Ingram also said that that e-learning allows for improved activity over traditional instruction.

Urdan and Weggen (2000) indicated that e-learning solutions can provide more collaboration and interaction with peers and experts as compared to traditional instruction. They suggested that interaction is facilitated by the fact that the instructor does not monopolize student attention in an online learning environment. Urdan and Weggen (2000) shared that "electronic learning solutions can offer more collaboration and interaction with experts and peers as well as higher success rates than the live alternative". They identified case studies, role-playing, simulations, streamed video, project teams, chat rooms, bulletin boards, online references, personalized coaching, and email as some techniques that could help create an interactive online environment. The authors also argued that distance learning can be more stimulating and encourage more critical reasoning than traditional classroom instruction because when using the above mentioned activities it can allow for group problem solving.

Feedback. The amount and quality of feedback provided to the learner has an impact on learner satisfaction. Feedback is particularly important to the effective delivery of e-learning courses. E-learning delivery methods such as web-based instruction can provide barriers to traditional type classroom feedback. For instance, in a web-based course learners cannot simply raise a hand and ask for clarification about a point made by the instructor. Hence, the design and integration of feedback mechanisms impact the learners' experience and level of satisfaction.

According to Neal & Ingram (1999) distance learners do not receive the day-to-day feedback available in traditional classroom settings. Instructor-student feedback is important as it helps the instructor to gauge the level of student satisfaction regarding a topic or an entire course. Because of the loss of traditional classroom feedback in e-learning environments, other methods to assess learner satisfaction need to be administered.

Learner feedback during and after the learning event is important to successfully measure levels of satisfaction. E-learning courses, because of the lack of face-to-face contact between instructor and student, require special efforts in order to obtain information regarding learner satisfaction. For example, e-learning courses don't allow the instructor to gauge levels of learner satisfaction using traditional methods such as facial expressions or body language. Neal and Ingram (1999) suggested that questions related to the efficiency of what students have learned and their level of satisfaction with distance learning courses remain largely unanswered until the traditional end-of-course evaluation forms are completed and reviewed. Special attention must be given to obtain student feedback in e-learning.

Sherry, Fulford, and Zhang (1998) conducted studies on two different measures of distance learners' satisfaction with instruction. The studies were held at a major University known for its early consistent involvement in distance education. The courses were delivered via live two-way audio and video technology. The first study analyzed the accuracy of a short, written survey designed to obtain learner perceptions for opportunity to interact in the distance education course. The survey included questions regarding interaction between the instructor and learner-to-leaner interaction. Results revealed that instructor-to-class interaction is positively and moderately correlated with perception of learner-to-learner interaction.

The second study by Sherry et al. examined the utility and feasibility of the Small Group Instructional Diagnostic (SGID) evaluation process in distance education. SGID is an interactive evaluation process tested at the University of Massachusetts. The SGID examines broad views of the instructional environment.

In the SGID evaluation process, course instructors volunteer for a facilitated mid-semester evaluation. A trusted colleague who usually has experience in faculty development conducts the evaluation. The facilitator guides the class through three questions regarding what helps, hinders, and should be changed about the course. Comments are displayed for the whole class to consider and rank. The facilitator reviews the list with the instructor. Finally, the instructor discusses the list and planned changes with the class.

Participants for the study consisted of students enrolled in two education courses delivered by two-way video and audio and graduate and undergraduate students in a traditional classroom setting in a similar field of study.

At the conclusion of the course, the distance education students and traditional students were asked questions regarding the pros and cons of the SGID evaluation process. Distance learners expressed concern about the investment of time required to conduct the SGID. However, distance learning students expressed an overall satisfaction with the use of SGID to measure the instructional climate.

Technology Satisfaction

Curriculum Delivery Methods and Preferences. There are many methods used to deliver e-learning courses. Web-based, CD-ROM, satellite, teleconferencing, and television are some of the more common delivery methods. Courses are also delivered using a combination of two or more different delivery methods. Porter (1997) related that one of the greatest strengths of distance learning lie in the different formats by which information can be presented. Different formats allow for different learner preferences to be met. Identifying which method or combination of methods is best suited for a given topic or course requires careful analysis of curriculum design, delivery technologies, and instructor and learner requirements. Combined, these components are important to evaluation at the system level (Chute, Thompson, Hancock, 1999). They must function together in order for e-learning efforts to be successful.

As with traditional instruction, regardless of the delivery method used, curriculum design is the most critical component of e-learning courses. Thompson (1999) supported this notion by stating that close attention to curriculum design and delivery is of critical importance to successful e-learning interventions. All other components are built upon or around the curriculum. Hence, when deciding on a delivery method, it is necessary to match the delivery method to the curriculum design.

In a report on the effectiveness of web-based instruction, the NEA also suggested that that the quality of instruction is the most important factor that determines the effectiveness of web-based instruction. Goodwin (2000) also supported this perspective by stating that instructor and curriculum quality, whether training in a traditional classroom, two-way video conferencing, or via a web-based environment, ultimately determines the effectiveness of a training or education intervention. A good curriculum can potentially make up for poor quality media, but it doesn't work the other way around (Hall, 2000).

While curriculum design is identified as the most critical component of e-learning, there are other aspects of e-learning courses that contribute to effectiveness. The learning environment and user interface design are frequently mentioned in the literature as key components to effective e-learning systems.

Learning Environment. Technology-based learning methodologies require a focus on the learners' environment. The ease with which the leaner can navigate through the learning environment affects the amount of learning that occurs as well as the learners' level of satisfaction with the course. A web-based course that is difficult to navigate is

less likely to be satisfactory to users. According to Thomas (2000), success in technology-based learning programs is based on an orientation to the learner not the instructor. A strong focus on the learner and the learning environment is a shift from traditional instructional design and development techniques. Norton and Wilburg (1998) believed that learner-based tools should be selected based on the way that they help students learn. The most important thing is how well the tool supports the learning process.

Smith (1998) described several important characteristics of distance learning program in a university setting. First, he identified that the interconnection between satellite sites by two way audio/video systems does not provide the same type of interaction available to students in a regular face-to-face classroom environment. The experience of being at an off-site location, due to technological limitations, contributes to the perception of the distance learning experience. Second, the site location where learners are located contributes to learner perception and understanding of the distance learning situation. This involves the level of constructed reality in distance learning situations.

Authors have identified evaluation type questions to guide the development or evaluation of learner-based tools. When selecting a multimedia environment, Norton and Wilburg (1998) suggested that instructors should ask the following questions:

- What is the theoretical approach to learning that guides the design of the learning environment? Is it a theoretical approach with constructivist ideas of learning, providing opportunities for learners to explore and interact with rich problems, or is it behavioristic, introducing information in small chunks, containing reinforcement aimed solely at the individual learner?
- Does the learning environment support opportunities for student groups to discuss and work with the material?
- Is the learning environment well organized? Is it easy to navigate? Are there clear pathways to locating necessary information? If there are different parts, are the functions and uses of each clearly identified?
- Are there different ways to use the environment, including the possibility to make choices about the kinds and levels of learner control?
- Are a variety of perspectives presented for the concepts taught? Are students encouraged to critically evaluate information regardless of whether that information is presented as images, sounds, or text?
- Within the structure of the learning environment, are opportunities provided for student to build their own links between different types of information?

The authors believe that these questions can be used to help in the selection of various learning environments – videotapes, software or audio tapes. They are good examples of what types of concerns need to be analyzed when evaluating e-learning applications.

Interface Design. Online education and training is one of the most promising delivery methodologies associated with e-learning. Organizations stand to gain many benefits

associated with online training. Decreased travel costs, just-in-time learning and higher retention through personalized learning are just a few of the potential benefits (Urdan and Weggen, 2000). However, when delivering training via online learning there are some special design concerns. Selecting a delivery technique or combination of techniques is of the most important of these concerns. Online delivery techniques fall into one of two categories, synchronous or asynchronous.

Synchronous course delivery is real-time, instructor lead on-line learning, in which all learners are logged on simultaneously and communicate directly with each other. Examples include virtual classrooms, audio/video conferencing, and two-way live satellite broadcast lectures (Urdan and Weggen, 2000). Asynchronous course delivery is a learning event in which learners cannot communicate without time delay. Examples include self-paced courses over the Internet or CD-ROM, streamed audio/video web presentations, online chats and discussion groups, e-mail, and video tapped classes (Urdan and Weggen, 2000).

User interface design is important whether delivering training synchronously or asynchronously. User interface design refers to the overall look and feel of the program that allows learner to access information (Hall, 1997). Identifying what navigational tools are most user-friendly and where to place information are concerns associated with the design of the user interface.

When evaluating the user interface, Brandon (1997) identified the following questions: Is the course intuitive to use, such that the learner needs little or no explanation to proceed through the course? Is the overall screen design consistent, consolidated, clean and clear? Are the graphics appealing and understandable? Answering these questions will help to ensure that the user interface design is effective and user friendly.

Researchers have examined learner satisfaction with user interface designs. The Telematic Center at the University of Exeter conducted a pilot study for assessing the effectiveness of Information and Communication Technology (ICT) training. The project gathered information data from nineteen business users that provided information regarding their use of ICT for personal and business uses. Completed questionnaires regarding the design of a user interface, identifying and capturing images (e.g., movie video and audio) and the consideration of different training models and processes.

The Telematic Center pilot of ICT training revealed that inter-activity should be enhanced (i.e., use of images and video clips for education and training). For example more images and embedded activities should be included. Also, findings from this pilot study opened dialogue between education and business leaders regarding the value of ICT skills training.

van Rennes and Collis (1998) studied student reactions to interface design of a WWW-based course at the University of Twente, Netherlands. Specific design related conclusions were drawn from learner responses to a questionnaire and traces of learner

usage. The researchers identified seven guiding principles to designing a learner-friendly user interface.

- Learners do not like to study by reading from the screen. They printed, portable, instead of hyper linked material, so they can study away from the computer.
- Learners do not want to go more than three clicks to find what they need.
- Learners appreciate a navigation frame that is always available.
- Learners are sensitive to the readability of on screen text, its layout, and consistent screen design. The formatting and spacing of the text as well as color are also important.
- Learners are not greatly concerned with images and logos on the site pages, but they do like being able to distinguish course pages from external hyper linked pages. Hence, all course pages should possess a common look.
- Learners prefer to scroll through a page, as opposed to using internal links to navigate. However, a link between the top of the page and the bottom of the page is appreciated.
- Learners want a direct indication of what is new on a page or site as soon as possible

Measuring Learner Achievement

The goal of any learning activity is for learning to take place. A common way to measure the effectiveness of instruction is to measure learner achievement. Measuring learner achievement in e-learning environments requires special attention. Chute, Thompson, Hancock (1999) relayed that the strategies and procedures used to assess the traditional trainee needs to be modified to fit the distance learning environment. In a study of asynchronous distance learning, Neal and Ingram (1999) also indicated that there are special issues related to obtaining online feedback.

A key aspect of some e-learning applications, such as CD-ROM and web-based applications, is that it allows for personalized instruction. Instructors can be informed about different learners' instructional objectives (Brogan, 2000). Learner achievement may be based on different learning objectives. For example one learner's objective may be to learn in order to pass a test, while another is simply trying to refresh basic memory, yet another learner may want to learn how to do a new task on the job. The type of objective must be considered when developing measurement and assessment approaches.

Hudspeth (1997) suggested that "data to judge learner progress can be derived from responses to: direct questions, directions to demonstrate, integrate, or otherwise show learning; project outcomes; and a variety of guided opportunities." Hence, traditional methods for measuring learner achievement can be applied to e-learning courses with some forethought and modification. Quizzes, exams, team and individual projects, as well as written assignments, can all be used in e-learning courses. When measuring learner achievement, Paloff and Pratt (1999) suggested considering the following questions:

- What was most useful to me in my learning process? What was least useful?

- Did I achieve my learning objectives in this course? If yes, what did I achieve? If no, what got in the way of achieving those objectives?
- What did learn about my own learning process by taking this course?
- How did I change as a learner through my involvement with this course?
- Do I feel that what I learned in and through this course will have application in other areas of my life? If so, where will I apply this knowledge?
- How well did I participate in this course? Am I satisfied with my level and quality of participation?
- Did I see myself as an active member in the group? Did I contribute adequately to collaborative assignments? How would I evaluate my performance in this class overall?

The use of electronic mediums can even make grading of tests and quizzes easier because scores can be tabulated immediately following the completion of a quiz or test, providing quick and accurate feedback to learners. Hudspeth (1997) related that this is especially true when determining if enabling skills, such as vocabulary recall, key term definitions, or association of important elements, have been mastered.

KPMG used a pre and post-test design to assess learner achievement in an e-commerce course that it delivered to eight thousand of its consultants around the world. The course was 100 Internet-based allowing learners to work whenever they had time. The course allowed learners to pick up where they left off. The pre-test was used to determine current knowledge and provide access to white papers, articles and other support material. All consultants who participated in the course were required to successfully complete the online post-test. Tracking tools allowed managers to follow progress and success.

The Center for Disease Control evaluated learner achievement in its distance learning courses with a traditional type final exam designed to measure mastery of instruction. Additional information on learner' achievement is obtained by allowing participants to develop action plans describing how to transfer what they have learned to the job (Segal, 1994).

Palloff and Pratt (1999) suggested several ways to measure student achievement. First, they asked learners to submit a self-evaluation as part of the completion of the course. This type of self-evaluation should asks learners if they feel that they have met their own learning goals for the course and how they feel they have performed. Second, in a large course that has been divided into groups or teams, the group maybe asked to appoint a leader who can assign grades based on member contribution to team projects. The group itself can also report a group grade or assessment on assignments that require collaboration. Lastly, they suggested referring to guidelines set at the beginning of the course to determine the relative weight placed on respective course components. For instance, in a course that relies heavily on discussion, the quality of and quantity of posts become evaluative elements. Porter (1997) heightened that at the conclusion of a learning activity, learners should be made to do something – write an e-mail, discuss the information, complete an assignment or participate in a simulation to respond to or

summarize what they have learned. For example, if taking a first aid course, the learner might learn from reading about procedures and viewing graphic examples. A more effective way to measure learner achievement is by reinforcing desired activities or learning. E-learning courses, then, should be designed to illustrate the probable results of a learner's decision.

When analyzing or developing an e-learning course, Hall (2000) contended that evaluation and record keeping are important for ongoing assessment. He pointed out that in a quality course, mastery of each course section is required prior to moving onto the next section. He also stated that quizzes and final exams are used to assess learner achievement in quality programs. Finally, automatic recording of learner data, and tracking of time taken to complete courses are also checkmarks of quality courses.

Cost Effectiveness of E-learning

In today's fast paced business environment, the management of learning resources is key to organization success. Organizations view learning increasingly as a competitive advantage rather than just another cost factor (Urdan & Weggen, 2000). The increased importance of training has lead many organizations to develop methods to measure and quantify the results and benefits of training programs in a fashion similar to other organization investments. As a result, training managers are increasingly being charged with proving the cost effectiveness of training (Phillips, 1997).

One widely known method for evaluating training programs in general is Kirkpatrick's Four Level model. The fourth and highest level of Kirkpatrick's model is Results. Measuring results is identified as the most difficult of the four levels of this model. When evaluating at this level Kirkpatrick suggest the use of a cost-to-benefit ratio to measure training results.

Cost-to-benefit ratio (CBR) and return on investment (ROI) are two financial tools commonly used to determine the cost effectiveness of a training program (Phillips, 1994). CBR and ROI are traditional financial analysis tools used to make decisions about the effectiveness of different types of organizational investments. Parsons (1995) suggested that the application of financial analysis tools to training programs has three benefits: 1) they help HRD practitioners look at training programs through the customers' eyes, 2) they guide practitioners in talking with other stakeholders about training programs, and 3) they provide a rational way to help make decisions.

The cost-to-benefit ratio is simply the program's benefits divided by costs. The formula is as follows:

$$\text{CBR} = \frac{\text{Program benefits}}{\text{Program costs}}$$

This formula utilizes the total benefits and costs. To calculate program benefits, data associated with business results from the training program must be converted to monetary

values. Converting data is a critical part of calculating CBR. Phillips (1997) identified ten strategies to convert data to monetary values depending on the type of data and the particular situation. The strategies are as follows:

- Output data is converted to profit contribution or cost savings.
- Cost of quality is calculated
- Wages and benefits are used as value for time
- Historical costs
- Internal and external experts
- External databases
- Participants estimate
- Participants supervisors provide estimates
- Senior management provides estimates
- HRD staff estimates

Calculating program costs involves monitoring all costs associated with the design, development, and delivery of the program. Examples of these costs might include facility rental, course materials, salaries and benefits of employees attending the program, and administrative costs.

Return on investment uses the net benefits divided by program costs. Net benefits are the program benefits minus the cost. The formula is as follows:

$$\text{ROI (\%)} = \frac{\text{Net program benefits}}{\text{Program costs}} \times 100$$

The ROI process begins with data collection methods, which are at the center of any evaluation effort (Phillips, 1994). ROI is based on converting hard and soft data to monetary values. The seven most common instruments used to collect ROI data are surveys, questionnaires, interviews, focus groups, tests, observation, and performance records (Phillips, 1997). According to Phillips (1994;1997) the values for ROI in HRD are often quite large, ranging from 150 percent to 400 percent signifying the importance of training programs.

Cost effectiveness of E-learning

One of the largest draws of e-learning is the reported cost savings associated with delivering training via the Internet, multimedia, satellite or other e-learning methods. E-learning is heralded by many as an effective means to deliver training and significantly reduce training costs. According to Chute, Thompson and Hancock (1999) the potential financial savings associated with e-learning can be significant when compared to traditional methods of training. Chute et al. added that e-learning can provide a cost-effective solution to the most demanding training and education needs. Indicating that e-learning is an acceptable medium to deliver a variety training types.

Cost savings estimates associated with e-learning are typically based on comparisons with traditional lecture-based instruction. Whalen and Wright (1999)

communicated that in analyzing the costs of web-based instruction the basis for comparison is the cost of developing and delivering an equivalent traditional instructor-lead course. However, in current literature, it is suggested that the use of the Internet to deliver training is challenging the old paradigms for designing developing, and delivering instruction. This shift is primarily driven by speculation of cost reduction and flexibility associated with delivering training over the internet.

Organizations claim to have slashed training budgets by millions as a result of implementing e-learning strategies. Leading firms such as Motorola, MCI-WorldCom and Ford are already reaping benefits associated with distributed learning (Greengard,1999). For example, MCI-WorldCom claimed to have cut its training budget by 30 to 50 percent by delivering approximately 20 percent of its training on the web. Web based training has reduced travel, facility and labor costs by approximately $3 million (Greengard, 1999).

Cost savings can result from a number of benefits provided by e-learning. Cost drivers play an important part in analyzing costs associated with e-learning. Cost drivers need to be analyzed closely when comparing e-learning to traditional classroom instruction. Savings can be realized from instructor and student travel savings, costs for dedicated classrooms, time spent traveling and many other factors.

The cost driver most often mentioned as a primary source of cost savings is travel. Chute, Thompson, and Hancock (1998) highlighted that travel cost displacement and costs associated with time lost in travel are of the most common factors organizations quantify when examining cost drivers related to e-learning. Greengard (1999) reported that organizations, because of the costs associated with transporting employees to training sites, toss wads of money at the travel industry. He goes on to state that moving information to people instead of people to information is a better solution to meet training needs of employees and reduce costs.

While cost savings related to travel are frequently mentioned as the major benefit of delivering training via technology, it is not the only area where organizations can reap savings. Chute, et al., Hancock (1998) related that there are a number of ways to evaluate the cost savings impact of distance learning programs over traditional instruction. According to Thompson, (2000) to determine the cost effectiveness of distance education the underlying issues in educational cost analysis and the costs involved in the variables that influence these costs must be considered. Chute, et al., (1998) indicated that organizations should structure their cost-effectiveness models by revisiting the business drivers uncovered in the organizational needs assessment. Thompson (2000) added that measurements of the cost effectiveness of distributed learning have generally been based on a couple of key assumptions: comparison to traditional delivery, comparisons among delivery systems, potential savings due to decreased travel, the ability to extend programs without hiring more personnel, and the possibility of revenue form higher enrollments.

Walker (1998) used a five level evaluation model to evaluate an Internet training tutorial delivered to employees of The Texas Natural Resource Conservation

Commission. Levels one through four were based on Kirkpatrick's four level evaluation model. The fifth level focused exclusively on return on investment of the training.

To evaluate the cost effectiveness of the training, Walker used variables similar to those mentioned by Thompson (2000). Three variables were used to evaluate at Kirkpatrick's fourth level, organizational improvement: travel savings; expected participant times savings; and course development and administration time cost savings.

Variables used for measuring ROI, Walkers fifth level, were more specific than those used at the fourth level. These variables were used to calculate ROI by dividing the benefit cost and the net benefit cost of the program by actual training costs. The resulting benefit/cost ratio (benefit/cost) was 3.75 to 1 while the ROI (Net Benefits/cost equaled) was 275%. Training benefits included in the calculation were travel cost saved; estimated participant tie savings over a one-month period; room use cost saved; facilitation expenses & materials cost saved; and development & contracting cost saved. Training cost included in the calculation were development and presentation; participants' computers amortized; facilitators computers amortized; Internet connection total; and participants' time converted to dollars.

When evaluating costs associated with e-learning, the cost drivers are different than those associated with traditional classroom based instruction. Frank (1998) developed a simulation model identifying and comparing these key cost variables for both types of instruction.

Jointly sponsored by the California State University, the National Learning Infrastructure Initiative of EDUCAUSE, and the State Higher Education Executive Officers, the project is entitled BRIDGE. The project resulted in a computer software simulation model that compares the projected operating and capital costs of expanding a college campus using distributed instruction versus the cost of expanding using traditional lecture instruction over a given period of time. Cost projections are based on the values of approximately 100 cost drivers.

Categorical parameters of cost drivers include: final enrollment distribution, course sharing & enrollment, broadcast course specifications, asynchronous network specifications, broadcast course costs – operating & capital, asynchronous network course costs – production & maintenance, asynchronous network course costs – computer related & capital, student support costs, budget expenditures, capital expenses, and campus growth. Each of these parameters has a set of more specific parameters under the respective menus.

In another study of cost-benefit analysis, Whalen and Wright, (1999) hypothesized that there are several key design elements that need to be identified as costs in the majority of Web-based training projects. They divided costs into fixed capital cost and variable capital costs.

Capital costs included the server platform shared by all courses on the server and the cost of content development. The authors considered the following costs in relation to content development: instructional and multimedia design; the production of text, audio, video, graphics, and photographs; the development of authoring and delivery software, or the cost of licensing commercial software; the integration, modification, and testing of course content; student and instructor training; and course testing. Operational costs were identified as costs related to the time students and instructors spent using the course.

To verify the above-mentioned cost methodology, the authors applied their methodology to courses delivered at the Bell Online Institute. The results revealed that all of the costing elements used in their method were all important.

Overall, the literature reviewed showed that significant financial savings are associated with the use of technology-based instruction when compared to traditional instruction. However, cost savings, alone, is not a good measure of effective training. Organizations must consider the learning that actually transpires as a result of training delivered. "…evaluation of cost-effectiveness should not focus on costs alone, but rather on costs in relation to educational value" (Thompson, 2000).

Selected E-learning Comparison Studies

The popularity of e-learning interventions is growing exponentially. To remain competitive in today's tight labor market, organizations are exploiting advances in technology to train employees more rapidly, more effectively, and at less expense than the past (Urdan and Weggen, 2000). The debate over the effectiveness of e-learning has gotten a lot of attention lately. Trainers, educators, researchers, and authors have discussed the significance of moving instruction to the web (Goodwin, 2000). However, the recent popularity of e-learning has not come without scrutiny. E-learning delivery methodologies can require a paradigm shift in the way that training is viewed and delivered.

This paradigm shift required trainers and educators to rethink how to best train and educate employees and students. A change of this magnitude is not easily accomplished without a compelling argument to do so. According to Chute, Thompson, and Hancock (1999), the first step in starting an e-learning program is usually to understand and convince others of the advantages of the delivery method. Since supporters of e-learning often promote its cost effectiveness and increased access as primary advantages, many question if it compromises educational effectiveness to get these benefits (Chute, Thompson, and Hancock,1999).

One of the most common ways to measure the effectiveness of e-learning is to compare it to traditional instructor-lead education and training. For many years educators and other experts have studied different forms of distance learning and teaching in order to identify if there are any significant differences when compared to traditional education and training. Chute, Thompson, and Hancock, 1999 related, "After looking first at correspondence, audio conferencing, videoconferencing, and computer conferencing,

these researchers have overwhelmingly reported that there is no significant difference in the achievement of students in well designed distance learning programs, based on standard performance measures".

This portion of the paper will present studies that compare e-learning programs to traditional instructor-lead classroom education. Studies will be grouped into three content areas, learner achievement, learner satisfaction, and cost effectiveness.

Learner Achievement Studies

A primary goal of providing training and education is to bridge the gap between current and desired knowledge, skills, and attitudes (KSA's). In order to measure if desired KSA's have been attained, learner achievement needs to be measured. A number of studies have compared learner achievement in courses delivered via e-learning and courses delivered in traditional face-to-face classroom instruction.

In a study of learner achievement at California State University, Schutte (1996) examined the effects of face-to-face vs. virtual professor-learner interaction, on the test performance of students. The study used a pre and post-test to obtain data. The Pre-test questionnaire focused on basic demographics and experience with computers, math, and statistics. The post-test assessment consisted of learner scores on midterm and final exams and information from the post-test questionnaire.

On the first day of class, learners were randomly assigned to the face-to-face course or the virtual course. Comparisons were made between these two groups in sex, age, ethnicity, years in school, grade point average, and computer familiarity. Students in both courses took the exact same midterm and final exams.

Results revealed that there was no significant difference in any of the demographic or experimental variables. However, there were significant differences on the midterm and final exam. The virtual learners scored an average of 20 points higher on the 100 point midterm and final exams. Data also indicated that virtual learners communicated more frequently with other learners than did face-to-face learners. Because of this, the researcher concluded that it is important that designers of virtual courses pay close attention to the issue of real time collaboration.

Payne and Payne (1998) discussed the analysis of learner achievement in distance learning courses delivered by the Federal Aviation Administration (FAA). The FAA, upon implementing new Interactive Video Teletraining courses, decided to analyze training effectiveness by comparing the new courses to traditional resident-based instruction. IVT is a one-way video two-way audio training system.

The major impetus of the FAA's effort was to identify if the quality of the IVT courses was equivalent, in learner achievement, to its traditional resident-based training. To measure learning quality, the FAA compared the learning results of the IVT courses with resident-based courses. When comparisons were not possible because an IVT course was all new, pre to post-tests were compared to measure learning.

The first course comparison was conducted with a Cockpit Inspection course. The resident course was thirty-six hours long while the IVT course was only twenty-four hours long. The mean test score for the resident-based course was a bit higher than the IVT course, but not statistically significant. The second comparison used pre-test and post-test results to determine learner achievement. The training consisted of four separate modules from a series titled, Staff Work. The modules were problem solving strategies, gathering and organizing information, presenting information to others and communicating with others. Each module averaged about 100 learners. The mean pre-test scores for the modules were 59.5 percent. The mean post-test score was 70.0. The gain was statistically significant at the $p < .05$ level. However, the gain was not as significant as expected. The cause of the less than expected gain was attributed to a mistake in enrollment. The course was designed for staff level employees but the course manager did not restrict enrollment. Hence, many of the students in the courses were not the intended audience.

A third comparison test was conducted with an Alcohol Testing course. This comparison also used pre-test and post-test design. Again because this was a new course there was no resident-based course for comparison. The course was six hours long and broadcast to 591 supervisors and mangers. The mean pre-test score was 55 percent while the mean post-test score was 80 percent. This represented a significant gain at the $p < .05$ level.

Because none of the above mentioned course evaluations included pre-test and post-test analysis of both an IVT and a resident-based course an additional course was selected for this type of evaluation. The course selected was a Quality Assurance course. Two resident-based courses totaling 31 students were used as the control group. The resident version was sixty hours long while the IVT was forty-six hours long. Students in the resident course scored slightly higher on the pre-test than students in the IVT course. The difference was not significant. However, on the post-test, IVT students scored slightly higher than did the resident-based class. Once again the difference in scores was not significant.

The results of the above mentioned evaluations convinced FAA management that IVT training was as effective as resident-based courses. They believed that the learners in the IVT courses learned as much as they did in traditional courses.

The military has also conducted comparison studies of distance learning and traditional training. Wisher and Priest (1998) reported on an analysis of learner achievement of an audio teletraining in the U.S. Army National Guard. Audio teletraining is described as simply a high quality conference call that allows learners at multiple locations to hear and speak to one another through a special switchboard called a bridge. The system uses standard telephone lines.

In this study the researchers evaluated a Unit Clerk course. The training provided basic knowledge regarding the recording, updating, and maintaining personnel records.

Participants are trained on forty-seven different tasks. The course is traditionally delivered at a Professional Education Center over a period of three-weeks. The distance learning version of the course was delivered using the same time frame. Participants consisted of 225 Army National Guard trainees. One hundred and seven (107) students were placed in the resident classroom while 118 were placed in the audio teletraining course. Control and experimental groups were not randomly selected. Placement was based solely on when the trainee enrolled.

Both courses used all of the same workbooks and job aids. Achievement tests were also identical. The diagnostic pre-test, administered prior to the start of each course indicated that there was no significant difference between the teletraining and resident based groups. Learner achievement was measured by analyzing test scores after the training. These tests covered sixteen critical tasks associated with Unit Clerk responsibilities. Results from these tests revealed that the teletraining group scored significantly higher than the resident group at the $p<.001$ level. The mean pass rate for the telelearning group was 93.58% as compared to 85.88% for the resident group. Researchers concluded that superior learning performance was exhibited by the audio teletraining group.

Learner Satisfaction Studies

"Perhaps the most immediate and obvious measure of program effectiveness focuses on the quality of the individual learning experience" (Chute, Thompson, and Hancock, 1999). Learner satisfaction has implications for all facets of e-learning, design, development, and delivery. As learning via technology is becoming more and more popular, especially training via the World Wide Web, the expectations and experiences of the learner need to be cataloged and analyzed. A number of researchers have examined the level of learner satisfaction with e-learning courses.

A study of learner satisfaction at the University of San Paulo in Brazil revealed that students preferred taking a physics course via the web to taking the same course in a traditional classroom setting. A unique component of the course was the use of mentors to assist students in completing the course. Questionnaires consisted of open and close-ended items. Open-ended items focused on topics such as student preferences and comparison of the distance course to the traditional course. Closed-ended items focused on use of technology, technical support, and student interaction. Results revealed that students had a high level of satisfaction with the use of technology, course content, and instructor and mentor support (Magalhaes and Schiel, 1999). All of these things, combined, suggested that when packaged carefully, and with the student in mind, distance learning courses can be preferred to that of traditional instruction.

Gillham, Buckner, and Butt (1998) conducted a user-centered evaluation of Web-supported learning at Queen Margaret University College in Edinburgh, UK. The purpose of the study was to obtain information about a Web site that provided support material for a traditionally taught course and to ascertain learners' perceptions of the site. The Web site studied was for a course in a Communication Studies program. The users of the site were not in a technology class and were not generally found to be technology enthusiasts.

The content of the site replicated material provided to students prior to the availability of the Web. The researchers elicited information about the following:

- Access and use of a supported Web site
- Evaluation of key criteria
- General views about Web-based education
- Use of other computers facilities and feelings about computing

Data were collected using a questionnaire with mostly closed items. Results revealed that the site was highly successful in introducing students to Web-based instructional material. All respondents indicated that they would like similar sites available for other courses. However, students were markedly conservative towards moving away from traditional forms of tutor contact. The researchers suggested that this may be a result of the popularity of the course tutor and the tutor's lecture style, which usually included film extracts to illustrate points. This suggested that, while students may be accepting of Web support material, they may not be as satisfied with replacing a good instructor with technology-based instruction.

Jewett (1998) studied learner satisfaction at the Education Network of Maine (ENM). In this study the ENM was a participant in the Flashlight Project, which is managed by Western Interstate Commission of Higher Education. The goal of the Flashlight Project is to evaluate the use of mediated instructional technologies in higher education. Using a special Flashlight Project Item Bank, the researchers created a survey to obtain information related to student satisfaction with courses delivered by the ENM using interactive television. Twenty three (23) courses were selected for the study, each have four different audience locations. They are: broadcast (or sending) site, community sites, University Center sites, and individual student homes. A total of 1886 students were surveyed.

T-tests were used to determine if there were significant differences between receive site (off-site) learners and broadcast site learners in regards to satisfaction with the course. Results revealed no significant differences between learners in the classroom with the professor (broadcast site) and learners at receive sites.
However, receive site students were more satisfied with the course than broadcast site students. Learners at the receive sites felt more strongly than those in the broadcast (sending) classroom because the delivery quality was adequate to allow them to learn the course content. Learners at receive sites indicated that they would take another course delivered in this format and would recommend the format to other students. The implication of study, according to the authors, is that students were neutral between a live person teaching and a watching.

Cost Effectiveness Studies

Cost effectiveness is one of the major benefits of e-learning courses. Organizations and institutions are interested in getting as much as possible out of education and training dollars. Cost savings of e-learning over traditional training instructor-lead face-to-face instruction are well documented (Karon, 2000). Experts

suggested that e-learning on the average costs about half as much as traditional face-to-face classroom training. A number of researcher, authors, and practitioners have compared the cost effectiveness of courses delivered via e-learning and courses delivered in traditional face-to-face classroom instruction.

An analysis of e-learning courses at Price Waterhouse found that compared to traditional classroom instruction, a multimedia based e-learning course reduced by 50 percent the time required for learners to attain the same level of knowledge. A return-on-investment analysis of the same course over a five year period revealed that the total cost of development and delivery was $106 as opposed to $760 per learner for traditional face-to-face instructor-led training version of the course (Hall, 2000).

Payne and Payne (1998) discussed the use of distance learning to reduce training costs in the Federal Aviation Administration (FAA). Due to government budget cuts the Federal Aviation Administration (FAA) had to cut cost in its training budget. The problem the FAA faced was how to reduce the overall cost of providing training while increasing training opportunities for employees. To meet the required budget cuts in training the FAA determined that it would convert 40 percent of its resident-based training for delivery by using some form of distance education technology to reduce overall training costs.

The organizations plan was to convert 8 percent of its existing resident-based training for delivery by print-based technology or correspondence training, 16 percent of its resident-based training by computer based multimedia, and 16 percent of its resident-based training for delivery by compressed digital satellite called Interactive Teletraining (IVT). IVT is a one-way video two-way audio training system.

The FAA already had some correspondence and multimedia computer-based course offerings. Hence it needed to develop an IVT program to reduce the agency's dependency on centralized training locations. Upon completion of development of the IVT courses the FAA conducted analysis to measure cost effectiveness. Benefit-to-cost ratios of the IVT courses ranged from 2.19:1 to over 11:1, depending on the number of courses converted, the cost of conversion, and the rate of course compression. The result was significant savings when compared to traditional resident-based training. The savings allowed the FAA to meet its education and training needs at reduced cost.

Wisher and Priest (1998) conducted a study of cost effectiveness in a telelearning course in the U.S. Army National Guard. The study compared the costs of a traditional three-week Military Unit Clerk course to the identical course delivered via telelearning. The researchers described teletraining as a high quality conference call that allows learners at multiple locations to hear and speak to one another with standard telephone lines and a special switchboard called a bridge.

Differences in the residential and telelearning courses were computed on a per student basis and based on yearly training loads, projected annually. Fixed costs were assumed to be same for both courses. These cost were:

- Salary for students – The average student in the course was at the E-5 pay grade.
- Instructors – the same four instructors taught both classes.
- Course material – Cost for preparation and production of course material was the same as both courses used the same materials.

Variable costs between the groups were:

- Distribution of material – There was an overnight delivery shipping charge associated with distributing material to telelearning students.
- Audio Bridge – there was a $.04 per minute per site charge for using the audio bridge. For 15 days of training, this equals $198 per site, based on ten sites and 59 students per class. This calculated to an average of $33.56 per student.
- Travel – For students in the resident course, the average travel cost was lodging $342 (18 days at $19 per day), airfare: $700, and meals $92.87 (18.5 days at $5.02 per day). Total per student travel costs equaled $1,134.87. For students in the telelearning course, the average travel expense was $18. Most telelearning students only had to travel to the locations within commuting distances.
- Equipment – The telelearning classrooms required a high quality conferencing system that cost $500 per site. Because the conferencing system had other uses, such as regular conference calls, an assumed capital expenditure of $250 was made.
- Test monitor – Remote sites required the use of a test monitor to conduct audio checks prior to class, take attendance, and serve as a test monitor. This cost was $184 per site.

In the end the audio telelearning course cost $90.57 per student while the resident-based course cost $1,134.87 per student for a difference of $1044.30. Delivering the Unit Clerk course lead to significant savings. The estimated cost savings on an annual basis were $292,000. After analyzing the above mentioned costs and the success rate of students, researchers concluded that cost savings can result from using low cost technology when significant travel is involved in training delivery.

Hall (2000) discussed three case studies that highlighted the cost advantages of e-learning compared to traditional instruction. The first case study, as mentioned before, was at Price Waterhouse, where they conducted a return on investment analysis for a multimedia training program. The total cost for development and delivery over five years was examined. The cost per learner for the multimedia-based program was $106 – compared to $760 per learner in the traditional course. Another cost benefit of this case study was that it took learners 50 percent less time to complete the course when compared to the traditional course. This is significant when considering opportunity costs of workers.

The second case study discussed technology applications training at Intel Corporation. In this case study the training group was able to embed the technology-based training into the applications themselves. This concept completely eliminated the

need for traditional classroom training on the selected applications. In addition to eliminating the need for traditional instruction, the embedded training also required less time to complete. Traditional training required 12 hours while the embedded training required only 2 hours, saving 10 hours of time. As in the previously discussed case, this time savings is significant when considering related opportunity costs.

The final case study that Hall (2000) discussed involved Storage Technology, a company that provides large storage hardware for large mainframe computers. The Storage Technology provides extensive training to field technicians. Traditionally, field technician training is provided in a lecture and lab format at one location in Colorado. Training length varied from four to ten days. The training was converted to a format in which the technicians received computer-based training at their local offices. As a result, significant cost savings were realized from reduced training time and travel expenses. A comparison of training development and delivery cost over a three-year period showed cost for the lecture/lab format at $3,291,327 vs. cost for the technology based format at 1,748,327 for a total saving of $1,543,000.

Global Issues in E-Learning

The world is transforming into a global village with the rapid development of information and communication technology (Nabil, Awerbuch, Slonim, Wegner, & Yesha, 1997). This transformation has more and more companies marching toward a truly global economy; as the CEO of General Electric, Jack Welch stated, "organizations must either globalize or they die". Today, almost 50 percent of the economy is based on exports and imports. U.S. corporations have invested more than $1 trillion abroad and employed overseas workers (http://www.astd.org). The ability to compete globally is dependent on the innovation, the skill and the knowledge of a learning organization and its people. Globalizing corporate training is crucial to the success of global business strategies.

When companies move training into a global arena, the biggest challenges are the worldwide variations in social, cultural, political and economic circumstances (Wellins & Rioux, 2000). Different languages, education systems, learning/teaching styles, government regulations, and infrastructures are examples of these variations. To adapt training to multicultural settings requires a new paradigm that includes an understanding of the deeper psychology of culture and the unique differences culture brings to a global workplace (Kemper, 1998).

This section aims to address four global e-learning issues; they are: cultural and, social differences, and language and technological issues. First, we review culture definitions and dimensions of cultural variation. Individualism and collectivism, will be used as a framework to discuss cultural differences. Interaction and communication styles, and learning/teaching styles will be used to discuss concrete cultural differences. Instructional design paradigms will also be reviewed. Second, social issues such as education, political, and religious differences will be discussed. Third, language and

technological issues in global e-learning will be examined. The section concludes with a summary.

Culture: Individualism and Collectivism

Culture is a complex and broad concept, which can be defined in many ways. Most people agree culture involves at least three components: what people think, what they do, and the material products they produce (Boldley, 1994; Roblyer, Dozier-Henry, & Burnette, 1996). Culture, shared among society members consciously and unconsciously, shapes value, assumptions, perceptions, and behavior of its members. It provides systematic guidelines for how people should conduct their thinking, their actions, their rituals, and their businesses. According to a recent survey conducted by a Development Dimensions International (DDI), 88 percent of global companies report that local culture and customs have a “moderate to great” influence on the way they conduct business in particular locations.

In order to understand the way culture influence e-learning, we must analyze it by determining dimensions of cultural variation. One of the most promising dimensions is individualism-collectivism (Triandis, 1987; Triandis, Bontempo, & Villareal, 1988; Hofstede, 1980). Based on the differences in the extent to which cooperation, competition, or individualism (Mead, 1967) is emphasized, this dimension yields two cultural groups: collectivism and individualism. Countries, such as China, Japan and Korea represent the collectivism culture, while the United States and European industrial countries are characterized by individualism (Triandis, 1987; 1990; Georgas, & Berry, 1995; Fishbein, et ac. 1992; Fiske, 1992; Stigler, Shweder, Herdt, 1990).

An interesting illustration of the differences between collectivism and individualism is to look at the way books and documents are recorded in some of these countries (Wang, 2000). China is a typical collectivist culture. Traditional Chinese books and documents are written from top to bottom, column by column. Chinese (used to) read from top to bottom, then from the right column to the left column. Their heads move up and down, "nodding" repeatedly, symbolizing their affirmation of their ancestors and of authority. By contrast, Western culture is recorded from left to right, line by line. When Americans read, they swing heads from side to side, challenging and saying "No" to their ancestors and to authority. Although this characterization of Asian and western cultural differences is little dramatic, it vividly illustrates the different attitudes toward tradition in these two different cultures.

The essential attributes of collectivist cultures are interdependence, group identity, self-restraint, and hierarchical control (Triandis, 1990; 1992; 1995). Individual matters are usually subordinated to the goals and benefits of a collective, such as the family, the tribe, the nation etc. The harmonious relationships and the inseparable "whole" of nature and human beings are highly valued. The pursuit of such harmony in family and social relationships becomes the basic rule of life. Hierarchical control is the fundamental means of creating such harmonious relationships: each person is fixed into a certain social order. Respect for ancestors, tradition, authority, parents, and elders are a core social value. Individualism, in contrast, highly values individuality and freedom.

The belief in human rights, freedom, and individual equality underline Western social philosophy. These basic cultural characteristics strongly shape the social systems, lifestyles, and values of each society.

Culture is constantly evolving; however, cultural elements change slowly (Triandis et al., 1988). With the new openness to the world, contemporary Asian countries are developing quickly as a market economy and the value system and lifestyles are becoming Westernized. As a result the culture is becoming complex, the collectivist characteristics, however, remain. The United States as an individualistic country, on the other hand, is moving in the opposite direction, there is a new tendency to place greater value on family and on cultural identity.

Individualism and collectivism provide us with a framework to discuss and analyze cultural differences nonjudgementally. Next, cultural differences related to global e-learning are reviewed.

Learning and Teaching Styles

According to the DDI survey, 85 percent of global companies are trying to establish a corporate culture in all locations that is consistent with the goals and vision of the company. Similarly, they expect to institute a consistent training program across all international locations. For this to happen, though, the local culture and customs need adherence. Local culture and customs can influence planning, design and implementation of this training. Keeping consistent with training process and content while being responsive to local cultural is important in designing global training program (Damarin, 1998; Collis & Parisi, & Ligorio, 1996; DeVoogd, 1998).

One important fact that needs consideration is the differences in learning and teaching styles. As we mentioned before, hierarchy is a foundation of social order and essential to collectivist cultures, while individualism is highly valued in individualistic culture. As a result, instructor-centered teaching and style is more acceptable in a collectivist culture, and learner-centered style is more natural in an individualistic society.

The role of instructors and students are also different in collectivist and individualistic cultures. As a result of hierarchy, the instructor is viewed as authority in collectivistic society. On the other hand, individualistic cultures treat people equally. Thus, the different expectation and perception of role of teacher and students may cause discomfort in the classroom. These are also reflected in the class participation. In some countries, e.g. Japan, student volunteering their responses would be considered bragging. It is also true the students are reluctant to ask questions in front of a group (Kemper, 1998).

Being humorous is also sensitive (Korpela, 1996; Lipman, 1991; McLellan, 1997). In some cultures, being humorous may be perceived as irresponsible. In the Japanese culture, if a trainer's behavior and activities lack form, trainees may view the trainer as irresponsible. For example, the entertaining instructional style often used in the

United States might not find a receptive audience in Japan, where such an approach isn't considered credible. Development Dimensions International has found that learners in different countries can react differently to such classroom techniques as feedback and role plays. It can also take longer to run workshops in certain countries due to differing learning styles and needs (Wellins & Rioux 2000).

Interaction and Communication

There are substantial cross-cultural differences in interaction and communication beyond the actual words being said. Any social group or organizational setting develops its own culture, with norms and expectations relating to aspects such as the degree of formality and centrality in communication patterns (Woolliams & Gee, 1992). Thus, a communication/interaction style appropriate in one country may be totally inappropriate in another country.

In a training setting, the differences in communication styles can seen in the following examples, such as who should initiate comments or questions; who should moderate; the extent to which disagreement or debate is expected; who should decide to determinate a line of communication; and the level of formality considered appropriate in interaction between instructors and students.

Originating from the respect for authority and harmony, Asian people generally prefer formality and indirectness in requesting and criticizing, especially when the authority in presence (Ho, 1994; Hatano & Inagaki, 1992). The pattern can be found in some small things such as, addressing people by family name with title, to general communication patterns. Not being aware of these, westerns may feel confused and uncomfortable when communicating. On another hand, the westerns are used to informality, directness, and less central communication patterns. If a western trainer brings this type of interaction into Asian countries, he/she may be perceived as rude and disrespectful of trainees. It is very important to acknowledge the differences in communication and interaction styles and adapt them where necessary.

Instructional Design Paradigm Addressing Cultural Differences

Some researchers have identified three different instructional design paradigms in addressing the cultural differences. These instructional design paradigms reflect particular world views and consist of different pedagogies. They identify inclusions and exclusions, and originate in a particular cultural and societal context (McLoughlin, 1999; Henderson, 1993; 1996). Analysis of these paradigms provides some guidelines on designing instruction for a global audience.

Unidimensional paradigm does not consider instructional design for global training. This paradigm denies cultural diversity and assumes that educational and training experiences are the same for trainees from different cultures. This approach is strongly driven by the need to establish a consistent training program that is aligned with the parent company. This approach always gets opposite results. Case studies and documented practice prove the limitation of this approach (McCain, 1999; Wagner, 1999).In contrast to the unidimensional paradigm, the inclusive paradigm takes in the

norms and perspective of the other culture without connecting to the home culture. This is a superficial way of including other cultures. This approach usually results in ineffective cross-cultural training.

To achieve true sensitivity to cultural differences, the training program should take a multicultural approach; be aware of and respect the deep structures of different cultures (Roblyer, Dozier-Henry, & Burnette, 1996). The home culture should serve as a base and filter for what trainees from outside world want and need. It is important to know how other cultures view your home culture. In this way, instructional designers and trainers can gain insights into their hosts' preparation for understanding and working with them (Chee, 1996; Boriarsky, 1995; Reeve, 1997). Essentially, this approach is a form of eclectic paradigm (Henderson, 1996), which entails designing learning resources that allow variability and flexibility while enabling students to learn through interaction with materials that reflect multiple cultural values and perspectives. These materials and resources also represent multiple ways of learning and teaching, and promote equity of learning outcomes by combining home culture and other cultures' interests.

Social Issues in Global E-Learning

In addition to the cultural issues, some social issues are also closely related to global e-learning. Here, the educational systems, political, and religious issues will be examined.

Differences in Educational Systems. Many countries have different educational systems. Some countries have shorter compulsory education years, while some countries offer more college education opportunities than others. The different educational systems offer companies a different pool of work force to choose from. In most developing countries, young people have fewer chances of receiving a college education, giving global companies a small pool of potential employees (Moore, 1994). As a consequence, a small employee market causes companies to compete for their workforce.

Different educational systems may also cause confusion on degrees. Degrees can have different qualifications in different countries (Moore, 1994; Mason, 1998). For example, in China, colleges only accept a small portion of high school graduates; thus, graduates have higher social/economic value than their counterparts in the United States, who have wide accessibility to colleges. Thus, some American companies have to offer positions that are normally offered to Master/PhD. degree holders in the U.S. to people with a lower college degree in China. When the training is designed for these Chinese employees, the instructional designers and trainers cannot assume that they have the same knowledge base as their counterparts in the U.S. Finally, different educational practices prepares employees for different pedagogies, different learning styles, and also gives them different perception of learning and teaching, and of the role of teacher and student. These differences have been examined in the previous sections.

Thus, it is not surprising that some training consultants (Hoffman, 1998; Kemper, 1998) suggest that trainers spend time visiting and observing classes in the local schools, and spend time with the students and teachers from the elementary level to the university

level, if possible. This will help trainers understand the home country's educational system better, which in turn could help them to facilitate relevant, meaningful and authentic training.

Religious and Political Issues. Religion and politics both are sensitive issues that trainers and instructional designers who adapt global e-learning, should be mindful of. In Asia, religion, history, economics, class systems, and politics have a deep impact on how life and work issues are perceived and programmed (Farmer, 1997). If the trainers are not careful with these issues in the training site, it will cause a great deal of discomfort. For example, an American trainer's careless talk about unification of China and Taiwan in a class where both Taiwanese and Mainland Chinese attended, caused a complete silence in the class (Kemper, 1998). Thus, paying respect to religious and political difference in host countries is very important.

Language Issues in Global E-Learning. Language is a critical issue in global e-learning. Language is a cultural tool, as well as culture itself. Language includes not only its most obvious meaning, but also the usage variations within a language that set one group apart from another. Such variations related to level and choice of vocabulary, and also to more subtle variations in tone and style of language use (Aston & Dolden, 1994). Even nonverbal language such as gesture, body language, and facial expression, is also important especially in Asian cultures. It is best to pay close attention to the subtle messages of body language, facial expressions, and what isn't being said and what's going on in the room (Poster, 1990; Pritchard, 1995).

In the global e-learning arena, English is the dominant language as is in the global e-commerce (Mason, 1998). This makes it hard to adapt training in non-English speaking countries. The obvious challenge is how to turn English-language training materials into culturally sensitive, intellectually stimulating, knowledge- and skill-transferring materials in a different language (Collins & Remmers, 1996). It is also difficult for trainees to communicate and participate in a second language, this case, English. Some studies suggest that trainees should be allowed to use their native language to discuss among themselves, while trainers should also try to the native language or seek an interpreter's help.

Some studies distinguished technical language from culturally sensitive language in global training (Volgman, 1997). One of the challenges is the clarification of the technical terminology. It requires careful translation at the onset of any work focused on rallying groups around key words or concepts. On the other hand, culturally sensitive language is more difficult to deal with. For example, humor belongs to culturally sensitive language. It often doesn't translate. So, trainers should be careful especially when using anything other than the audience's native language, be careful, speak slowly and avoid large words and jargon (Kemper, 1998).

Technological Issues in Global E-Learning

Technology has a cultural dimension not as neutral as many people believe (Pernici & Casati, 1997). Being aware of cultural differences in technology can help instructional designers and trainers to design more culturally sensitive training materials. Examples are used to exemplify how different cultures interpret and react to the common web interface/technology design.

For the most common used communication applications, such as email and text chat, some culture members have higher expectations to communicate, which may impose burdens on participants (Boriarsky, 1995; Galdo, 1996). For example, many Chinese Internet users have higher expectation to communicate than American counterparts according to a recent Chinese online survey. Thus, Chinese workers will potentially face more distractions when they go online to receive training.

Hyper linked text is one of extensively studied computer-mediated learning tools (Ayserman, 1996). Many studies indicated that a hyperlinked environment emphasizing user choice might not be consistent with a hierarchically oriented culture. Hyperlinking may also not be optional for persons with certain learning styles or needs, such as field-dependent persons and those with strong task-orientations. Such characteristics are partially a function of the individual him or her, but are also influenced by the broader cultural setting (Sellin & Winters, 1996).

In terms of lecture and information presentation, cultures vary in the amount of information desired or required. For instance, in a high context culture (Japan), implicit information is more acceptable than in a low-context culture (Germany) (Hoft, 1996).

When doing collaborative projects, the cultural variations in understanding of task sharing and context affect the effectiveness of collaboration (Krauss & Fussell, 1991; Korpela, 1996). Social networks and relationships intervene with the task. Some groups may have a relationship focus while others have a task goal. As a result, on-line tasks are perceived differently by different groups (Walls, 1994).

Expectations that the course is fixed or static and that the teacher decides the essential resources (Hites, 1996) is reflective of hierarchical and authoritative cultures. This, however, is an unlike expectation in the US. Internal and external learner control is another concern. In many western cultures, people seek control over their environment, while in other cultures, individuals try to accommodate the external environment (Norman, 1993).

Visualization is a good response to overcoming cross-cultural language problems in training (Collis & Remmers, 1997). However, the design of user interfaces for international use also requires the cultural sensitivity because it can affect communication and interaction (Nielsen, 1990). Thus, the interpretability and acceptability of visualizations, as well as the use of visualization themselves in learning settings, is subject to considerable cross-cultural variation.

Global e-learning heightens cultural awareness and transcultural management. Some of the issues that could underline this awareness and management are: cultural and social differences, and language issues, and technological issues. In reviewing this and other related issues, global e-learning trainers and instructional designers can strive to achieve consistency while allowing flexibility (Ulrich & Black, 1999). In essence, global e-learning personnel need to be:

- Aware of , respect and manage cultural differences
- Work with social constrains and avoid sensitive issues
- Be aware of and learn the native language(s) or find good interpreters
- Take into consideration technological infrastructure, and the cultural aspects and implications of a wide range of technologies.

E-learning Industry Trends

For the purposes of this report, we define e-learning **….**This section reviews the current status of e-learning industry trends and the e-learning delivery infrastructure. First, the status of newly emerging industry standards is discussed. This is followed by a review of blending traditional classroom based learning and e-learning delivery techniques. Third, we look at systems that are beginning to be implemented to deliver e-learning. Fourth, the authoring environment used in developing e-learning content is then discussed. Fifth, a definition and online learning portals are discussed. Finally, an overview of training and learning management systems and integrated systems is presented.

Emerging Industry Standards

"Solutions based on the specifications save customers money and reduce technical risks as the e-learning market continues to evolve." (http://www.imsproject.org/) A current movement in the e-learning industry involves the development and adoption of learning standards. Vendors, academics, government agencies, and industry consortia are all collaborating to define ways that will enable learning technology products to inter-operate. Closed, proprietary solutions may have worked in the past for CD-ROM, but they are unacceptable for interoperability on the Web. The goal of the learning standards initiative is to develop open specifications. More developers are eschewing proprietary hardware and software designs that put systems at greater risk of obsolescence. (Barron, 1999) In the ideal, the result of standardization would be the ability to access all courses from any vendor directly from your intranet and administer these courses from any one training management system also from your intranet. Also, there would be compatibility across product lines. For example, you would be able to buy your management system from one vender, authoring from another, content from a third, and expect it to all work together.

The standards began to be developed in their raw form a decade ago by the Aviation Industry CBT Committee (AICC), an open forum of training professionals that develops guidelines for interoperable learning technology. The AICC has developed a Computer-Managed Instruction (CMI) specification that defines the tracking data

exchanged between management systems and interactive lessons. It also defines an interchange format for course structure so that entire courses can be exchanged between management systems made by different vendors (Conner, 2000).

The EDUCOM Instructional Management Systems Project (IMS) is a coalition of over 225 educational institutions, training organizations, government agencies, and vendors defining a comprehensive architecture for online learning. The architecture encompasses platform independent interfaces for metadata, aggregated content, management services, user profiles and external services such as databases. The IMS architecture anticipates the widespread availability of emerging technologies such as XML and provides an excellent vision for the future of online learning. IMS recently submitted a metadata specification to the IEEE LTSC for standardization. Notable is the IMS metadata specification that was unanimously accepted by IMS on June 15. Metadata associates descriptive information, such as author, title or subject, with content so that it can be easily located and appropriately used. The IMS Metadata specification benefits the learner looking for specific information with a meta-data aware search tool both when the search is of web-based resources and CD-ROM or DVD-ROM encyclopedias. (http://www.imsproject.org/background.html)

The World Wide Web Consortium (W3C) charts the future course of general purpose Web technologies such as HTML and XML. While the W3C does not focus on learning, it does define basic technologies that are assumed by many learning technology specifications. The Computer Education Management Association (CedMA) is a forum whose members are education managers from companies manufacturing hardware or software products. CEdMA provides a forum to discuss training and business issues of common interest to technology vendors. It is well positioned to accelerate vendor awareness and adoption of learning technology standards.

The Advanced Distributed Learning (ADL) initiative fosters collaborations between government, academia and industry to accelerate the advent of effective online learning. The initiative began in November 1997 under the aegis of the U.S. Department of Defense and White House Office of Science and Technology Policy. Last June, the ADL conducted a successful test of its Shareable Courseware Object Reference Model (SCORM), a reference model that defines a Web-based learning "content model." SCORM incorporates IMS metadata standards, and, for the first time, allows for content from different vendors' learning management systems to be passed to other vendors' systems without any problems. At the ADL-sponsored Plugfest in June, the ADL, AICC, IMS, and IEEE groups were able to meet together and discuss a unified e-learning specification that incorporates the four groups' work. (Bethoney, 2000) Also at the event, over 90 organizations pledged support for SCORM specification.

The IEEE Learning Technology Standards Committee (IEEE LTSC) is an open, accredited standards body tasked to develop "real", de jure learning technology standards. Consortia such as IMS, ADL, and the AICC increasingly acknowledge the IEEE LTSC as the single forum for turning specifications into standards. Both the AICC and IMS initiatives are furthering their goals in the IEEE LTSC. The AICC has submitted its CMI

specification and IMS has jointly submitted a metadata specification with the European ARIADNE Project. The Alliance of Remote Instructional Authoring and Distribution Networks for Europe (ARIADNE) is a research and technology development (RTD) project pertaining to the "Telematics for Education and Training" sector of the 4th Framework Program for R&D of the European Union. The project focused on the development of tools and methodologies for producing, managing and reusing computer-based pedagogical elements and telematics supported training curricula. Validation of the project's concepts is currently taking place in various academic and corporate sites across Europe.

Since December 1997, ARIADNE has been involved in standardization activities performed under the auspices of the IEEE LTSC Committee. In this context, ARIADNE has agreed to collaborate with the US funded Educause IMS Project, in view of reaching as quickly as possible an Educational Metadata set that would be widely acceptable. ARIADNE is also active in the standardization activities initiated by the European Commission, scheduled to take place under the auspices of the CEN/ISSS (European Committee for Standardization / Information Society Standardization System). Work in this forum will initially concentrate on the "localization" of the mainly English language results obtained so far at the IEEE (Richards, 1998).

Learning Objects

One evolution of standardization is the concept of learning content as a chunked object that is independent of its proprietor. Shared specifications in several coalitions, such as IMS and ADL, are paving the way toward true interoperability among content, authoring tools, and learning management platforms (Barron, 2000). These specifications will then be submitted to the IEEE Learning Technology Standards Committee, which can then standardize them.

Within the IEEE LTSC, there has been considerable work done on the development of a Learning Object Metadata standard. Learning Objects are defined within the IEEE as “any entity, digital or non-digital, which can be used, re-used or referenced during technology supported learning (computer-based training systems, interactive learning environments, intelligent computer-aided instruction systems, distance learning systems, and collaborative learning environments).”
Examples of Learning Objects include multimedia content, instructional content, learning objectives, instructional software and software tools, and persons, organizations, or events referenced during technology-supported learning. The Learning Object Metadata standards will focus on the minimal set of attributes needed to allow these Learning Objects to be managed, located, and evaluated. Attributes of Learning Objects to be described include:

- Type of object
- Author
- Owner
- Terms of distribution
- Format

Where applicable, Learning Object Metadata "may also include pedagogical attributes such as; teaching or interaction style, grade level, mastery level, and prerequisites. The standard will support security, privacy, commerce, and evaluation, but only to the extent that metadata fields will be provided for specifying descriptive tokens related to these areas." We expect these standards will conform to, integrate with, or reference existing open standards, such. (http://ltsc.ieee.org/wg12/index.html) Despite the many efforts for industry standardization, there is some skepticism as to whether or not they will be implemented by technology vendors. One reason many have been reluctant to begin developing standard-compliant products is because the standards are not set in stone. Barron (2000) explains that until they feel pressured by competition to adhere to interoperability standards, developers may not be willing to move away from their proprietary formats. One possible response to this is that vendors may continue to develop their proprietary product, but with the option of translating content into standard-compliant formats. A major incentive to comply with the standards comes through the government-sponsored ADL initiative. If they make a requirement for standards-compliant products for all federal agencies, vendors will feel pressured and unable to resist.

Current Delivery Systems and Technologies

Several options are available to the training manager interested in implementing an e-learning solution within their organization. Though they might differ in details such as bandwidth, user interface, and interactivity, the technologies used to deliver e-learning instruction have begun to converge around common technology standards and the delivery infrastructure known as the Internet. Approaches to online learning vary from those that use the Internet as little more than a distribution mechanism for simple text and graphics content to new technologies that allow live, two-way interactivity over dial-up connections, to science fiction-like virtual reality simulations (Barron, 1999). This section provides an examination of these various technology systems.

Text and Graphics (HTML)

Perhaps the most basic delivery method used in e-learning is through static HTML pages. Brandon Hall (1997) describes this medium as consisting mostly of text-and-graphics web pages that utilize the basic capabilities of the World Wide Web. These courses tend to be primarily informational in nature, and represent most of the e-learning courses that are currently available. One advantage of using intranet-based training and performance support is that cross-compatibility of the HTML language. All that is needed to access e-learning courses is a web browser, and it also frees an organization from being tied to any one supplier's proprietary system.

Text and graphics based courses include many different types, such as courses that exist purely on email, bulletin board/online discussion forums, and static HTML web pages that consist of text and graphics. This delivery format is often used as a supplement to traditional face-to-face instruction (Hall, 1997). While these courses represent the bare

minimum in terms of utilizing the capabilities of the web, designing interactivity into text and graphics courses can augment their instructional effects. One common way in which this is accomplished is through the use of multimedia.

Multimedia

Multimedia training is a type of computer-based training that uses two or more media, including text, graphics, animation, audio (sound/music), and video. In practice, multimedia utilizes as many tools as is practical to produce a colorful, engaging program delivered via the computer. A typical program allows users to control their progress and pace through the course so everyone can learn at his/her own speed. Multimedia languages such as Java and DHTML, and plug-ins for authoring tools such as Shockwave are becoming increasingly used to deliver e-learning.

However, multimedia is not without its drawbacks. Limited bandwidth presents a special problem when designing Internet-based education with multimedia. Connection speeds can be slow and downloads can be long due to factors which trainers often have little control over. Until bandwidth improves, e-learning developers often need to exclude most of the "fat media" in their delivery systems, especially video, or create a hybrid design. Barron (2000) explains that "the visually rich, highly interactive medium and sophisticated authoring tools of the CD-ROM era have been replaced with the bandwidth constraints of the Internet and authoring limitations of HTML. The consequence is that the idealism of multimedia is presently much greater than its actuality." However, experts predict that this situation will improve in the future as new technologies such as greater bandwidth and greater compression rates are developed for delivering audio and video (Hall, www.brandon-hall.com).

One strategy that has emerged to compensate for multimedia performance issues are Hybrid CDs, also known as Internet CDs, simultaneously integrates audio and video content delivered on a CD-ROM with the Internet. This combination results in "centralized content that is easy to update and distribute [via] the Web… while the CD makes distribution of high bandwidth content that is static (yet still impractical for LAN/WAN/Intranet/Internet distribution) feasible." Combing the advantages of each seems to be the best solution, and can provide the learner with far more interactivity. (http://www.caicbt.com/hybridinfo.html)

When discussing interactivity in e-learning, it is important to ensure that gratuitous use of multimedia does not overshadow the instructional strategy. To be effective, e-learning needs to step beyond simple interactivity such as "Next" buttons and move to a more engaging form of interactivity that promotes insight, skill, and the ability to reapply knowledge in numerous work contexts (Horn 2000). The problem is that building sound interactivity based on business and instructional analysis is a difficult task that "can drive budgets way up and deadlines way out--which is the wrong direction in the face of surging learning demands and shortening development cycles."(Horn 2000). One way to help make this manageable is by creating an infrastructure that supports collaborative learning.

Collaborative Technologies

With the hype that e-learning has recently received, organizations may rush to implement a solution without considering some important instructional components. Collaborative tools are often one of the tools sorely missed in some e-learning offerings (Hall, 2000). Collaborative tools facilitate interaction and communication among online learners (see Empowering Online Learners); empowering learners in the learning process. Therefore, e-learning programs that omit collaborative tools rob the learner of a well-rounded learning experience.

Collaborative learning networks may consist of many technologies, such as bulletin boards, conferencing software (i.e. Microsoft's NetMeeting), and streaming media (i.e. RealPlayer). The purpose of these technologies is to create an environment that fosters the students' learning through interactivity. In this environment, students are more apt to consider how the content they are receiving will impact them on the job (Horn, 2000). In a collaborative paradigm, instructors take on more of a facilitator role than a lecturer role, often mentoring virtual teams as they work through problems and questions that relate to the instructional objectives for the course. Horn (2000) has put together a chart comparing web-based training (WBT) to collaborative learning network:

WBT	**Collaborative Learning Network**
It has the advantage of being anytime, anyplace for individual learners.	It requires learners to complete assignments by specific deadlines, rather than simultaneously.
There's no collaboration among students.	Collaboration, voting, and outcomes are determined solely by students.
SME-centered; authority for learning is not transferred.	Learner-centered. Learners understand that it is up to them to learn, not the teacher to teach.
The instructor (or subject matter expert) is the center of knowledge and learning.	The learner group connected via the Internet is the center of knowledge and learning.
Students are directed by an instructor or software to answer predetermined questions.	Learners are empowered by source knowledge to formulate and answer questions.
The authority figure is the subject matter expert and the associated content.	Authority transfers from the subject matter expert to the students.
Content is transmitted to students.	A transaction occurs between learners to determine content relevance and application.

So far, we have discussed collaborative environments that do not necessarily require specific time and place logistics. Another component to collaborative learning environments may include synchronous interaction.

Synchronous interaction is an increasingly popular delivery system used in many e-learning environments today. Hall (2000a) defines synchronous delivery as "an instructor or team of instructors [who] will present and be connected by audio or video, while at the same time the student will be online interacting with the online course." One of the appealing powers of synchronous interaction is the continuous, real-time sharing of knowledge and learning on the job (Swider, 2000). Other advantages include the immediate access to instructors and online mentors to ask questions and receive answers, similar to traditional learning environments. The disadvantage is that it requires a set date and time, contradicting the "anytime, anywhere" promise of e-learning (Hall, 2000). Streamed media can be used to deliver audio to multiple learners at one time.

Collaborative software packages such as Microsoft NetMeeting can enable live, multi-way interactivity over a dial-up connection where learners can jointly edit documents and collectively solve problems using a shared 'whiteboard' space. New technologies, called Thin-Clients, are emerging that provide similar functionalities without the need to install (or download) an application on each user's computer. This prevents the training department from having to walk users through a software installation, rebooting, and troubleshooting before learning even begins, resulting in a lower cost for implementation (Barron, 2000b). Thin-client technology is fueled by voice-over-internet-protocol (VOIP), which can deliver two-way audio, or connect learners to a phone bridge for integrated teleconferencing. One problem preventing mass adoption of thin-clients is the compatibility issues that emerge as users upgrade their web browsers to newer versions. The thin-clients often have to be continuously changed to support compatibility (Barron, 2000b).

Regardless of the technologies used to employ synchronous delivery, it is seen as an important aspect of e-learning. Anderson et al. (2000), working for IDC as a specialist group in the synchronous arena, recently highlighted the importance of synchronous delivery in a report on the future of e-learning; "While traditional brick-and-mortar classrooms will decline in revenue share for corporate education, growth in technology-delivered training must be driven by live e-learning solutions." The authors continue, "IDC believes that this technology has great potential as a method for effective learning, especially when it is combined with both traditional instructor-led training and other delivery mediums".

Blending

The movement to blend classroom approaches with e-learning is growing. Instructional designers for e-learning courses are finding that blending, or live e-learning, is often done to enhance the quality of the learning experience. Blending refers to an online learning course that is held at a specific time. (Hall 2000b) Many components of blending are synonymous with those discussed earlier in the Collaborative Technologies section.

Instead of viewing e-learning from a polarized spectrum of either web-based training or instructor-led training, the various training alternatives now allow for subtler options. Decisions can be based on the cost of bringing learners together, which parts of learning are best served by classroom vs. self-instruction, and what is needed to ensure

that individuals complete the course. Brandon Hall (1999) asks e-learning designers to consider the following options along the blending continuum:

- Online pre-test - Assess current skills.
- Online pre-work - Pre-work used to be hit or miss. Half the class wouldn't bother with it, and it dragged them down. Now a mastery test can assure completion.
- Live classroom meeting - Tried and true, still the first choice of many learners.
- Self-paced online course - Likely to be the dominant form of instruction in the future, offering the flexibility of time- and place-independence.
- Online tutors - What happens when you are working online in a course and have a question? Will anybody ever see your exercises and provide feedback, grading and encouragement? This is the function of the online tutor, a role established by DigitalThink.com a couple of years ago. They claim it has helped them reach more than 85 per cent completion rates for their courses, a vast improvement over other online courses.
- Online performance support - Continue to provide users with simple, targeted tools to do their job better, faster, easier
- Online post-test - Easy [Kirkpatrick's] Level II evaluation.
- Live online session. Need to give a booster session to assure the use of new skills, but don't want to bring all the learners together in one physical location? How about a one-hour live online learning session?
- Discussion forum - The basic threaded discussion may emerge as the single most useful collaborative tool to link users with each other and with content experts.

A subtle benefit of blending is that it moves away from the "course" mentality and toward the lifelong learning approach we hear so much about. Beginning and ending points will be less clear-cut and may go away altogether (Hall, 1999).

Future Delivery Systems and Technologies

DHTML

Many e-learning systems are beginning to employ a Dynamic HTML (DHTML) scripting in delivery. DHTML is similar to Thin-client technology as discussed earlier in that it allows for more engaging interactions without the need for browser plug-ins - provided the browser version is fairly recent. The difference is that DHTML is more often used for delivering asynchronous content. DHTML can create robust applications over a standard Internet browser used to deliver technologies such as multimedia, and even authoring environments for e-learning content (Training & Development, 1999).

XML

XML, short for Extensible Markup Language, allows learning content to be labeled in detail, making it possible to customize e-learning content based on a learner's needs. This detailed labeling of web page content also allows for more accurate searches. The technology is on the path to replace HTML as the standard Web authoring language and is already being used by some e-learning providers as a means of providing on-the-

fly customization of content. (Barron, 2000a). Additionally, if authoring-system vendors and courseware providers were to adopt XML as a standard, the need for third party browser plug-ins (i.e. Shockwave) would be eliminated (Training and Development, 1999). XML extends the advantages of inter-operability even further by both integrating content and tracking learner progress across several different providers. Finally, XML's richer language allows for more interactive content than HTML, which leads to a more engaging experience for e-learners, and may ultimately make e-learning more commercially viable (Filipczak 1998). XML is expected to radically transform the Internet in general and e-learning in particular upon adoption of standards by the World Wide Web Consortium.

VRML

Virtual Reality Modeling Language (VRML) is the 3D language of the Web. It's purpose is to provide information to web pages in a three dimensional format. Because objects in this environment are 3D, they can be viewed from any angle, including close-ups. Applications for this in learning include simulations, such as in a manufacturing environment where one "moves" around the factory "operating" the machinery. (Hall, 1997). Current problems facing the widespread adoption of VRML in e-learning is the necessity for a client-side plug-in to be installed on the learner's computer. This problem hopes to be solved by the development of international standards for VRML, currently being drafted by the Web3D Consortium (Barron, 2000a).

Integrating Knowledge Management with E-Learning

"If Knowledge Management is a great way to get learning to happen, shouldn't training departments be involved in harnessing Knowledge Management?" This is a question posed by Barron (2000c) in a recent article on the emergent role that e-learning and knowledge management will play together in the future. The two fields have traditionally held different positions within an organization, with Knowledge Management (KM) typically being a strategic partner with executive decision makers. Internal training departments, usually the hosts of e-learning initiatives, have been badly positioned politically, but do have a relatively good reputation for coming in under budget (Barron 2000c).

Many barriers exist for established organizations to integrate the training function with knowledge management. The largest barrier to integrating these two fields is the traditional reliance of training on assessment techniques used to measure skills and knowledge. This practice runs counter to knowledge management's goal of capturing and sharing knowledge in real-time. Some analysts predict that assessment will move from 'prove what you know' to strictly being used as a way to customize the content that you receive (Barron 2000c). Another challenge facing integration of e-learning and knowledge management will be a shift in the balance of power. Training departments will have to acclimate to a new model where they are not the sole producers of content, but rather are responsible for helping to decentralize it to subject matter experts. (Barron 2000c). This decentralization of knowledge will be necessary for organizations that are looking to reduce product cycle times by providing employees with current content.

Finally, one obstacle that knowledge management has always had to deal with remains: motivating individuals to share knowledge, not hoard it.

Fortunately, the technologies that are being used by both e-learning and knowledge management may help converge the two fields. Collaborative forums used in e-learning such as threaded discussion boards enable learners to share information. A learning intervention that combines the best of learning and knowledge management would supplement procedural information with input from an employee's peers, possibly in the form of "war stories" (Barron 2000c). XML, discussed earlier, is also seen as a key technology for tying learning to knowledge management. For example, IBM's MindSpan Solutions group is using the Web language to tie relevant e-learning and knowledge resources to various skill profiles; learners are matched with a skill profile through an assessment mechanism (Barron 2000c).

One way to consider the future of knowledge management and e-learning is to think of the partnering as an internal mini-economy where individuals are rewarded when their knowledge, or content, is used by others. This provides individuals with incentive to contribute and use their own knowledge and that of their peers.

Authoring Tools

Authoring tools provide a way to create content. A variety of different methods exist to author the content used in e-learning and vary in their approach and degree of difficulty. Many of these have been touched on earlier in the delivery systems component, such as HTML, DHTML, and XML. The development of training and performance support in HTML and its derivatives using traditional tools is efficient and easy, compared to the development of computer-based training on CD-ROM (Curtin 1997). Many third-party authoring tools are available and frequently used in e-learning content creation such as Macromedia Authorware and Dreamweaver (with CourseBuilder plug-in) and Click2Learn's ToolBook, among others. Some provide simple features and offer drag and drop interfaces for designing content. Others require programming in HTML, Java, or other languages. Typically, the courses that are authored in a more complicated environment offer more media-rich interactivity (Hall 2000a). A thorough description and comparison of different authoring tools is available online at http://www.elearningmag.com/issues/may00/cover.htm.

As discussed earlier, with the adoption of standards for new web languages (such as DHTML and XML), we may see a decay in the use of some third party authoring tools for e-learning content.

Training and Learning Management Systems

Training Managements Systems (TMS) sometimes referred to as Learning Management Systems (LMS), form the infrastructure of an e-learning system. TMS are a dynamic platform that support the tracking of users (learners), assessing performance, deployment of content, providing administrative functions such as access to user records, as well as providing an environment for chat rooms, threaded discussions, and synchronous learning

environments (McCrea et al. 2000; Domingo 1999). TMS often interface with existing enterprise resource planning software applications.

The products of many leading TMS providers include features such as robust functionality, highly scalable, easy implementation, and strong content partnerships (McCrea et al. 2000). These features are especially important when choosing a TMS in order to accommodate the growing number of e-learners.

Portals

Brandon Hall offers an explanation of learning portals on his website, http://www.internetconnect.net/~bhall/portals/. "Learning Portals are web sites that provide a combination of courses, collaboration and community. Initially set up with e-commerce for the individual purchaser with a credit card, most portals have plans to offer credits of some type for multiple registrations from a single organization. The most likely winning model [for e-learning portals] will be the aggregators who coffer courses from multiple content creators. Like Amazon for books, they want to be the single place you go to on the Internet to find the training you want.

Around the different approaches, several strategies are being developed for implementing these various technologies into the online learning medium. Vendor solutions range from do-it-yourself content development to all-in-one turnkey packages. Training portals offer outsourced e-learning solutions to businesses that do not have the expertise or resources to develop the programs themselves. As Brandon Hall mentions above, a given learning portal may have multiple content providers, and may in turn be a content provider for other portals. This again raises the issue of inter-operability between these many providers.

Portals can also be seen from a different perspective as representing the end user interface of the e-learning system. The portal can function as an entry platform for the course content itself, as mentioned above, and for other features such as training management systems and authoring environments. It is important for the portal to be well organized, easy to navigate, and personalized to the learner, if possible (McCrea, Gay, and Bacon, 2000). Customized learning portals can provide many resources to users such as a job-related information and aids, development plans, courses taken in the past and those in progress, appropriate news releases, announcing upcoming seminars and events, and access to learning communities (McCrea et al. 2000). This customization of portals could prove to be extremely important in the future in order to maintain customer loyalty as the previously discussed standards are adopted that allow learners to access content from a number of competing portals.

Integrated Solutions

Many e-learning providers offer complete turnkey solutions consisting of content and multimedia, an authoring environment and training management systems in order to competitively differentiate themselves from others in the market. "With learning technology development now at a fever pitch, claims of a "total training solution" have

become a comical mantra in the press releases of product developers." (Barron 2000a). Many e-learning portals offer integrated solutions as their services.

We've examined many of the components and technologies used in delivering e-learning content. Current technologies, such as text and graphics, multimedia, collaborative software, and synchronous delivery are giving way to newly emerging technologies. Industry consortia and government agencies are taking many of these technologies, such as DHTML, XML, and VRML, through extensive revision in order to create standards that support reusable learning objects and allow for enhanced learner interactivity. The adoption of these standards may change the way the e-learning is presently authored. Instead of using third party software to more independent tools that may even enable learners to author their own content to assist in knowledge management. In order to help manage all the administrative and tracking functions of an e-learning environment, a training management system is necessary. Commercial e-learning providers called portals have emerged offering courses, content, collaboration, and community. These providers are partnering with one another and other organizations in order to offer a through library of content. Finally, one emerging trend is the consolidation of all of these variables into one integrated commercial solution sold to businesses looking to implement a complete e-learning program.

References

Abernathy, D. J. (1998). The WWW of distance learning: Who does what and where? Training and Development 52 (9) p. 29-30.

Anderson, Cushing; Dankens, Anne-Sophie; Julian, Ellen H. (2000) "Worldwide and U.S. Corporate IT Education and Training Services: Forecast and Analysis, 1999-2004." Report #W22154, May 2000. Available at http://www.idc.com.

Aston, M. & Dolden, B. (1994). Logical sans frontiers. Computer and Education, 22(1/2), 1-8.

Ayserman, D., & Minden, A. (1996). Individual differences, computer, and instruction. Computers in Human Behavior, 11(3-4), 371-390.

Baker, M. H. (1995, August). Tips for being a successful distance student. Handout distributed at post-conference workshop, 11th Annual Conference on Distance Teaching and Learning, Madison, WI.

Barron, Tom (2000a) "The future of digital learning." E-learning May/June 2000 Vol. 1, No.2, pp. 46-7.

Barron, Tom (2000b) "Thinking Thin: The Race for Thin-Client Synchronous E-Learning." http://www.learningcircuits.org/jun2000/barron.html June 2000.

Barron, Tom (2000c) "A Smarter Frankenstein: The Merging of E-Learning and Knowledge Management" http://www.learningcircuits.org/aug2000/barron.html Aug. 2000.

Bassi, L., Cheney, S., & Van Buren, M. (1997). Training industry trends 1997. Training and Development (51), p. 46-47.

Berge, Z. L. (1998). Conceptual Frameworks in distance training and education. In Schreiber, D. A., & Berge, Z. L. Distance training: How innovative organizations are using technology to maximize learning and meet business objectives. (pp.19-36). San Francisco: Jossey-Bass.

Bernstein, D. S., & Auerbach, S. (1999). 1999 state of the industry report. Inside Technology Training, 12-16.

Black, J. (1997). Online students fare better [On-line]. Available: http://www.news.com/news/item/0,4,7147,00html

Bethoney, Herb (2000) "Searching for the perfect… SCORM?" e-Week July 17, 2000. Vol. 17, No. 29, p. 72.

Boldley, J. H. (1994). Cultural anthropology: Tribes, states and global system. New York: Academic Press.

Boriarsky, C. (1995). The relationship between cultural and rhetorical conventions: Engaging in international communication. Technical Communication Quarterly, 4(3), 17-22.

Bostrom, R.P., Olfman, L. & Sein, M. K. (1990). The importance of learning style in the end-user training. MIS: Management Information Systems 14 (1).

Brenner, J. (1997). An analysis of students' cognitive styles in asynchronous distance education courses at a community college. (ERIC Document Reproduction Service No. ED 415 924).

Brogan, P. (2000). Harnessing the power for online learning. E-learning, January-March, 41.

Canfield, A. (1980). Learning styles inventory manual. Ann Arbor, MI: Humanics Media.

Cann, A. J. (1999) Approaches to the evaluation of online learning materials. Innovations in Education & Training International. 36(1), 44-52.

Chee, Y. S. (1996). Mind bridges: A distributed multimedia learning environment for collaborative knowledge building. International Journal of Educational Telecommunications, 2(2/3), 137-154.

Chute, A, G., Sayers, P. K. & Gardner, R. P. (1999). Networked learning environments. http://www.lucent.com/cedl/networked-learning.html

Chute, A,G., Thompson, M. M., & Hancock, B W. (1999). The McGraw-Hill handbook of distance learning. New York: McGraw-Hill.

Clariana, R. B. (1997). Considering learning style in computer-assisted learning. British Journal of Educational Technology, 28(1), 66-68.

Coggins, C. C. (1988). Preferred learning styles and their impact on completion of external degree programs. The American Journal of Distance Education, 2(1), 25-37.

Cohen, V. L. (1997). Learning styles in a technology-rich environment. Journal of Research on Computing in Education, 29(4), 339-350.

Collis, B; Parisi, D., & Ligorio, M. B. (1996). Adaptation of course of trans-European tel-learning. Journal of Computer Assisted Learning, 12(1), 47-62.

Collis, B, & Remmers, E. (1997). The World Wide Web in education: Issues related to cross-cultural communications and interaction. In B. Khan (Ed.). Web-Based instruction (pp.85-92). Educational Technology Publications, Englewood Cliffs, NJ.

Curry, L. (1983). An organization of learning styles theory and construct. Paper presented at the meeting of the American Educational Research Association, Montreal, Canada. (ERIC Document Reproduction Service No. ED 235 185).

Damarin, S. K. (1998). Technology and multicultural education: The question of convergence. Theory into Practice, 37(1), 11-19.

Davie, L. E., & Wells, R. (1998). Empowering the learner through computer-mediated communication. Alexandria, Va: U.S. Army Research Institute for the Behavioral and Social Sciences.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. Management Science, 35, 98-1003.

DeVoogd, G. L. (1998). Computer use and power sharing: Multicultural students' styles of participation and knowledge. Computers and Education, 31(1), 351-364.

Dewey, J. (1938). Experience and education. New York: Marcmillan.

Dillon, P., & Tearle, P. (1999). Ensuring effectiveness of ICT training: Report and evaluation 1999. ED431073

Driscoll, M. (1998). Web-based training: Using technology to design adult learning experiences. San Francisco: Jossey-Bass/Pfeiffer.

Domingo, Luis Santo (1999) "Choosing an e-learning management system." December 15,1999.
http://www.intraware.com/ms/itwr/netinsights/1999/dec/991215_4.html

Dunn, R., Dunn, K., & Price, G. (1989). Learning style inventory manual. Lawrence, KS: Price Systems.

Eastmond, D. V. (1995). Alone but together: Adult distance study through computer conferencing. New York: Basic Books.

Edwards, C., & Fritz, J. H. (1997). Evaluation of three educational online delivery approaches. ED430516.

Enochs, J. R. (1984). The relationship of learning style, reading vocabulary, reading comprehension, and an aptitude for learning to achievement in the self-paced and computer-assisted instructional modes of the yeoman "A" school at the naval technical

training center. Paper presented at annual meeting of the mid-south Educational Research Association.

Filipczak, Bob (1998). "XML: meta-language for the Web?" Training, v. 35 no. 5 (May '98) pp. 113-14.

Fishbein, M., Bandura, A. Triandis, H. C., Kanfer, F. h., Becker, M. H., & Middlesatdt, S. E. (1992). Factors influencing behavior and behavior change. Final Report on Theorists Workshop, University of Illinois, Department of Psychology.

Fiske, A. (1992). The four elementary forms of sociality: Framework for a unified theory of social relations. Psychological Review, 99(689-723).

Galagan, P. (2000). Getting started with e-learning. Training and Development 54 (4), p. 62-64.

Ganzel, R. (1999). What price online learning? Training, 36(2), 50-54.

Gee, D. B. (1990). The impact of students' preferred learning style variables in a distance education course: A case study. (ERIC Document Reproduction Service No. ED 358 836).

Georgas, J. & Berry, J. W. (1995). An ecological taxonomy for cross-cultural psychology. Cross-Cultural Research, 29(121-157).

Galdo, 1996;

Gibson, C. (1996). Toward an understanding of self-concept in distance education. American Journal of Distance Education, 10(1), 23-36.

Gillham, M., Buckner, K., & Butt, R. (1999). The cautious student – A user-centered evaluation of web-supported learning. Innovations in Education & Training International, 36(4), 327-333.

Goodwin, J. (2000). Web-based distance learning: How effective is it? Available: http://www.lucent.com/cedl/web_based_distance_learning.html

Gotschall, M.. (2000). E-learning strategies for executive education and corporate training. Fortune, 141 (10) S5 – S59.

Grashna, A. (1972). Observations on relating teaching goals to student response style and classroom methods. American Psychologist, 27, 144-147.

Greengard, S. (1999). Web-based training yields maximum returns. Workforce, 78(2), 95-96.

Gunawardena, C. & Boverie, P. E. (1993, November). Impact of learning styles on instructional design for distance education. Presented at the World Conference of the International Council of Distance Education, Bangkok, Thailand. (ERIC Document Reproduction Service No. ED 359 926).

Hackett, B. (1997). The value of training in the era of intellectual capital. The Conference Board, report 1199-97-RR.

Hall, B. (1997). Web-based training cookbook. New York: Wiley.

Hall, Brandon (1999) "Blending: How To Combine In-Person and Online Training." Technology for Learning. September 1999, Vol. 5 no. 9 pp. 1-2.

Hall, Brandon (2000a) "Resources for enterprise-wide e-learning initiatives." E-Learning Magazine, http://www.elearningmag.com/issues/may00/cover.htm.

Hall, Brandon (2000b) "Making sense of e-learning resources, content, tools and services." http://www.elearningmag.com/issues/july00/coverstory.htm. July 2000.

Hall, B. (2000). New study seeks to benchmark enterprises with world-class e-learning in place. E-learning, 1 (1) 18 - 29.Urdan, T. A., & Weggen C. C. (2000). Corporate e-learning: Exploring a new frontier. WR Hambrecht + Co.

Hall, B., & Snider, A. (2000) Glossary: The hottest buzz words in the industry. E- Schreiber, D. A., & Berge, Z. L. (1998).

Hall, B. (2000). How to embark on your e-learning adventure: Making sense of the environment. E-learning, January-March.

Hardy, D. W., & Boaz, M. H. (1997). Learner development: Beyond the technology. New directions for teaching and learning, 71, 41-48.

Harreld, J. B. (1998). Building faster, smarter organizations. In Tapscott, D., Lowy, A., & Ticoll, D., & Klym, N. Blueprint the digital economy: Creating wealth in the era of e-business. New York: McGraw Hill.

Henderson, L. (1993). Interactive multimedia computer courseware and culturally appropriate ways of learning. In Latchem C., Williamson, J. and Henderson, L. (Eds.). Interactive multimedia: Practice and Promise (pp. 189-203). London: Kogan page.

Henderson, L. (1996). Instructional design of interactive multimedia: A cultural critique. Educational Research and Development, 44(4), 85-104.

Hites, J. M. (1996). Design and delivery of training for international trainees: A case study. Performance Improvement Quarterly, 9(2), 57-74.

Hoft, N. J. (1996). Developing a cultural model. In Galdo, E. M. D. and Nielsen, J. (Eds.), International User Interfaces (pp. 41-73). New York: John Wiley.

Hofstede, G. (1980). Culture's consequences. Berly Hills, CA: Sage.
Ulrich & Black, 1999

Holton, E. F. (1995). In search of an integrative model for HRD evaluation. Proceedings of the 1995 Academy of Human Resource Development Annual Conference (pp.4-2). Baton Rouge, LA: Academy of HRD.

Horn, Richard (2000) "The Network is the Teacher: Collaborative E-Learning." http://www.learningcircuits.org/jun2000/horn.html June, 2000.

Hsu, T. E., Frederick, F. J., & Chung, M.(1994). Effects of learner cognitive styles and metacognitive tools on information acquisition paths and learning hyperspace environments. Presented at the Convention of the Association for Educational Communications and Technology.

Huseman, R. C., & Goodman, J. P. (1999). Leading with knowledge: The nature of competition in the 21st century. Thousand Oaks, California: SAGE Publications.

Hutton, S. (1999). Course design strategies: Traditional versus online. What transfers? What doesn't? ED430115

Ingram, D., & Neal, L. (2000). Asynchronous distance learning for corporate education: Experiences with lotus learningspace [On-line]. Available: http://www.lucent.com/cedl/neal_formatted.html.

Jewett, F. (1998). Bridge: A simulation model for comparing the costs of expanding a campus using distributed instruction versus classroom instruction. Documentation and instruction. ED430426.

Jewett, F. (1998). The education network of Maine: A case study in the benefits and costs of instructional television. Case studies in evaluating the benefits and costs of mediated instruction and distributed learning. ED429486.

Johnson, S., Palma-Rivas, N. & Suriya, C. & Downey, S. (1999). Examination of critical issues for development and implementation of online instruction. In Kuchinke, K. P. Academy of Human Resource Development Proceedings.

Johnson, S. D., Aragon, S. R., Shaik, N., & Palma-Rivas, N. (1999). Comparative analysis of online vs. face-to-face instruction. Retrieved January 14, 2000 from the World Wide Web: http://www.outreach.uiuc.edu/hre/public/comparison.pdf/.

Karon, R. L. (2000). Bankers go online: Illinois banking company learns benefits of e-training. E-learning, 1 (1) 38-40.

Karon, R. L. (2000). Bank solves compliance training challenge with internet. E-learning, January-March.

Kashima, Y., Yamaguchi, S., Kim, U., Choi, S-C, Gelfand, M J. & Yuki, M. (1995). Culture, gender and self: A perspective from individualism-collectivism research. Journal of Personality and Social Psychology, 69, 925-937.

Keefe, J. W. (1979). Learning styles: an overview. Student learning styles. Virginia: NASSP Publications.

Keefe, J. W. (1979). Learning style: An overview in student learning styles. In Diagnosing and Prescribing Programs, (pp 1-17). Reston, VA: National Association of Secondary School Principals.

Kemper, C. (1998). Global training's critical success factors. Training and Development, 35-37.

Korpela, M. (1996). Traditional culture or political economy? Information Technology for Development, 7(1), 29-34.

Khajanchi, V., & Kanfer A. (2000). Knowledge management. National Center for Supercomputer Applications.

Khan, B. H. (1997) Web-based instruction (WBI): What is it and why is it? In B. H. Khan (Ed.). Web-Based instruction (pp.5-18). Englewood Cliffs, NJ: Educational Technology Publications.

Kirkpatrick, D. (1996). Evaluating training programs: The four levels. Berrett-Koehler Publishers, San Francisco.

Kolb, D.A. (1976). Learning styles and disciplinary differences. Boston, MA: McBer and Company.

Kolb, D. A. (1976). Learning style inventory technical manual. Boston, MA: McBer and Company.

Kolb, D. A. (1984). Experiential learning: Experience as the source of learning and development. Boston, MA: McBer and Company.

Kolb, D.A. (1985). Learning style inventory. Boston, MA: McBer and Company.

Kotter, J. P., & Heskett, J. L. (1992). Corporate culture and performance. New York: The Free Press.

Krauss, R.M. & Fussell, S.R. (1990). Mutual knowledge and communicative effectiveness. In Galegher, J., Krauss, R.M. and Egido, C. (Eds.), Intellectual Teamwork: social and technological foundations of cooperative work, (pp. 111-145). Hillsdale, N.J.: Lawrence Erlbaum Associates.

Larsen, R. E. (1992). Relationship of learning style to the effectiveness and acceptance of interactive video instruction. Journal of Computer-Based Instruction, 19 (1), 17-21.

Leonard, B. (1996). Work and training overlap. HR Magazine (http://www.shrm.org/hrmagazine/articles/0496cov.htm)

Lipman, M. (1991). Thinking in education. Cambridge: Cambridge University Press.

Loo, R. (1997). Evaluating change and stability in learning style scores: A methodological concern. Educational Psychology, 17(1-2), 95-100.

Magalhaes, M. G. & Schiel, D. (1997). A method for evaluation of a course delivered via the world wide web in Brazil. The American Journal of Distance Education, 11(2), 64 -70.

Mason, R. (1998). Globalizing education: Trends and Applications. New York: Routledge.

McCain, M. (1999, July). Scaling the Great Wall. Training and Development, 38-42.

McCrea, F., Gay, R. K., & Bacon, R. (2000). Riding the big waves: A white paper on B2B e-learning industry. San Francisco: Thomas Weisel Partners LLC.

McLellan, 1997

McLoughlin, C. (1999). Culturally responsive technology use: Developing an on-line community of learners. British Journal of Educational Technology, 30(3), 231-243.

Mead, M. (1967). Cooperation and competition among primitive people. Boston: Beacon.

Moore, M. (1994). Is there a cultural problem in international distance education. In M. Thompson (Ed.), Proceedings of Conference on Internationalism in Distance Education. University Park: The Pennsylvania State University, The American Center for the Study of Distance Education, pp. 188-192.

Moldafsky, N, I., & Kwon, Ik-W. (1994). Attributes affecting computer-aided decision making – a literature survey. Computers in Human Behavior 10 (3), 299-323.

Moskal, P., Barbara, M., & Foshee, N. (1997). Educational technology and distance education in central Florida: An assessment of capabilities. The American Journal of Distance Education. 11(1), 6-22.

Nabil, A., Awerbuch, B., Slonim, J. Wegner, P. & Yesha, Y. (1997). Globalizing business, education, and culture through the Internet. Communications of the ACM, 40(2). (http://www.acm.org/pubs/articles/journals/cacm/1997-40-2/p115-adam/p115-adam.pdf)

Nahavandi A., & Malekzadeh, A. R. (1993). Organizational culture in the management of mergers. Westport, Connecticut: Quorum Books.

Neal, L. (1997). Virtual classroom and communities. http://www.lucent.com/cedl/group97.html.

Neal, L., & Ingram, D. (1999). Asynchronous distance learning for corporate education: Experiences with lotus learningspace [On-line]. Available: http://www.lucent.com/cedl/neal_formatted.html.

Nelson, G. E. (1998). Online evaluation: Multiple choice, discussion questions, essays, and authentic projects. ED430659.

Nielsen, J. (1990). Designing user interfaces for international use. Amsterdam: Elsevier.

Norman, D. A. (1993). The things that make us smart. Reading, MA: Addison-Wesley.

Norton, P., & Wiburg, K. M. (1998). Teaching with technology. Harcourt Brace & Co., Orlando, FL.

Nurmi, R. (1999). Knowledge-intensive firms. In Cortada, J. W., & Woods, J. A. The knowledge management yearbook 1999-2000. Boston: Butterworth-Heinemann.

Orr, K. L. & Davidson, G. V. (1993, January). The effects of group computer-based instruction and learning style on achievement and attitude. Presented at the Convention of the Association for Educational Communications and Technology, New Orleans, LO. (ERIC Document Reproduction Service No. ED 362 192)

Parsons, J. G. (1995). The impact of values on the financial analysis of HRD. Proceedings of the 1995 Academy of Human Resource Development Annual Conference (pp.4-2). Baton Rouge, LA: Academy of HRD.

Pernici, B. & Casati, F. (1997). The design of distance education applications based on the www. Paper presented at the WWW'94 Conference Workshop: Teaching and Learning with the Web, held at the First International Conference on the World-

Wide-Web, May 25-27 1994, CERN, Geneva, Switzerland. http://www.epcc.ed.ac.uk/t+lwkshp/submissions/barbara.html

Phillips J. J. (1994). "Measuring ROI in an established program," In Action: Measuring Return on Investment, Vol. 1. Alexandria VA: American Society for Training and Development, 1994, pp.187-197.

Phillips, J. J. (1997). Handbook of training evaluation and measurement methods (3rd ed.). Houston, TX: Gulf Publishing .

Piaget, J. (1985). The equilibration of cognitive structures: The central problem of intellectual development. Chicago, University of Chicago Press.

Pinto, J. K. & Geiger, M. A. (1991). Changes in learning-style preferences: A prefatory report of longitudinal findings. Psychological Reports, 68, 195-201. Phillips, 1997

Porter, L. R. (1997) Creating virtual classroom: Distance learning with the internet. New York: J. Wiley & Sons.

Porter, L.R. (1997). Creating the virtual classroom: Distance learning with the internet. New York.: John Wiley & Sons, Inc.

Preskill, H. (1997). HRD evaluation as a catalyst for organizational learning. Proceedings of the 1997 Academy of Human Resource Development Annual Conference (pp.2-1). Baton Rouge, LA: Academy of HRD.

Rangecroft, M., Gilroy, P., Long, P., & Tricker, T. (1999). What is important to distance education students? Open Learning, 14(1), 17-24.

Rakoczy, M. & Money, S. (1995). Learning styles of nursing students: a 3-year cohort longitudinal study. Journal of Professional Nursing, 11, 170-174.

Reeve, T. (1997). An evaluator looks at cultural diversity. Educational Technology, 37(2), 27-31.

Riechmann, S. W., & Grasha, A. F. (1972). The refinement and construct validation of the Grasha-Reichmann student learning styles scales. Unpublished dissertation, Cincinnati, Ohio.

Reiff, J. C. & Powell, J. W. (1992, February). Learning differences and interactive computer program. Presented at the Annual Meeting of the Association of Teacher Educators, Orlando, FL. (ERIC Document Reproduction Service No. ED 346 087).

Richards, Tyde (1998) "The Emergence of Open Standards for Learning Technology." Macromedia Interactive Learning Division. September 2, 1998.

Roblyer, M., Dozier-Henry, O. & Burnette, A. (1996). Technology and multicultural education: An uneasy alliance. Educational Technology, 36(3) 5-12.

Rowland, P. & Stuessy, C. L. (1988, Summer). Matching mode of CAI to cognitive Style: An exploratory study. Journal of Computers in Mathematics and Science Teaching, 7(4), 36-40.

Ruble, T. L. & Stout, D. E. (1991). Reliability, classification stability, and response-set bias of alternate forms of the Learning Style Inventory (LSI-1985). Educational and Psychological Measurement, 52, 481-489.

Schreiber, D. A., & Berge, Z. L. (1998). Distance training: How innovative organizations are using technology to maximize learning and meet business objectives. San Francisco: Jossey-Bass.

Schutte, J. G. (1996). Virtual teaching in higher education: The new intellectual superhighway or just another traffic jam? Available: http//www.csum.edu/sociology/virexp.htr.

Shreiber, D. A. & Berge, Z. L., (1998). Distance training: How innovative organizations are using technology to maximize learning and business objectives. Jossey-Bass, San Francisco, CA.

Sein, M. K., & Robey, D. (1991). Learning style and the efficacy of computer training methods. Perceptual and Motor Skills 72 (1) 243.

Sellin, R. & Winters, E. (1996). Cross cultural communication: Tips for those who develop material for translation (http://www.bena.com/ewinters/xculture.html)

Sherry, A. C., Fulford, C. P., & Zhang, S. (1998). Assessing distance learners' satisfaction with instruction: A quantitative and a qualitative measure. The American Journal of Distance Education. 12(3), 5-28.

Sims, R. R., Veres, III, J. G., Watson, P. & Buckner, K. E. (1986). The reliability and classification stability of the Learning Style Inventory (LSI-1985). Educational and Psychological Measurement, 46, 753-760.

Smith, N. T. (1998). Student satisfaction in distance learning classes. Unpublished doctoral dissertation, Texas A&M University.

Soo, K. S. & Bonk, C. J. (1998). Interaction: What does it mean in online distance education. (ERIC Document Reproduction Service No. ED 428-724).

Stigler, J.W., Shweder, R.A., & Herdt, G. (1990). (Eds.). Cultural psychology: Essays on comparative human development. Cambridge: Cambridge University Press.

Summary, R. & Summary, L. (1998). The effectiveness of the world wide web as an instructional tool. ED431393

Swider, Lillian (2000) "Making the Case for Synchronous Web-Based Software." http://www.learningcircuits.org/jun2000/swider.html June 2000.

Tapscott, D., Lowy, A., & Ticoll, D., & Kalakota, R. (1998). Joined at the bit: The emergence of the e-business community. In Tapscott, D., Lowy, A., & Ticoll, D., & Klym, N. Blueprint the digital economy: Creating wealth in the era of e-business. New York: McGraw Hill.

Thomas, L. (2000). Evaluation of distance education systems [On-line]. Available: http://www.lucent.com/cedl/evaluaofdes.html

Thompson, M. (2000). The effectiveness of distance learning. Available

Thompson, M. (2000). Factors Influencing Student Learning Outcomes in Distance Education [On-line]. Available: http://www.lucent.com/cedl/learningworks/facinfl.html

Thompson, M. (2000). Cost-effectiveness of distance education [On-Line]. Available: http://www.lucent.com/cedl/cost.html

Torode, C. (1999). More bang for the buck in internet training. Computer Reseller News, 833, 196.

Triandis, H. C. (1987). Collectivism vs. individualism: A reconceptualization of a basic concept in cross-cultural social psychology. In C. Bagley, and G. K. Verma (Eds.). Personality, cognition, and values: Cross-cultural perspective of childhood and adolescence. London, Macmillan.

Triandis, H. C. (1996). Individualism and collectivism. Boulder, CO: Westview Press.

Triandis, H. C., Bontempo, R. & M. Villareal (1988). Individualism and collectivism: Cross-cultural perspectives on self-in-group relationships. Journal of Personality and Social Psychology, 53(2), 33-338.

Training & Development (1999) "The new languages." Training and Development, v. 53 no11 (Nov. 1999) pp. 35-6.

Urdan, T. A., & Weggen C. C. (2000). Corporate e-learning: Exploring a new frontier. WR Hambrecht + Co.

Van Rennes, L., & Collis, B. (1998). User interface design for WWW-based courses: Building upon student evaluations. ED428731.

Volgman, K. W. (1997). Designing computer assisted training for global use.

Wagner, E. D., & Reddy, N. L. (1999). Design considerations in selecting teleconferencing for instruction. Distance Education for Corporate and Military Training, 64-70.

Wagner, E.D., & Reddy, N. L. (1999). Design considerations in selecting teleconferencing for instruction. Alexandria, Va: U.S. Army Research Institute for the Behavioral and Social Sciences.

Walls, J. (1994). Global networking for local development: Task focus and relationship focus in cross-cultural communication. In Harasim L. M. (Ed.). Global networks (pp. 153-166). Cambridge, MA: MIT Press.

Wang, X. C. (2000, July). Basic skills training vs. cultivation of creativity: Differences between Chinese and American Art Education. Presented in the Pacific Early Childhood Education and Research Association Inaugural Conference, July 24-27, Kobe, Japan.

Watkins, K. E., & Marsick, V. J. (1993). Sculpting the learning organization: Lessons in the art and science of systemic change. San Francisco: Jossey-Bass.

Webster, J., & Hackley, P. (1997). Teaching effectiveness in technology-mediated distance learning. Academy of Management 40, (6).

Wegner, S. (1998). Lost in translation? Cited in McMain, M (1998). Scaling the Great Wall. Training and Development, (July, 1999) 38-42.

Weinstein, M. B. (2000). Thirty three world-class competencies. Training and Development 54 (5) p. 20 –23.

Wellins, R., & Rioux, S. (2000, May). The growing pains of globalizing HR. Training and Development, 79-85.

Willis, B. (1994) (Ed.) Distance education: Strategies and tools. Englewood Cliffs, NJ: Educational Technology Publications.

Witkins, H. A., Otman, E., Raskin, D., & Kats, S. A. (1971). A manual for the embedded figures test. Palo Alto, CA: Consulting Psychologist Press.

Whalen, T., & Wright, D. (1999). Methodology for cost-benefit analysis of web-based tele-learning: Case study of the bell institute. The American Journal of Distance Education, 13(1), 24-44.

Whyte, M. M, Karolick, D. M., Nielsen, M. C., Elder, G. D., & Hawley, W. T. (1995). Cognitive styles and feedback in computer-assisted instruction. Journal of Educational Computing Research, 12(2), 195-203.

Williams, M.L., Papcrock, K., & Covington, B. (1999). Distance learning: The essential guide. London: Sage Publications.

Wisher, R. A. & Curnow, C. K. (1998) An approach to evaluating distance learning events. U.S. Army Research institute for behavioral and social sciences, Technical Report 1084.

Wisher, R., & Priest, A. N. (1998). Cost effectiveness of audio teletraining for the U.S. army national guard. The American Journal of Distance Education, 12(1), 38-51.

Woolliams, P., & Gee, D. (1992). Accounting for user diversity in configuring online system. Online Review, 16(5), (http://sunrae.uel.ac.uk/hci/int/papers/online.htm).

Van Rennes, L., & Collins, B. (1998). User interface design for WWW-based courses: Building support on student evaluations. Paper presented at the World Conference on Educational Multimedia, Hypermedia and Educational Telecommunications.

Zahm, S. (2000). No question about it – e-learning is here to stay: A quick history of the e-learning evolution. E-learning, 1 (1) 44-47.

Zoltan, E., & Chapanis, A. (1982). What do professional persons think about computers. Behavior and Information Technology, 1, 55-68.