

WHITE PAPER

## **Key Strategic and Functional Considerations in Choosing a Knowledge Sharing Solution**

**Building an effective communication, collaboration,  
and learning infrastructure**



## SUMMARY

With a business environment notable for its rapid change, organizations are coping with reduced cycle time—the critical delay between idea and implementation—and the need to continually adjust their operations to meet new market conditions. Effectively managing new information and deploying it throughout the organization is critical to meeting these challenges. Continuous, enterprise-wide knowledge sharing has, therefore, become essential. As organizations adopted solutions to address the need to share knowledge, the most common initial application has been in the area of training or learning. Unfortunately, traditional classroom training programs are too expensive and time-consuming to enable organizations to distribute mission-critical information quickly and efficiently.

Organizations whose survival depends on maintaining an up-to-date, well-informed workforce need a flexible knowledge sharing solution that is at least as effective as, and in some cases better than, the high level of participant engagement found in the traditional classroom. Although, enterprise-wide learning is just one benefit of a comprehensive knowledge sharing solution. The optimal solution provides a single platform for the delivery of communications, collaboration, and learning. The focus of this white paper is on the wide array of distance learning options available today, and identifies the best solutions for meeting not just one, but all of today's strategic, enterprise-wide knowledge sharing demands—communication, collaboration, and learning.

## THE NEED FOR CONTINUOUS, ENTERPRISE-WIDE KNOWLEDGE SHARING

In an economic climate characterized by rapid change, competitive advantage—even survival—depends on an organization's ability to disseminate organizational knowledge and promote ongoing learning and collaboration throughout the enterprise.

Over the past few years, companies have focused on dramatically improving their time-to-market for new products, services, and technologies as a key means of gaining an important advantage over their competitors. The pace of rollouts for new services, policies, procedures, and price structures has decreased from every 12 to 24 months to almost monthly. To support these changes, organizations must communicate changing information to employees quickly. For example, if sales and marketing do not understand a new offering and are unable to explain its benefits to the marketplace, the organization will lose any advantage it might have gained from an early launch.

According to Phil Horton, Marketing Director at BMW (GB), a ONE TOUCH Knowledge Systems' customer, "in today's changing market, consumers place greater importance on trusted brands. We recognized there was a lot of learning needed quickly to differentiate ourselves from the rest of the automotive marketplace at the point of contact with our customers."

As companies push the envelope by continually rolling out improved products and services, however, they can rapidly deplete the extent to which their employees' knowledge base is suitably up-to-date. "Human skills are subject to obsolescence at a rate perhaps unprecedented in American history" commented Alan Greenspan, chairman of the Federal Reserve Board of the United States. Estimates place the value of these intellectual assets at three to nine times the company's book value. For example, Hewlett-Packard reports that the half-life of a software engineer's knowledge is 2.5 years, after which half of what the engineer learned in his or her initial training has become obsolete.<sup>1</sup> Without continuous learning and access to critical knowledge resources, employees quickly lose their ability to bring the same value to the organization that they did the day they were hired from college. As a result, in the words of Brandon Hall, noted e-Learning industry expert, "learning is moving from being an event to an ongoing, lifelong process."<sup>2</sup>

In addition to shaping individuals' careers, organizations responding to constantly changing market conditions also need the flexibility to deploy teams of employees in changing configurations. Continuous learning and knowledge sharing prepares employees to meet the challenges of their new roles within the organization.

By providing employees with access to the knowledge they need, organizations are making employees' jobs easier, and actually contributing to staff attraction and retention. According to KPMG Consulting, LLC, "organizations that grasp the cultural implications can achieve what we define as the High-Performance Employee—an individual who uses (knowledge management) procedures and technologies to fulfill their own potential and deliver real business benefits to the organization, its customers, and its stakeholders."<sup>3</sup>

Cisco Systems CEO John Chambers, speaking about the way in which the Internet is changing our lives, noted that, through e-Learning, employees will be able to take more control of their jobs. Admonishing the enterprise, Chambers stated, "If we don't find ways to train our employees better and faster, we will be non-competitive." In the same October 1999 address, he forecast the growth of e-Learning to rise steadily for two-and-a-half years, then take off. "The biggest growth in the Internet, and the area that will prove to be one of the biggest agents of change, will be online training, or e-Learning," Chambers concluded.<sup>4</sup>

Taking that concept and potential benefits of knowledge sharing farther, Jack Welch, Chairman of General Electric, noted "The old idea of the manager knowing a few more facts than his subordinates is nonsense; leaders share information so everyone understands

the vision and contributes to its success. That's what communication is all about. And it's at the heart of managing the modern day corporation."

Clearly, business visionaries from all industry sectors see the need for and benefits of continuous, enterprise-wide knowledge sharing. In the near future, organizations that survive and thrive will be "learning organizations," able to manage and distribute knowledge throughout the enterprise quickly and continuously. Key to becoming a true learning organization is the selection of an effective, efficient learning solution that can serve as both a scalable distributed learning and a knowledge sharing infrastructure.

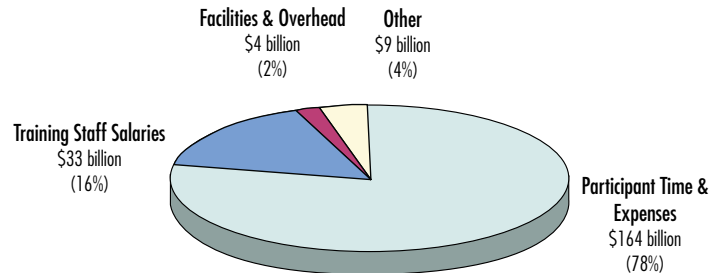
The same technology that is fueling our economy and increasing our need for lifelong education and easy access to knowledge has, not surprisingly, had significant implications on how we deliver this information. According to Merrill Lynch, the e-Learning market will grow from \$3.5 billion in January 2001, to more than \$25 billion in 2003.<sup>5</sup>

## THE LIMITATIONS OF LIVE ON-SITE TRAINING

As organizations recognize the need for continuous learning, including ongoing training, they search for solutions that meet their requirements for high-quality, low-cost, rapid delivery of information. Live classroom programs are considered the benchmark for high-quality training and communications, primarily because they offer the opportunity for human interaction and collaboration that is so fundamental to effective learning. In addition to easily seeing graphic materials that instructors use to make their points, students can ask questions and discuss materials with the instructor and with other students in a way that maximizes understanding and retention.

While face-to-face classroom interaction takes advantage of the full range of verbal and nonverbal communication skills that comprise human interaction and understanding, conducting live sessions has significant limitations. Large organizations simply have too much information to disseminate to too many people and no fast way to make it happen. Moreover, the costs associated with conventional training are high, including airfare, lodging, lost productivity, and lost revenues as vital employees are diverted from productive activities. As a result, large organizations suffer training backlogs and are unable to distribute mission-critical information quickly and efficiently enough to meet competitive demands.

The American Society for Training and Development (ASTD) estimates that as much as \$210 billion is spent on employee training per year<sup>6</sup>, as illustrated below:



It is noteworthy that 78% of the \$210 billion is the cost of participant time and expenses while attending training. Even a small reduction in participant time could make a large impact; for instance, a 5% reduction in training time could save employee time worth \$8 billion a year.

## THE MOVE TO E-LEARNING

In addition to participant time and cost savings, organizations can benefit from the costs associated with an acceleration in time-to-market. If employees' travel time is reduced, more time is available to be spent on development, sales, and marketing. According to the ASTD, e-Learning has changed the economics of training delivery.<sup>7</sup>

In response to these constraints, companies have turned to new, increasingly interactive forms of distributed learning—technology-based learning or the "electronic" delivery of learning that eliminates the need for participants to be physically present in the same location as the presenter. The meaning of the term e-Learning is evolving, though, as the scope, application, and power of the technologies it describes develop and expand to encompass increasingly high levels of multimedia-rich content and interactivity among presenters and participants. For the purposes of this paper, e-Learning is defined as the delivery of content via all electronic media, including the Internet, intranets, extranets, satellite broadcast, audio/video tape, interactive TV, and CD-ROM.

### Reduced Costs

Companies originally adopted distributed learning solutions to reduce direct training expenses. By delivering training directly to where participants work, these programs eliminate travel costs. Technology-enabled learning also reduces the indirect costs of lost productivity that result from the time spent traveling to and from the off-site training location. For employees who generate revenues for the company, such as the sales force, e-Learning minimizes the time spent away from activities that could otherwise generate revenue for the organization, such as meeting with customers and prospects.

### **Rapid Delivery**

When companies inform employees about new products using traditional "train-the-trainer" methods, they encounter considerable delays. Typically, a limited number of experts can present the information, and it can take a great deal of time for these experts to travel to the large number of sites typical of a multinational organization. E-Learning allows an organization to address up to thousands of people instantly and simultaneously, wherever they might be located, leveraging the expertise of the enterprise's various subject matter experts. In fact, studies have shown that e-Learning can actually take 20% less time than conventional classroom training.

### **Extended Reach**

As organizations continue to globalize, the audience that needs to receive critical information grows. It becomes increasingly important to ensure the communication and training medium is flexible enough to scale as the number of participants increases.

### **Consistency**

Another drawback to conventional classroom training is the margin for inconsistency. No live class or presentation is ever the same twice. The one-to-many capability of e-Learning not only has the benefit of cost-effectiveness, but is an efficient way to deliver consistent corporate communication messages. Being able to broadcast a single presentation to all participants at the same time, including the ability to share and hear the same questions and answers, allows organizations to enhance the effectiveness of any training or communications event.

### **Uncompromising Quality**

One of the primary concerns organizations have when considering e-Learning is whether it matches the quality and effectiveness standards set by live classroom training. Studies have shown that the quality of learning that employees receive through advanced e-Learning programs can be as good as, and in some cases better than, stand-up training programs, as evidenced by standard performance measures.

A study of e-Learning at Con Edison, a supplier of power to New York City and Westchester County, conducted by Vantage International in March 1998 concurs. According to the report, "Students were overwhelmingly and unequivocally positive about the e-Learning experience. Several factors contributed to their satisfaction level, including one-on-one interactive experience with the presenter. Every student felt that they had a personal con-

nection with the instructor that motivated them to pay better attention to the material, and as a result, increase their learning. Because students paid better attention, were more interactive with the instructor, and were less stressed, they felt they learned more, and their test scores would reflect this enhanced learning experience."<sup>8</sup>

The Federal Aviation Administration (FAA) obtained similar results in its own trials of e-Learning. Tests comparing e-Learning with similar on-site courses found essentially no difference in the quality of the learning between distance versions and on-site versions of the same courses, as measured by examinations during and at the end of each course.<sup>9</sup> In other words, the FAA believes participants learn just as much in distance versions of courses as they do in traditional on-site versions of the same courses.

E-Learning participants at BMW (GB) showed an increase in comprehension as well. Analysis by a third party of the automobile manufacturer's e-Learning program showed that employees grasped new corporate initiatives and understood changes in brand perception faster and more comprehensively following the implementation of a knowledge sharing network. BMW determined that their e-Learning program did a better, more consistent job in communicating a clear corporate vision and reinforcing company values than the conventional method of training.

Numerous other organizations have conducted studies over the past several decades that cite side-by-side analyses of e-Learning and live classroom courses in which the outcomes verified that the e-Learners did as well as or better than their classroom-bound counterparts. In 1998, a study comparing online distance learning versus traditional classroom learning revealed that Cyberlearners performed significantly better ("statistically significant at the 99% level") than the Traditional Learners with respect to final exam scores.<sup>10</sup>

One professional trainer, Joyce Harvey of Harvey & Associates LLC, cites studies that show no significant difference between an e-Learner's experience and that of a learner in a conventional classroom. In fact, some studies indicate e-Learners actually learn, retain, and test out better. Additionally, in her experience, e-Learning forces some instructors to teach better. "It is very easy not to show a graphic or share an application or Web page in stand-up instruction," states Harvey. "E-Learning really forces both presenters and learners to participate and interact."<sup>11</sup>

Organizations have reported many benefits resulting from the use of their e-Learning networks. In surveys conducted by ONE TOUCH Knowledge Systems, since 1989 customers have consistently stated the following benefits:

- increased learner comprehension,
- decreased travel cost,
- increased content covered,
- increased audience size,
- decreased cost per learner,
- increased learner satisfaction,
- increased presenter satisfaction, and
- improved tracking of learner performance.

These benefits are largely attributable to the use of e-Learning solutions as a cost-avoidance tactic and a distributed training application. Increasingly, however, ONE TOUCH customers report even more compelling benefits from the use of their e-Learning networks as a means of collaborative knowledge sharing. These include:

- greater competitive agility from accelerated time-to-market,
- increased productivity from highly collaborative knowledge sharing,
- lower employee turnover with improved morale and performance from more timely, consistent, and clear corporate communications, and
- enhanced shareholder value from shift to knowledge-based, initiative-driven operations.

## CASE IN POINT #1: E-LEARNING REDUCES COSTS AND IMPROVES CYCLE TIME FOR LEADING ENERGY SUPPLIER

GPU Energy is an electric power supplier formed following industry deregulation through the merger of three separate power companies, serving two million customers. In 1998, to meet the varied training needs of its 5,000 geographically dispersed employees, GPU created an e-Learning network by adding a ONE TOUCH Presentation Server and remote classroom equipment (Interactive Touchpads and KnowledgeSite™ Managers) to its business television network. With 1,000 touchpad-equipped seats in 74 classroom sites across three Northeastern states, GPU used its new "Learning Curve" e-Learning infrastructure to quickly educate the entire company in the adoption of a critical new enterprise resource management (ERP) software backbone. GPU accomplished the daunting task in a short three-week period, during which it broadcast and conducted 5,600 interactive training sessions. In addition to greatly accelerating its ERP training initiative, the company estimates it saved \$2.1 million using e-Learning versus its previous stand-up training model.<sup>12</sup>

## CASE IN POINT #2: E-LEARNING A DRIVING FORCE IN SALES GROWTH

BMW (GB) has seen steady growth in the last two decades. In addition to the strength of the BMW product line, much of this success is attributable to the company's commitment to speeding vital information to front-line staff in its 7,000-member workforce using advanced distributed knowledge and learning methods. In 1998, BMW (GB) identified the need to further expand and accelerate its enterprise learning initiatives to maintain its leading position in the face of mounting competitive, environmental, and legislative pressures. The following year, the company enhanced its existing business television (BTV) network with the addition of ONE TOUCH Knowledge Systems' interactive knowledge sharing solution. By incorporating e-Learning into their communication efforts, BMW was able to transform their BTV network from a tactical, cost-cutting training tool to a strategic, competitive advantage. The company's first goal was to reassert BMW's brand values across the enterprise. What would have taken at least 12 months to roll-out using their previous training methods, took only seven weeks using e-Learning. "The capabilities of the ONE TOUCH-powered e-Learning network has had a pronounced effect on the productivity of the BMW (GB) workforce," according to Phil Horton, Marketing Director, BMW (GB).

In sum, properly designed learning programs, coupled with appropriate technology, can rapidly accelerate the distribution of knowledge without sacrificing desired learning outcomes. A critical first step, therefore, is selecting an e-Learning solution that can accommodate a rich learning environment, as well as provide tools to measure participant results that can be recorded as part of an employee's overall learning profile. If chosen carefully, an e-Learning solution can complement a learning and knowledge management system as part of an enterprise-wide knowledge sharing solution.

## THE KEY IS A HIGH LEVEL OF INTERACTIVITY

While a wide range of available technologies provide e-Learning, not all are equally effective. The foundation for the most effective learning is a level of interactivity high enough to fully engage the learner. Interactivity can be defined as a two-way connection between instructors and students, or even a three-way connection among instructors, students, and other students. Interaction has also been defined as "the degree to which an individual actively participates in an information-exchange".<sup>13</sup> Research consistently suggests that interactivity plays an essential role in student motivation and learning. It also helps the learner process and remember the content of the course.

There are, however, many levels of interactivity associated with the various e-Learning solutions available. At the lowest level, interaction is not real-time and generally takes place in a one-way direction. The interaction may simply indicate whether the learner has respond-

ed correctly or incorrectly to test questions about the material. With this type of interactivity, the instructor directs the learner to a predetermined goal. One major limitation is that it can lead to learner dependency on the instructor, shallow thinking, and inhibit creative expression.

In contrast, high-level interaction gets learners involved in setting and achieving their goals. The presenter becomes a partner and mentor, helping students reach their goals. Students also explore ideas together and critique each other's work. Such high-level interactivity engages participants in the learning process and encourages their skill development, creative expression, and mastery of higher-level knowledge and skills. Additionally, investing in infrastructure that promotes interaction and collaboration provides an organization the power and flexibility to use a single delivery method for all communications and learning needs.

According to Karen Mantyla, writing for the ASTD, "interaction is a requirement for maximum effectiveness to occur in such instructional events as the following:<sup>14</sup>

- Gaining attention
- Stimulating attention
- Maintaining attention
- Informing learners of the instructional purpose
- Presenting information
- Asking and answering questions
- Providing feedback on performance

In today's rapidly changing business environment, organizations need training and communication methods that allow participants to absorb and use the material quickly and to think of creative solutions to challenges. Only learning sessions that engage students through high-level interactivity—whether in a conventional classroom or via highly interactive, presenter-led, real-time e-Learning—can help them develop the independent thinking and skills necessary to meet that objective.

## CHANGING EXPECTATIONS

According to industry analyst firm, WR Hambrecht + Co., "technological barriers are diminishing. The main hurdles to e-Learning, such as lack of interactivity, content availability, technology standards, and bandwidth, are currently being addressed. Especially the continued adoption of broadband should facilitate higher uses of media-rich e-Learning products."<sup>15</sup>

Previously, organizations with limited network capacity would have to compromise a rich learning experience by adopting lower-level, asynchronous or Web-based e-Learning solutions. These limitations are quickly diminishing, though. As broadband technology costs are declining, access and availability are increasing. Organizations no longer have to sacrifice e-Learning features such as streaming video, two-way audio, or live interaction—all critical elements in a successful learning environment.

In addition, organizations are responding to workforces that are increasingly exposed to broadband at home. More and more consumers have subscribed to DSL (digital subscriber line) or a cable provider, taking advantage of a highly interactive multimedia-rich online experience at home. In fact, it is projected that 11 million homes will have broadband via satellite in 2001.<sup>16</sup> Clearly, today's employees will expect the same experience on the job that they have grown accustomed to at home.

## THE POWER OF VISUAL INTIMACY

When choosing an e-Learning solution, it is important to consider the critical role played by video-based visual interactivity in conveying and understanding communications. Don Gentry, an AT&T Distance Learning Specialist, noted the primacy of live video in learning when he commented, "We have concluded that live video broadcast, with the ability to interact with the presenter, is as close to the standard classroom environment as you can be without really being there."<sup>17</sup>

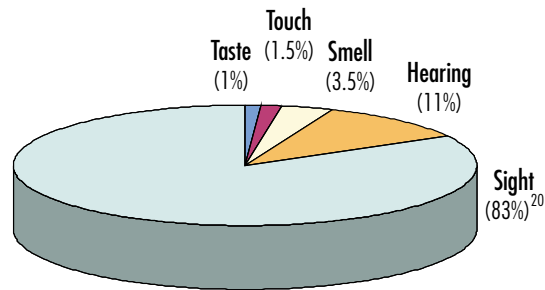
While content is of major importance, the subtleties of face-to-face human interaction can be of equal or greater importance because of the way they can illuminate or cloud the content. By integrating such features as live presenter video, two-way voice, and response data interaction, e-Learning technology can attain a level of "visual intimacy" with students that rivals—or may even exceed—that found in a conventional classroom setting. "Visual intimacy is critical to helping people feel like you're right there with them in the room or at their desk. Without that intimacy, you reduce people's desire to verbally interact and they leave the training session, either mentally or physically," explains Raphaela Fodale, director of Interactive Distance Learning (IDL) consulting at Visual Service, Inc.<sup>18</sup>

The roots of how we communicate with one another predate the development of language. Non-verbal communication is a behavior we do inherently and unconsciously—even when we are talking on a conventional telephone to a person who cannot see us. One analysis has suggested that effective communication between individuals relies:

- 7% upon words,
- 38% upon tone of voice, and
- 55% upon gestures.<sup>19</sup>

Another analysis goes even further in stressing the importance of sensory input in the learning process; its findings suggest that we actually learn better by seeing.

**We learn through:**



These findings underscore the importance of combining or integrating visual and conversational interactivity into the design of an effective learning program. It is the interactive relationship—not the technology—that makes the connection between teacher and student work. But, without the appropriate delivery system, this critical interactivity can be limited or precluded altogether.

**AN OVERVIEW OF E-LEARNING TECHNOLOGIES**

Historically, distance education meant correspondence study. Today, organizations are faced with a wide range of technologies that use audio, video, and computers to communicate and share knowledge.

**Terminology**

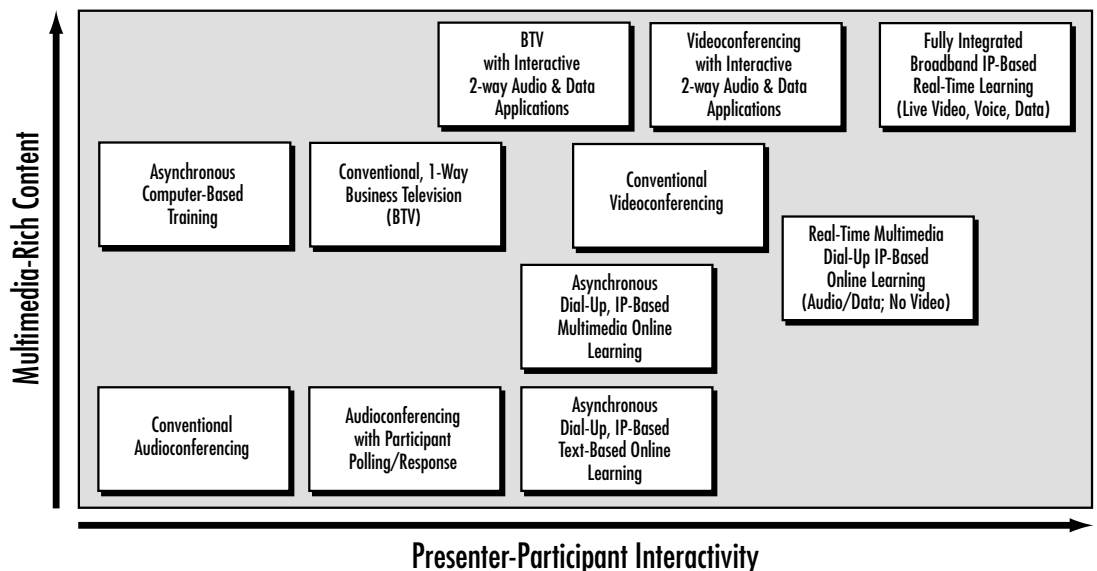
Numerous similar-sounding terms abound in the world of technology-based learning. The original, fundamental concept of distance learning began with technologies that allowed students to benefit from consistent training while physically separated from their teachers. This may have started at some organizations with mailing manuals, videotapes or simple teleconferencing, and evolved to computer-based training (CBT) tools using pre-recorded lessons on diskette or CD-ROM, and one-way business television (BTV) broadcasts.

With the rise of the Internet, the term "Online Learning," began to expand the range of distance learning options. Although sometimes used interchangeably with e-Learning, online learning more precisely refers to Web-based learning, which constitutes just one part of the technology-based learning spectrum: learning via the Internet. "Distance Learning," on the other hand, is a broader and less precise term that encompasses non-electronic as well as technology-based methods of distributing knowledge.

The next generation of solutions—e-Learning—has variously incorporated telephony, broadcast video, computer hardware and software, and multimedia content. This includes key developments such as the addition to BTv of response mechanisms that enable a high level of real-time, two-way voice and interaction between physically separated presenter and participants, as originally pioneered by ONE TOUCH Knowledge Systems. Other second-generation e-Learning solutions include videoconferencing applications that establish two-way visual and voice communications among participants. The hallmark and the most advanced of these e-Learning solutions is a high-level integration of video and voice communications with data response that allows class participants to interact and collaborate easily and naturally in real time.

Like its business counterpart, e-commerce, the term e-Learning is generally regarded as "electronic" delivery of learning via the Web. Also like e-commerce, it is rapidly evolving in its scope and application. In this paper, the term e-Learning is used to represent the highest level of both multimedia-rich content and interactivity among instructor and students. It is also defined as just one component of a broader, more comprehensive enterprise-wide knowledge sharing solution.

### Interactivity is Key Consideration in Selecting Enterprise Learning and Communication Solution



All e-Learning solutions fall into two categories: synchronous (real time) and asynchronous (non-real time or on demand). Synchronous instruction requires the simultaneous participation of learners and presenters. The advantage of synchronous instruction is that it offers the highest level of interactivity because the interaction occurs in real time. In addition, the peer pressure factor can have a notable effect on increasing class participation.

Asynchronous instruction does not require the simultaneous participation of all students and instructors. This makes asynchronous instruction more flexible than synchronous instruction, giving the students a choice of location and time. As a result, distance learning can occur across multiple time zones and geographic regions. Because asynchronous instruction allows students to take their time in responding to questions, this can be a benefit for students who speak English as a second language or are more analytical. The primary limitation is that because these courses do not occur in real time, they offer less interactivity than synchronous systems.

"Presenter-led" is another term used in distinguishing between different e-Learning solutions. Often not associated with asynchronous solutions because of their self-paced and often text-heavy nature, presenter-led refers to a session that is controlled and managed by a subject matter expert. Very similar to the conventional live, stand-up classroom, a presenter-led e-Learning solution allows participants to interact with the presenter. Studies of such interactions indicate an increase in student comprehension and learning. An exception to the non-presenter-led asynchronous solution is the ONE TOUCH Front Row® OnDemand solution. Since OnDemand captures live Front Row desktop presentations—including the presenter video, participant audio, and high level of interactivity—it is able to preserve the benefits of having an expert lead the session.

The following discussion details the various learning alternatives currently on the market and how closely each comes to meeting the needs of today's learning organizations.

## AUDIOCONFERENCING

Audioconferencing uses telephones, speakerphones, or microphones and, if necessary, an audio bridge to connect multiple phone lines providing two-way voice communication between two or more groups or three or more individuals in separate locations. Audioconferencing is relatively easy to set up, requires no special technical skills, and has the advantage of being a low-cost, low-tech way to connect a presenter with multiple learners for certain types of training and communications.

As a distance learning technology, however, audioconferencing by itself is limited in that participants are unable to see the person with whom they are speaking. In addition, stand-alone audioconferencing makes no provision for participants to collaborate or share visual materials or applications, and there is no built-in way to record the discussion for later review. The basic technology generally offers no built-in tools for managing the class proceedings, such as ways to determine who can enter a discussion at what time. This creates additional challenges to presenters attempting to cover large amounts of information efficiently in a limited time period. The addition of technology called audiographics, however, can enable a presenter and participants to create and share computer-generated graphics and slides.

## COMPUTER-BASED TRAINING

Computer-based training (CBT) uses a computer to deliver and/or manage learning experiences. This type of training is delivered asynchronously on a CD-ROM. The student reads the information presented on the screen and interacts with the content by using a mouse or keyboard. The student controls the pace of the instruction.

Studies at Aetna Insurance and McDonnell Douglas showed test scores 5% higher with computer-based training than with classroom instruction. According to Travis Piper, president of CBT developer Creative Approaches Inc. of East Bloomfield, NY, the reason that CBT can be effective is that learners are able to "keep clicking until they get it."<sup>21</sup>

CBT is well suited to training programs that require drill and practice, tutorials, simulations, and instructional games. Its asynchronous nature also means that CBT is very flexible, allowing students to take courses at their convenience. Depending upon the number of students who take the course, these materials can be very cost-effective. Development costs are incurred once, but spread over many uses. Some CD-ROM programs also include courseware management capabilities that track such things as which student took what lesson, what their scores were, and the amount of time a student spent on each program.

On the downside, CBT courses lack the benefit of the direct interactivity with another human being that comes with synchronous learning. Some participants may find CBT courses boring, particularly in cases where a "talking head" presents the material as opposed to a presenter who can call on students, share applications, tailor the pace of the session, and answer impromptu participant questions.

The cost to produce an asynchronous CD-ROM can be high, and the time required lengthy. As a consequence, CBT is best suited for training content with a long shelf life, and is not an optimal solution for "just-in-time" learning that relies on fast-changing, short-shelf-life content.

## VIDEOCONFERENCING

Videoconferencing, the live connection of two or more people using a combination of video and audio through videoconferencing hardware and software, is broadly used as a distributed learning solution. This allows participants—including presenters or subject matter experts—to see and hear each other at all locations and to engage in interaction similar to that in face-to-face classes. With the right camera equipment, participants can also easily see presentation material and graphics, such as charts and graphs, PowerPoint® slides, and other computer applications. The greatest advantage of videoconferencing is its unique two-way video and voice interactivity. This enables all participants not only to converse naturally, but to view each other's non-verbal body language, thus simulating stand-up classroom-like interactivity, enhancing problem solving, behavior modeling, and skills practice.

One of the primary limitations of basic videoconferencing is the lack of built-in class management and measurement tools. There is no "hand-raising" protocol, for instance, so anyone can speak at any time. Neither does videoconferencing offer an automatic means of certifying participation or formally polling or testing participants to measure their understanding of the material. Additionally, the bandwidth costs for high-quality video are still high, and two-way videoconferencing depends on inbound and outbound video connectivity between the instructor and all participants.

ONE TOUCH Knowledge Systems and videoconferencing vendors have begun to jointly market combined meeting/learning systems. These hybrid solutions offer the live, two-way audio/video interactivity of videoconferencing together with interactive student response systems and a complete suite of presentation authoring and class management tools. This enables students to register responses to polls, quizzes, and tests, and greatly enhances the presenter's ability to manage the class in real-time, while precisely measuring and certifying class progress and student comprehension. Additionally, these tools can be used to produce a variety of reports, including attendance, individual responses to questions, overall class performance, and the number of participants directly interacting with the presenter by calling in. Participant results can then be exported to an enterprise learning and resource management system. This is yet another example of how an effective e-Learning solution can be a key component of an enterprise-wide learning and knowledge sharing solution.

## BUSINESS TELEVISION

Business Television (BTV) refers to the use of one-way video and audio broadcast over satellite as part of a private business communications network. In its basic form, it is the transmission of focused educational programs throughout a network. BTV programming has three basic formats; programs can be live and interactive, entirely pre-produced, or a com-

bination of live presentation and pre-produced material. BTV networks can have thousands of receive sites. This allows organizations to broadcast institutional updates, news, training, meetings, and other events to large numbers of participants and multiple locations, simultaneously. As a result, the best presenters can deliver their expertise to thousands of people without having to travel to each site.

Like videoconferencing, BTV broadcasts allow instructors to communicate both verbally and non-verbally, which makes it possible to deliver highly engaging classes. But, unlike videoconferencing, bandwidth costs are reduced by eliminating video of the student back to the instructor. BTV networks can be augmented with the addition of ONE TOUCH Knowledge Systems' effective two-way audio and data interaction system—turning traditional one-way BTV into IBTV, or interactive business television. In the classroom, learners—who can see and hear their presenter on a TV monitor—are able to interact easily and naturally using the patented ONE TOUCH Interactive Touchpad with its integrated, hands-free microphone and response keys. By pressing the touchpad's Call key, for example, a student "raises a hand." The presenter and student can then freely converse as the rest of the class listens in. When the instructor queries the class, participants answer—yes/no, true/false, multiple choice, or numeric response—with a press of the touchpad. This solution also offers the presenter comprehensive but easy-to-use authoring and class management tools. Class results are compiled automatically via the Presentation Server and are available for immediate display to all participants, while individual student records can be logged into an enterprise database, providing a critical measure of participation and achievement. Post-class tabulation of responses allows the instructor to determine his effectiveness in reaching participants. The combined high level of real-time interaction and collaboration between learners and presenter creates the shared learning experience and dynamic class environment essential to effective e-Learning and knowledge sharing.

## TEXT-BASED ONLINE LEARNING

Most text-based online learning solutions involve asynchronous courses that students access via an e-mail-like protocol. Typically, students log in and download a text-based lecture from the instructor, then upload their responses to the lecture. An electronic bulletin board-like capability may also be included, offering participants the ability to communicate and collaborate asynchronously via "threaded discussions." In some cases, these systems also support interactive relay chat to enable "real-time" electronic conversations.

Many instructors report that the use of e-mail encourages even the quietest students to participate in the discussions because they are less likely to be intimidated, as they may be in face-to-face discussions with other students. E-mail also allows instructors to store question-and-answer exchanges for other students. Because these systems are not real-time, however,

they generally provide far less interactivity than real-time systems. They lack the body language information provided by video-based systems. They do not accommodate application sharing or whiteboarding. The considerable written exchanges can become overwhelming. And most problematic, text-based courses can be boring because of their low level of interactivity and lack of visual feedback. As many experts claim, social interaction is seen as the foundation of true learning.

### **E-LEARNING: The Internet Ushers in a New Wave in Distance Learning Technology**

The rise of the Internet and intranets in the late 1990s provided an infrastructure that is widely used for both real-time and asynchronous collaboration. Over the past few years, Web-based training courses that make use of these collaborative capabilities have become ubiquitous—and are available in a variety of formats described in the following sections. All Web-based training programs eliminate the need for companies to maintain expensive, dedicated training classrooms. Their Internet-based architecture allows instructors to deliver information anytime, anywhere, in a form convenient for students. The ease-of-use of common browsers makes them suitable for virtually anyone with minimum PC skills. Users can complete testing over the Web. And the ability to browse the Web gives instructors and learners access to resources in thousands of networks worldwide.

The major disadvantage of most current versions of Web-based training alternatives is that limited bandwidth generally precludes or severely limits these learning solutions from offering the high level of real-time multimedia interactivity necessary to achieve the visual intimacy critical for the most effective learning and communications. In order to accommodate a multimedia-rich e-Learning solution, an organization needs a broadband network, or in other words, a high-speed connection to the Internet. Fortunately, technology has continued to advance, and today more and more organizations—and households—are accessing the Internet via a broadband connection. Prices for services like Digital Subscriber Line (DSL), cable, and satellite have all come down. This increase in high speed Internet access has remarkably changed the workforce and consumer experience. As people are exposed to richer media over the Internet, the bar has been raised for acceptable, engaging online content both at home and at work. Recent developments in broadband connectivity, discussed below, are being used by the most advanced solutions to overcome earlier bandwidth limitations.

## ASYNCHRONOUS MULTIMEDIA ONLINE LEARNING

Asynchronous multimedia online learning programs are pre-produced, or "canned" training sessions that students access using a browser-equipped PC, via the Web. Programs can include realistic graphics, animation, movement, music, sound, images, text, and digitized, realistic voice. Many also include various levels of built-in measurement and certification tools that allow students to register, sign into the class, and take tests.

While some of these classes may also include streaming video clips, they are generally limited and not fully integrated into the presentation, due to Internet bandwidth limitations. Students can interact with an expert and other students asynchronously through threaded or bulletin board-like chat facilities.

The advantage of using multimedia in these programs is that it involves the human senses, especially sight and hearing, giving users a sense of interactive control over the computer. Multimedia is also effective because it addresses many learning styles. The variety of methods used in multimedia ensures that the learner is exposed to the content in many ways, assisting in retrieval, retention, and application.

These classes are not live, however, so students are unable to benefit from synchronous interaction with the instructor and other students. Moreover, because the video or animation clips used to support the class tend to feature subject matter rather than the instructor, the experience of seeing and hearing a live instructor as an integrated part of the instruction, which is key to successful learning for so many participants, is missing. As a result, although attractive because it is easily accessible, this solution shares many of the limitations of CBT. An exception to the typical asynchronous solution is Front Row OnDemand. Because OnDemand captures the experience of a live Front Row desktop presentation—including the presenter video, participant audio, and high-level interactivity—participants need not have viewed the class live to receive the benefits of having an expert lead the class.

## REAL-TIME PRESENTER-LED E-LEARNING

Today, not only does the Internet's infrastructure support real-time interactivity, but organizations are demanding such interactivity. Again, as more consumers are exposed to multimedia-rich content on their home PCs, they expect the same rich experience at work. Real-time, presenter-led video-based e-Learning meets these demands by providing live, engaging classes over the Internet. Students benefit from audio communications with the presenter and other participants, and can see applications, whiteboards, and content from the World Wide Web on their PCs. These programs also feature class management tools, as well as tools for testing, polling, and certifying students, making them an integral part of an enterprise learning and knowledge management program.

In addition to providing all of the benefits of asynchronous multimedia online learning classes, these real-time classes offer the benefit of live audio interaction. But, because they generally do not allow students to see the presenter live as an integrated part of the presentation, they lack the visual intimacy that is critical to the highest level of interactivity—and the most effective learning.

As research consistently reveals, the combination of telling and showing methods of instruction increases student retention.<sup>22</sup>

<b>Method</b>	<b>Methods of Instruction % Recall</b>	
	<b>3-Hours Later</b>	<b>3-Days Later</b>
Telling Alone	70%	10%
Showing Alone	72%	20%
Blending Telling & Showing	85%	65%

### **Overcoming Internet Bandwidth Limitations**

Over the past two to three years, technologies have emerged that overcome traditional Internet bandwidth limitations. "Broadband technology is exploding as a means of accessing the Internet at extraordinarily high speeds to perform basic tasks such as sending and receiving data as well as viewing and interacting with multimedia applications."<sup>23</sup>

Broadband technologies include DSL and compact, low-cost, user-installable digital satellite systems such as Hughes DirecPC®, which provides Internet download speeds of up to 400 kbps. These cutting-edge technologies are enabling a new breed of no-compromise, fully integrated e-Learning systems such as ONE TOUCH Front Row, with its presenter video and two-way voice and data exchange. And because they can connect presenters and participants via the Internet/intranet, they are easier to use and can be more cost-effective to deploy than earlier high-end e-Learning solutions.

**FULLY INTEGRATED, HIGHLY  
INTERACTIVE REAL-TIME  
KNOWLEDGE SHARING**

Fully integrated real-time broadband e-Learning applications, including Front Row, deliver live, interactive video and two-way audio and data exchange directly to users at their PCs over an intranet or the Internet using access such as DirecPC. These solutions provide all of the advantages of real-time multimedia online learning, including the ability to view text,

graphics, and animations; converse in real-time; see and interact with data, including PowerPoint slides; browse the Web; and share applications and whiteboards. With the click of a mouse, students can call the presenter to ask questions, select answers to questions, or signal difficulties with the pace of instruction. These systems also include full-duplex audio, sophisticated class management tools, and measurement certification. Most significantly, the fact that these distributed learning solutions overcome Internet bandwidth limitations means that instructors can fully engage learners with presentations offering the highest levels of conventional classroom-like interactivity—presentations that take advantage of the system's seamlessly integrated full-motion video, full-duplex audio, and interactive data exchange capabilities.

In short, these systems offer the highest level of classroom-like interactivity on the market today. Because students gain considerable visual intimacy and interactivity with their instructor and other students, they are far more likely to learn and retain the information. And, they provide organizations a single platform to accommodate all of their knowledge sharing needs; including critical business communications, collaboration, and learning.

Elliott Masie, head of the Masie Center and a noted lecturer on learning and technology, commented, "I believe and will advocate that we can use the term 'e-Learning' to reflect both the technology and the experience of learning in this new age. Experience is an essential component of e-Learning, for it is where the value lies. . . . Let's make sure we don't 'downshift' from a high-intensity classroom experience to a boring online learning moment. We can and will do better. The e-Learning I envision has the intensity of an airplane simulator, the support of an email from a trusted mentor, the engagement of a great novel, and creates the experience of learning that makes a learner say 'WOW.' The WOW is about their connection with knowledge, not about the technology."<sup>24</sup>

The major issue affecting an organization's move to fully integrated, real-time knowledge sharing involves infrastructure requirements. The benefits of high-level interactivity, such as visual intimacy, require high bandwidth that most terrestrial networks are unable to provide. One example is high-quality video, which is often accommodated via a satellite link. Satellite communications have become a well-accepted solution for overcoming the limitations that terrestrial alternatives pose to organizations that need to send large amounts of video, voice, and data information quickly to geographically dispersed sites. Increasingly, companies are turning to the skies to overcome the current limitations to bandwidth that the Internet entails today. Looking ahead, as the business world evolves further toward globalization and commitment to enterprise-wide knowledge sharing, the e-Learning community will benefit from the expected technological advancements in increased availability of broadband network access.

Commenting on the evolution of distributed learning technology, e-Learning industry analyst Scott Pope of the Delphi Group, commented, "Flexible, dynamic and adaptable, e-Learning has come a long way since its humble beginnings as CBT training. In its nascent stages, Web-based training was merely a poor substitute for the classroom environment that had rudimentary media capabilities and little interactivity. Advanced e-Learning technology that supports core business objectives offers tremendous advantages over its classroom counterparts."<sup>25</sup>

## CONCLUSION

In today's highly competitive environment, rapid and continual dissemination of organizational knowledge is essential to every organization's strategic advantage—even survival. Organizations need proven, cost-effective ways to rapidly distribute high-quality training and knowledge across their entire enterprise—reaching employees, partners, and customers. The key to sharing this knowledge is the ability to quickly and effectively leverage the power of the expert. The benefits include increased productivity and greater competitive agility—in other words, increased profitability and a greater impact across business lines. All e-Learning solutions can reduce the time and cost of training. But only the most advanced, interactive, presenter-led e-Learning programs offer a complete suite of knowledge sharing abilities and class management tools and deliver live, interactive video broadcasts of presenters right to students, wherever they are located. These solutions thereby offer participants the highest possible level of participant-presenter interactivity, collaboration, and engagement in the learning and communication process. As a result, only advanced e-Learning programs can marry the training/communications capabilities of traditional on-site programs with the time and cost advantages of other distance learning solutions. With fully integrated, real-time e-Learning, organizations can now quickly and effectively communicate with the extended enterprise, keeping the entire organization aligned and on a clear, consistent path to success.

## Footnotes

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