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SOLUTIONS SOFTWARE TECHNOLOGY

E-Learning: The Training Method of the Future?

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Abstract

Traditionally training has been performed by face to face style presentation and interaction. This requires the learner and the presenter to be in physical proximity. The cost of providing this type of training has become prohibitive as it requires of the learner to spend time away from the workplace combined with travel and accommodation costs. An alternative to face to face presentation is e-learning. Training can take place at a convenient time and location for the learner and the employer while the presenter can be an expert located anywhere in the world. This paper will discuss the benefits and potential limitations of e-learning and will be of benefit to educators, trainers and anyone interested in an alternative to face to face training.

Introduction

Wikipedia describes electronic learning or e-learning as a type of technology supported education/learning (TSL) where the medium of instruction is through computer technology, particularly involving digital technologies [1]. This could include any training delivered on a computer such as courses on a media such as CD-ROM or over the Internet. The material can be designed to support individual or organizational skills development. Examples include courses developed to provide information as well as those designed to build specific job-related skills. A myriad of online learning solutions have emerged over recent years, including self-paced e-learning, virtual classrooms, simulations, games and communities of practices.

Increasingly, organizations are turning to e-learning to save travel costs and instructional time. In a 2006 survey of training delivery methods [2], e-learning is reported to now account for nearly one-third of all training delivery of workforce learning. This is illustrated in Fig. 1.

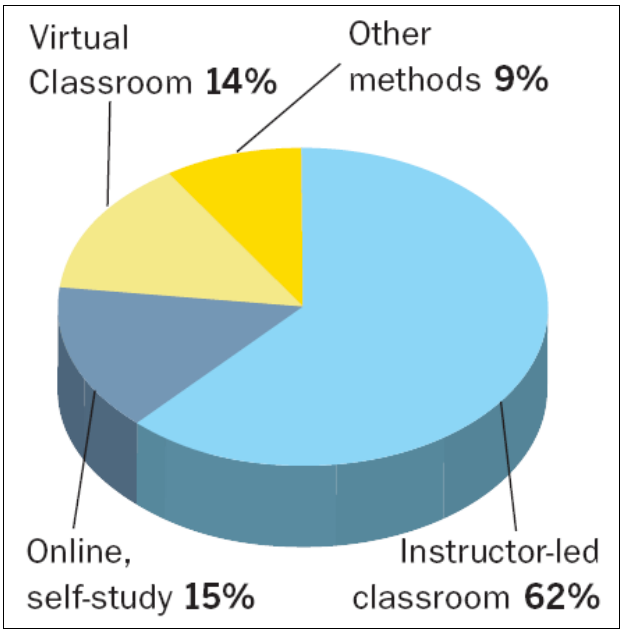

Fig 1: Training Delivery Methods [2]

While the classroom still dominates, the use of on-line self study and instructor led virtual classrooms has increased significantly over the past few years. This is more common in large organizations as these have the budget and technology necessary to accommodate on-line training. In comparing industries the survey found that e-learning was more widely used in technology and financial services sectors than other industries. Manufacturing, retail and surprisingly educational institutions have lagged behind in the adoption of e-learning.

With rapid changes in training techniques and nature of workforce, Information and Communication Technologies (ICT) play a critical role in the overall learning process. In a bid to stay in the aggressively competitive environment, the corporate world is sharpening its focus on cutting-edge technologies such as e-learning. The worldwide e-learning industry is projected to be worth over 52 billion US$ by 2010 [3].

Growth of E-learning

By 2006, nearly 3.5 million students were participating in on-line learning at institutions of higher education in the United States [4]. Many for profit higher education institutions now offer on-line classes. By contrast, only about half of private, non-profit schools offer them. A recent report [5], based on a poll of academic leaders, says that students generally appear to be at least as satisfied with their on-line classes as they are with traditional ones. Private institutions may become more involved with on-line presentations as the cost of instituting such a system decreases. Properly trained staff must also be hired to work with students on-line. These staff members need to understand the content area, and also be highly trained in the use of the computer and the Internet. Online education is rapidly increasing, and online doctoral programs have been developed at leading research universities.

Technology

Today many technologies can be used in e-learning. These include webcasts, blogs, collaborative software, and virtual classrooms. Most e-learning situations use combinations of these techniques. E-learning is naturally suited to distance learning and flexible learning, but can also be used in conjunction with face-to-face teaching, in which case the term blended learning is commonly used. E-learning pioneer Bernard Luskin argues that the "E" must be

understood to have broad meaning if e-learning is to be effective [1]. Luskin says that the "e" should be interpreted to mean exciting, energetic, enthusiastic, emotional, extended, excellent, and educational in addition to electronic that is a traditional interpretation.

E-learning Services

E-learning services have evolved since computers were first used in education. There is a trend to move toward blended learning services, where computer-based activities are integrated with practical or classroom-based situations.

E-learning lessons are generally designed to guide students through information or to help students perform in specific tasks. Information based e-learning content communicates information to the student. These are known as inform programs. Examples include content that distributes the history or facts related to a service, company, or product. With information-based content, there is no specific skill to be learned. By contrast, programs designed to build specific skills as classified as perform programs. In performance based content, the lessons build off of a procedural skill in which the student is expected to increase proficiency. Some typical examples of perform e-learning are lessons on software use or designing a database

Computer based learning (CBL) refers to the use of computers as a key component of the educational environment. While this can refer to the use of computers in a classroom, the term more broadly refers to a structured environment in which computers are used for teaching purposes. The concept is generally seen as being distinct from the use of computers in ways where learning is at least a peripheral element of the experience (e.g. computer games and web browsing).

Computer-based training (CBT) services are where a student learns by executing special training programs on a computer relating to their occupation. CBT is especially effective for training people to use computer applications because the CBT program can be integrated with the applications so that students can practice using the application as they learn. Historically, CBTs growth has been hampered by the human resources to create the program, and hardware resources needed to run it. However, the increase in PC computing power, and especially the growing prevalence of computers equipped with CD-ROMs, is making CBT a more viable option for corporations and individuals alike. Many PC applications now come with some form of CBT, often called a tutorial.

Web-based training (WBT) is a type of training that is similar to CBT; however, it is delivered over the Internet using a web browser. Web-based training frequently includes interactive methods, such as bulletin boards, chat rooms, instant messaging, video conferencing, and discussion threads. Web based training is usually a self-paced learning medium though some systems allow for online testing and evaluation at specific times. Recent years have seen an explosion in online training for educators by numerous content providers.

Computer-supported collaborative learning (CSCL) is one of the most promising innovations to improve teaching and learning with the help of modern information and communication technology. Collaborative or group learning refers to instructional methods whereby students are encouraged or required to work together on learning tasks. It is widely agreed to distinguish collaborative learning from the traditional model in which the instructor is assumed to be the distributor of knowledge and skills.

E-Learning Reusability

Much effort has been put into the technical reuse of electronically-based teaching materials and in particular creating or re-using material. Creating a course requires putting together a sequence of learning objects. There are proprietary and open, non-commercial and commercial, peer-reviewed repositories of learning objects.

An excellent example of e-learning that relates to knowledge management and reusability is the US Navy e-learning, which is available to active duty, retired, or disable military members [6]. This on-line tool provides certificate

courses to enrich the user in various subjects related to military training and civilian skill sets. The e-learning system not only provides learning objectives, but also evaluates the progress of the student and credit can be earned toward higher learning institutions. This reuse is an excellent example of knowledge retention and the cyclical process of knowledge transfer and use of data and records.

Communication Technologies

E-learning communication technologies are generally categorized as asynchronous or synchronous. Asynchronous activities use technologies such as blogs, wikis, and discussion boards. The idea here is that participants may engage in the exchange of ideas or information without the dependency of other user's involvement at the same time. E-mail is also asynchronous in that mail can be sent or received without having the recipient's involvement at the same time. Asynchronous e-learning is illustrated in Fig. 2.

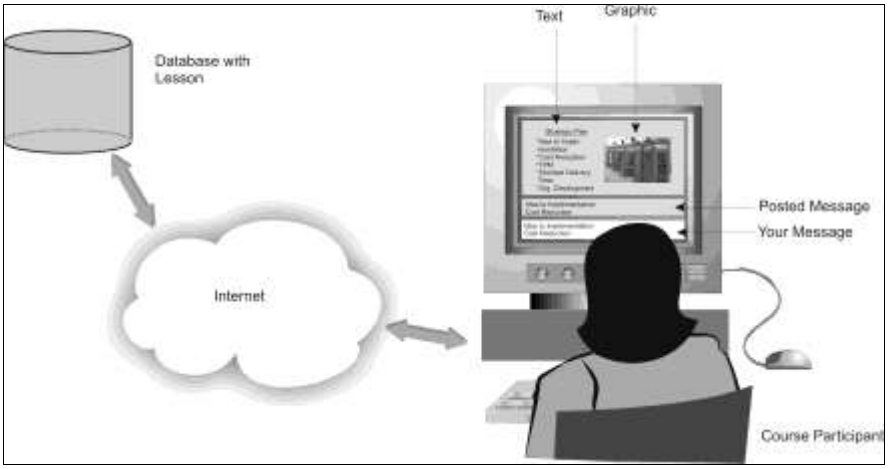

Fig 2: Asynchronous E-learning [7]

By contrast synchronous activities involve the exchange of ideas and information with one or more participants during the same period of time. A face to face discussion is an example of synchronous communications. Synchronous activities occur with all participants joining in at once, as with an online chat session or a virtual classroom or meeting. Virtual classrooms and meetings can often use a mix of communication technologies. In synchronous e-learning, the instructor reviews student answers and gives feedback, as in a traditional face-to-face classroom. Synchronous e-learning is illustrated in Fig. 3.

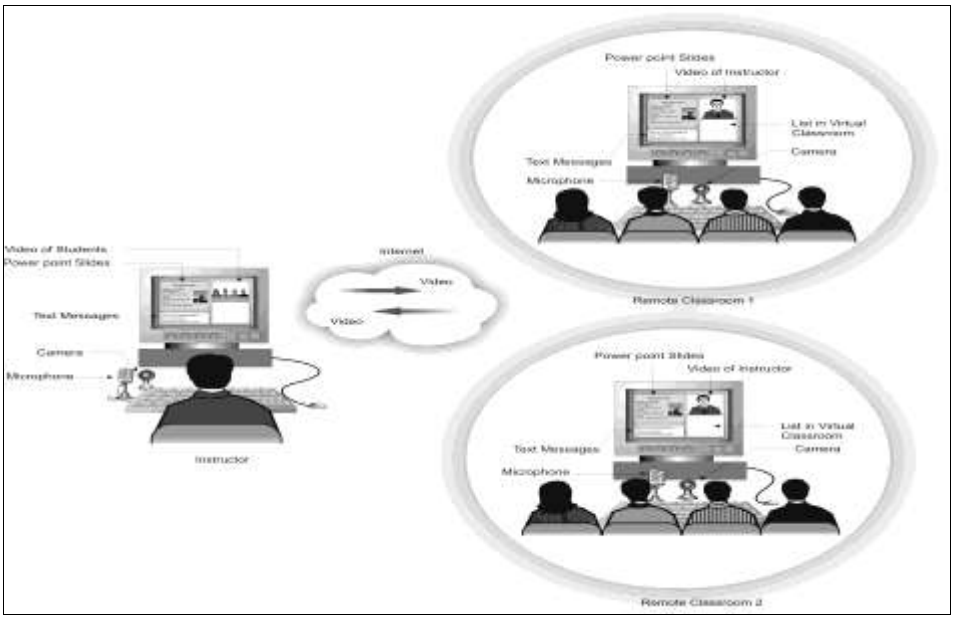

Fig 3: Synchronous E-learning [7]

Both the communities provide a general overview of the basic learning models and the activities required for the participants to join the learning sessions across the virtual classroom or even across standard classrooms enabled by technology. Many activities essential for the learners in these environments, require frequent chat sessions in the form of virtual classrooms and/or blog meetings

Benefits of E-learning versus traditional classroom settings

E-learning can provide the following major benefits for the organizations and individuals involved.

- Quality education, made affordable. Instructors of the highest calibre can share their knowledge across nationals and international borders which allow students to attend courses across physical, political, and economic boundaries. Recognized experts have the opportunity of making information available internationally, to anyone interested at minimum costs. This can drastically reduce the costs of higher and specialised education, making it much more affordable and accessible to the masses. An internet connection, a computer, and a projector would allow an entire classroom in a developing country's university to benefit from the knowledge of an international expert.
- Convenience and flexibility to learners. E-learning is self-paced and the learning sessions are available around the clock. Learners are not bound to a specific day/time to physically attend classes. They can also pause learning sessions at their convenience.
- Reducing environmental impact. No travel is required for e-learning, thus reducing the overall carbon output. The fact that it takes place in a virtual environment also allows some reduction of paper usage. With virtual notes instead of paper notes and online assessments instead of paper assessments, e -learning is a more environmentally friendly solution.

How Does E-Learning Compare with Traditional Methods?

Numerous comparison studies conducted over the past decade have shown no significant differences between traditional and e-learning [8]. A 2004 report [9] integrating research studies that compared outcomes from electronic distance education to outcomes from traditional classroom instruction yielded the achievement effect sizes shown in Fig. 4.

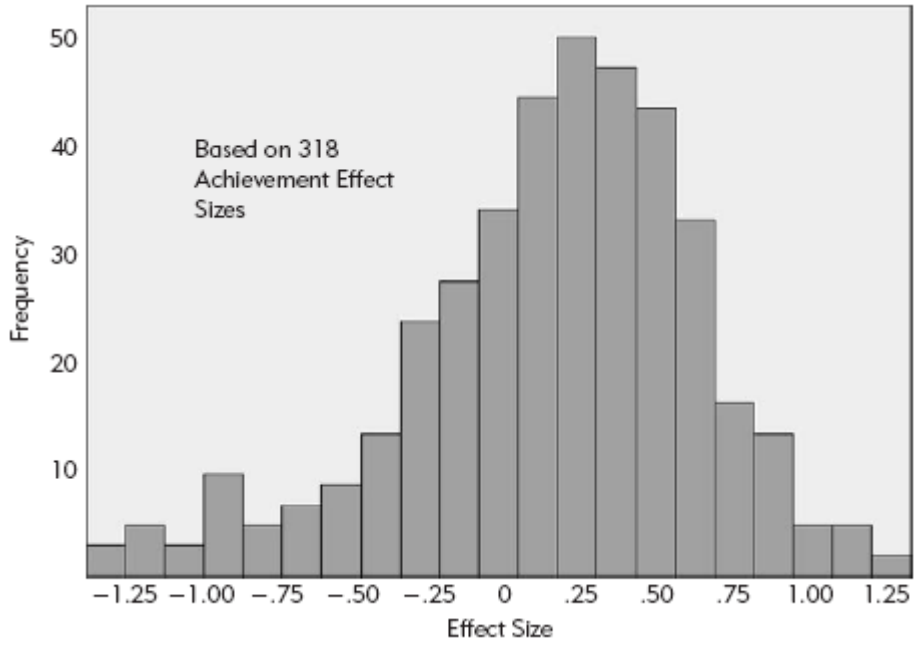

Fig 4: Electronic Distance Learning vs. Face-to-Face Instruction: Histogram of Effects.

The majority of effect sizes are close to zero, indicating no practical differences in learning between face-to-face and electronic distance learning. However, the bars at either end of the histogram show that some distance learning courses were much more effective than classroom courses and vice versa. Other researchers agree that learning in an online environment can be as effective as that in traditional classrooms. Students learning in the online environment are more likely to be affected by the quality of online instruction. As would be expected, learning performance in well designed and well-implemented online courses was significantly better and more effective than those in courses where teaching and learning activities were not carefully planned and the delivery and accessibility were impeded by technology problems.

From all the comparative research, it has been found that it is not the delivery medium, but rather the instructional methods that cause learning. When the instructional methods remain essentially the same, so does the learning, no matter how the instruction is delivered. When a course uses effective instructional methods, learning will be better, no matter what delivery medium is used [8].

What Makes E-learning Unique?

Not all media can deliver all instructional methods. For example, the capability of a paper document to deliver audio or animation is quite limited. The potentially valuable instructional methods unique to e-learning are as follows:

- Practice with automated tailored feedback. The e-learning courseware can give automated feedback telling the user that the answer is incorrect. Hints can be provided where the mistake is being made.
- Integration of collaboration with self-study. In both virtual classrooms and asynchronous e-learning, learners can collaborate at independent times by email and discussion boards. There is some evidence that under the right conditions learning and working together can result in better outcomes than learning and working alone.
- Dynamic adjustment of instruction based on learning. The content of the course can change based on the mistakes the user makes on practice problems. E-learning is capable of making these adaptive changes.
- Use of simulation and games. Realistic situations and job problems can be compressed into a short time frame. These simulations can provide highly effective learning environments.

E-Learning Pitfalls

Despite the capabilities of technology-delivered instruction, there are two common barriers to the realization of the potential of online learning [8]. These are:

- Failing to identify the job skills which lead to learning failure. Detailed job and task analysis is a prerequisite and a labour-intensive process. E-lessons that bypass the job analysis process run the risk of presenting knowledge and techniques out of context. This lack of job context risks failure to teach the required skills. Teaching knowledge and skills that do not result in job performance changes will not yield the required learning results.
- Media abuse from an over or under use of technology in ways that defeat learning. Humans have limited capacity to absorb information and over-enthusiastic use of software features can depress learning. On the other hand if the capabilities of media to deliver a rich learning experience is underutilised this will lead to sub optimal learning.

Challenges in E-learning

The challenge in e-learning, as in any learning program, is to build lessons in ways that are compatible with human learning processes. To be effective, instructional methods must support these processes. That is, they must foster the psychological events necessary for learning. While the computer technology for delivery of e-learning is upgraded almost daily, the human side of the equation, the neurological infrastructure underlying the learning process, is very

old and designed for change only over evolutionary time spans. In fact, technology can easily deliver more sensory data than the human nervous system can process. To the extent that audio and visual elements in a lesson interfere with human cognition, learning will be depressed.

The timeline of learning and applying new skills has three phases: the Pre-Instruction phase, Instruction phase, and Performance phase [10]. While instructional programs have typically jumped immediately into learning events, it is often well worth the time and effort to prepare learners first. With effective preparation for learning and a firm commitment to applying new skills, instructional programs can have far greater impact. In the Instruction phase, e-learning programs need to provide meaningful, memorable, and motivational experiences if we expect learners to retain knowledge following achieving good post test scores.

Conclusion

The chronic skills shortage that faces many developing countries like South Africa will require substantial training and development to improve the existing skills pool. Traditional training, while highly effective, may not have the capacity to deliver the results required. From the above discussion it can be seen that e-learning can be used to significantly accelerate the skills development process, provided the course content is designed to make best use of the new technology.

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