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**National Association of EMS Educators
Internet-Based Distributed Learning in EMS Education**



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Internet-Based Distributed Learning in EMS Education

Introduction

Internet-Based Distributed Learning (IBDL) is emerging in EMS as an educational delivery system and judging by its rapid growth in higher education (Gallagher, 2003) it will likely become commonplace. EMS educators are integrating IBDL methods into initial learning, refresher training, and continuing education. Distributed Learning can be achieved through many modes of delivery besides the Internet; however this document focuses on IBDL because the Internet has clearly become a major technology used in the education of health care professionals and is likely to become a highly utilized platform for teaching and learning in EMS. The IBDL focus of this paper is not intended to discount the utility and quality of other distributed learning methodologies which have unique advantages of their own.

Defining Distributed Learning

Distributed Learning (DL) or distributed education is “...any educational or instructional activity in which students are separated from faculty and other students” (Council for Higher Education Accreditation, p.1, 2002). Moore and Kearsley, describe DL as: “...planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques, special methods of communication by electronic and other technology, as well as special organizational and administrative arrangements” (1996, p.2). Although the terms “distributed learning” and “distributed education” are used interchangeably, distributed education is the process while distributed learning is the result. Within the literature the terms “distance”, “distributed” and “distributive” are commonly used; no terminology consensus yet exists for this type of education and learning.

Features of Distributed Learning

Distributed Learning has specific features that differ from other forms of education delivery systems.

- DL delivery methods comprise print, audio, video, video-conference, interactive CD-ROM/DVD, web-based, and computer-based media, or any combination of these.
- Communication between instructor and learner, and among learners, can be synchronous or asynchronous.
- Asynchronous instruction is available 24 hours a day, 7 days a week.
- The learning environment is student-centered. DL Educators typically create learning environments that encourage or require the student to take more initiative in their education.

Background

DL has a lengthy history as a means to reach students who might otherwise not enroll in educational programs. When postal services were established correspondence courses became popular; in England, these were offered as early as 1837. In 1892, the University of Chicago offered the first college-level courses by mail, and by 1923 the International Correspondence School - the largest home study company in the USA today - had enrolled 2.5 million students. In the early 1900s technology emerged into education delivery with courses being offered by radio; by 1934 education was being broadcast via television. Educators have been reporting results from the use of distributed learning for many years. Russell (1999) has reviewed and reported on three hundred and fifty-five research and case study reports dating back to 1928 that in large majority support the efficacy and effectiveness of distributed learning when compared to classroom based offerings. The 1970s saw the development of two-way audio, and in the 1980s two-way audio-video. Courses began to be broadcast via satellite and cable, and in 1989 the University of Phoenix and Connect-Ed offered the first degrees via the Internet. (Public Broadcasting System, nd). DL has come into prominence with the advancement of modern communication technology.

DL increased dramatically in the 1990s as personal computer ownership and Internet access has become widespread, and continues to increase with the expansion of satellite and broadband availability. Between 1995 and 1997, higher education institutions offering distributed education courses increased from 33% to 44%, and another 21% planned to offer programs by the year 2000 (Lewis, Snow, Farris, Levin, Greene, 1999).

In 1997, over 1 million students enrolled in credit-granting distributed education courses in a wide variety of fields. More than 97,000 of those students enrolled in a health profession—the fourth largest group—at over half the nation’s public 4 year schools and one-third of the nation’s public 2-year schools (Lewis, Snow, Farris, Levin, Greene, 1999). One merely needs to look at web sites such as Medscape (<http://www.medscape.com>), the Nursing Continuing Education Directory (<http://www.nursseceu.com>) or CMEWeb (<http://www.cmeweb.com>) to see the extensive amount of continuing education available to health care professionals in a wide variety of fields, including emergency medicine.

The National Highway Traffic Safety Administration’s EMS Education Agenda for the Future (1999) serves as the educational needs assessment for advancing EMS practice. The Agenda includes the following recommendations:

- The National EMS Education Standards will encourage enhanced flexibility for the instructor, allowing multiple instructional methods while maintaining consistency of learning objectives.
- The standards will be designed to encourage creativity in delivery methods such as problem-based learning, computer aided instruction, distributed learning, computer-instruction, and others.

IBDL gives EMS educators, educational institutions and EMS providers an excellent method to address and meet these recommendations. IBDL can certainly accommodate the development of cognitive and affective skills and with appropriate technology investment it can be used for psychomotor training. IBDL should be offered as an alternative and enhancement to classroom instruction, so that each modality is available when appropriate to give learners more options. IBDL is a more enduring form of information exchange with the potential to reach a wider audience than any single classroom lecture.

Strengths and Opportunities of IBDL

IBDL has many advantages for EMS learners; it has disadvantages as well. Curran and Noseworthy (1999) delivered an extensive report from Canada which documented findings about technology-based DL. The report includes statements concerning education delivery within health care professions. The report was based on several years' experience of IBDL for continuing education in the medical, nursing, and pharmacy professions.

Advantages

Curran and Noseworthy identify the two most significant advantages:

- *Effective Education:* Multiple studies have demonstrated that IBDL increases knowledge and that it is equivalent to classroom learning. Smaller studies have shown that IBDL is able to change behaviors and to increase confidence.
- *Learners like it:* Besides objective studies, many subjective studies, including those relating to emergency medicine, rate IBDL highly. Most participants state that they would use IBDL again and recommend it to others.

Other advantages are put into three broad categories:

Convenience

- *Large capacity, rapid access:* The structure of the World Wide Web allows for large amounts of information to be stored and rapidly accessed.
- *Wide availability:* Most health professionals have computer and Internet access from home or work.
- *Time and place independence:* Available to instructors and learners 24/7 from any place with computer and Internet access.
- *Instructor convenience:* Reduces repetitive teaching tasks so instructors can focus on learner needs. Instructors can also be more responsive since they do not need to be in the same location as learners to communicate.
- *Cost efficiency:* Once initial investments are made (see disadvantages), IBDL is a cost-efficient delivery system. It eliminates the need for a physical space and increases the number of participants. It also allows multiple experts to contribute asynchronously, which removes some scheduling constraints. It reduces travel requirements and can reduce the cost of duplicating and distributing educational materials.

Learner-Centered Design

- *Interactive*: IBDL has been shown to increase attention level and attention duration.
- *Self-paced*: The learner determines the pace of instruction. Or a learner could, for example, stop the course to look up a reference article.
- *Adaptive*: Material can be individualized based on the learner's responses. Courses can be made to address multiple learning styles.
- *Learner feedback*: Interactivity and multiple self-assessment tools built into a course let learners check their progress; this can be done immediately following test submission.
- *Comfortable environment*: Since many health care professionals access courses from home, they are in a familiar and comfortable environment — an advantage especially for those intimidated by others in a classroom.

Information Enhancement

- *Multimedia material*: Information can be presented in different forms thus enhancing learning and appeal to various learning styles.
- *Clinical scenarios*: Interactive learning works particularly well for teaching problem-based learning through clinical scenarios.
- *Communication and support*: In an interactive environment, particularly an asynchronous one, learners have the ability to interact with the instructor and with peers from a wide geographic distribution for discussion, collaboration, or consultation.
- *Decision support systems*: These comprise patient management and computer consultation programs. EMTs can enter data regarding the presentation of patient they have recently cared for to find out more information about such things as differential diagnosis or definitive treatment. This type of activity has significantly effective educational value.
- *Just-in-time learning*: This enables access to specific information just prior to using it. EMTs can make use of it, for example, when an emerging disease outbreak occurs.
- *Information updates*: When updated information becomes available it can be entered into the source of the IBDL for learners to access; this avoids the need for mass mailings, update training, and other means of keeping information current.
- *Consistency*: The information is “enduring” (recorded, stored, and readily available for a prolonged time period) therefore each presentation is consistent for a large number of learners.

Disadvantages

As with all innovations, new systems and changes to current educational practices, IBDL has disadvantages.

- *Set-up and maintenance costs*: Participating in IBDL requires owning a computer with Internet access, preferable via broadband. As new programs require new technology, frequent system upgrades may be required. It can be expensive for educational institutions to develop the infrastructure to offer IBDL — in fact this

is the significant reason why most private two-year institutions have not kept pace with their public counterparts in offering IBDL (Lewis, Snow, Farris, Levin, Greene, 1999).

- *Lack of computer skills:* Participating in IBDL requires basic computer skills that some EMTs do not have. Additionally, instructors involved in course development for a professional audience require a degree of technical sophistication as well as medical expertise.
- *Security:* Several issues arise regarding IBDL and network security.
 - *Internal:* This aspect deals with the provider's network security involving ways that information is stored, collected, and controlled. This includes personal information, course materials, course access, and test results. Learners must be able to track activity and be assured of their privacy.
 - *External:* Learners need to be sure their personal computers are secure when accessing information via the Internet; browser security features, firewalls, and antivirus software should be considered.
 - *Student identification:* Verifying and authenticating student identity in accessing materials, completing assignments, and taking tests. Verifying participants is difficult to do on any but the most superficial level without using costly technology.
- *Information validity and reliability:* The Internet is an open forum for anyone, so it is filled with a spectrum of information, from quality reports to personal opinion to misstatements. Learners and instructors need skills to identify accurate, current, and relevant sources.
- *Lack of access:* Learners cannot participate if they do not have computer and Internet access. A U.S. Department of Commerce report (2002) shows:
 - As of 2001, more than half of Americans use the Internet.
 - 54% of all households and 53% of rural households have Internet access.
 - Although Internet usage is increasing dramatically, some groups are lagging behind. Only 39.8 % of African American and 31.6% of Hispanic households have access; only 21.3% of disabled persons have Internet access (more than 60% have no personal computer at home); households earning less than \$35,000 annually, single-parent households, and people without any college education fall below the national average for Internet access and usage.
 - Broadband (high-speed) Internet access is in 22.2% of central city households and 21.2% of urban households, but only 12.2% of rural households, for a national average of 19% of online households.

It must be noted, however, that access is improving as technology is available to the public in many institutions, such as libraries, universities, and even public schools. Broadband access in households connected to the internet more than doubled from 2000 to 2001.
- *Pedagogical limitations:*
 - *Psychomotor skills:* Without the ability to transmit tactile stimuli IBDL is limited as a methodology for teaching psychomotor skills. It can be done using simulation technology such as sophisticated mannequins that electronically record performance, or by using live high-definition video

to observe learners; these solutions are expensive and thus not widely available.

- *Instructor skills*: Instructors skilled at classroom teaching may lack the skills to use technology to its full advantage; IBDL requires teaching skills that differ in approach from the traditional classroom teaching skills. For example, instructors who are skilled at fostering discussions in a classroom may be unskilled in fostering online, written discussions. This can lead to instructor frustration and poor course design.

IBDL and EMS Education

IBDL is in its infancy within EMS, yet already the Continuing Education Coordinating Board for Emergency Medical Services (CECBEMS) has developed a DL policy statement that includes Internet Based offerings (2001). The National Registry of Emergency Medical Technicians (NREMT, 2002) has endorsed IBDL as approved by CECBEMS with limitations. This custodial approach reflects a desire for IBDL programs to be high quality.

Examples of EMS IBDL

- Shepherd Community and Technical College in Martinsburg, West Virginia, is currently conducting an initial paramedic training program for students who live and work two hours away at Keyser. Two-way audio and video are used for didactic instruction; this is supplemented with Saturday “skills day” classes for psychomotor skills development. Plans are underway to expand this to a second site in Fall 2004 (Dulaney, 2003).
- Victoria University (Victoria, Australia) offers paramedic education that combines online learning with an on-site paramedic who functions as supervisor, educator and mentor. (McDonell and Edwards, 2000).
- Charles Sturt University (New South Wales, Australia) offers a degree conversion course for paramedics who choose to gain a qualification from an academic institution (Lord 2000).
- Inver Hills Community College in St. Paul, Minnesota developed WebMedic in 2001. (Johnson and Page, 2001). This program features web based synchronous and asynchronous didactic lectures along with classroom based skill labs and traditional clinical rotations

The area of greatest growth has been in refresher training and continuing education. For example, several for-profit companies offer CECBEMS-approved continuing education courses with a wide range of topics at a low cost. These programs thus far have been designed with limited interactive learning strategies. In all cases an instructor is available via email should a question arise. Quinsigamond Community College in Worcester, Massachusetts, has designed an interactive web-based paramedic refresher program (with one classroom day for psychomotor skills for review and testing) Enrollment is limited to paramedics in southern New England while its efficacy is being studied in conjunction with the NREMT. (Correria, June 13, 2003). Also encouraging is the emergence of non-profit and for-profit companies that offer technical expertise for online DL specifically for EMS organizations. Many companies offer similar services for the medical field in

general; but EMS specialization means that these companies see a market potential. The Florida Fire Chiefs Association and the American Ambulance Association are currently working with a private company developing EMS clinical and management continuing education programs for their constituents. (Eastham, 2003) Since 2000, the University of Maryland Baltimore County has been supporting a broad-based continuing education program for the Federal Emergency Management Agency, National Disaster Medical System (NDMS). Many of the NDMS web based continuing education classes carry CECBEMS approval for EMT and Paramedic continuing education credit (Paluck, 2003).

Advantageous Pairing

The nature of EMS lends itself well to IBDL. Consider the following situations common in EMS where IBDL would be of benefit:

- *Rural and military EMTs:* The availability of online classes can solve the geographic access problem to classroom based training opportunities in these environments.
- *Odd schedules:* EMTs can complete continuing education during times that fit into an unusual schedule. This reduces travel fatigue thereby making it a safer option.
- *EMS organization needs:* IBDL has many advantages to offer employers.
 - IBDL allows an EMS organization to train a large number of personnel in a short period of time, and saves on travel and overtime costs.
 - The reduced cost of IBDL delivery may make it possible for more EMS organizations to offer continuing education to employees and even volunteers. This can improve employee recruitment and retention.
 - Making classroom-based programs available to all employees can be time consuming for an instructor. EMS organizations can create their own IBDL classes and then use their own resources or partner with outside vendors, colleges or vo-tech schools to implement them.
- *Content control:* Medical training requires accuracy and consistency, which IBDL can provide to a larger number of learners. This could be a great asset to a medical director who oversees numerous EMTs. It could also be used by local, state, national, or federal organizations to disseminate information in a consistent manner.

Proceeding with Caution

Though IBDL is a new, exciting, and in-demand form of distributed education, it can, like other forms, be done well or poorly. Creating a quality IBDL environment requires many considerations, including the following:

- *Technology:* IBDL courses require not only instructional expertise but also technologists to manage the technical aspects of education delivery. Although some instructors do choose to undertake both roles, Internet technology expertise is certainly is not an instructor requirement.
- *Computer skills:* Knowing how to use the available interactive tools effectively greatly enhances the learning experience. Many instructors and learners may be eager to participate in IBDL but lack the computer skills to do so.
- *Instructors:* Creating effective IBDL requires new teaching approaches.

- Instructors need to acquire distributed education skills, such as interactive lesson development, effective written communications, and asynchronous teaching strategies that may place more responsibility on students to ensure that learning occurs.
- *Learners:* Although convenience may be one of greatest advantages IBDL offers to learners, educators should be careful to ensure that interactivity is not diminished — greater interactivity means greater learning (which is true for classroom programs as well).
 - For longer programs IBDL demands more effort and discipline on the part of the learner, as it is easy to put off sitting at the computer when compared to attending a scheduled class.
 - Learners have to engage in discussions more actively than is required for classroom courses. Not all learners accept this type of learning in the initial stages. However, they readily adapt to the change of learning environment.
- *Security:*
 - *Learner's privacy:* Learners will demand assurances that their privacy is protected. This relates to disseminating personal information over the Internet or having others see what activities have been engaged.
 - *Identification:* In order to minimize dishonesty, some means of user identification must be used to assure credit is given to the EMT who completes an educational program.

EMS Learning Activities

With all the technical and training aspects of IBDL completed, instructors can create several general learning environments based on interactivity:

Non-Interactive

Non-interactive learning activities are those that do not require any type of feedback or interaction between learner and instructor. Lecture notes, audio recordings, or audio-visual recordings of classroom lectures are examples. These are the simplest type of IBDL. Although they are a convenient mode, they lack the most basic interaction. An example of non-interactive learning is watching a training video. Non-interactive learning does not require class participation, discussion, or testing to verifying comprehension. This type of educational activity is used extensively for individual learning but has a minimal role for credit-granting activities associated with initial training, continuing education, or refresher training.

Interactive

This type of lesson, in its simplest form, comprises a written monograph followed by a post-test. This method is the same as journal (print)-based continuing education offerings, however it is delivered via the Internet. Some may be embellished interactive programs with slide shows or streaming video, which offer improvements over journal-based programs for some learners. At the high-end, this form of lesson would include audio, video, visual enhancements, plus multiple forms of interactive self-evaluations, like quizzes and other learning activities.

Facilitated-Interactive

The instructor, acting as a facilitator, encourages or requires interaction among multiple students and/or the instructor. For most academic-based EMS instruction, the organizational requirements will mandate that IBDL be offered in a traditional cohort approach with a defined start and end date for the course. However, students may complete the requirements for the course at any time that is convenient during the entire course offering period. Instructors typically have deadline dates for certain assignments, which limits the flexibility of students but helps prevent students from submitting all work at the last minute – something that is not in the best interest of the student or the instructor. There are numerous methods of this type of instruction. For example, students who are separated by time and place can participate in asynchronous discussion using a discussion board, where a “thread” is a topic and each “response” under that thread is a participant contributing to that conversation. Over time (hours to weeks) more and more responses are posted, making the conversation more in-depth. The same result can be achieved through individual or group email. Combining facilitated interactions with multimedia and interactive self-assessment creates a rich learning environment.

Opportunities for EMS educational programs

EMS education falls into one of the following categories: initial training, continuing education, and refresher training. Cognitive, affective, and psychomotor skills may be addressed in any of these programs. IBDL, with varying levels of interactivity, can be more or less appropriate for these education programs and skills. The following illustrations are provided:

Initial training

New students require a high level of interaction with faculty and peers. Skilled IBDL instructors can use IBDL effectively in conjunction with regular classroom meetings, moving some typical classroom activities to an interactive and/or facilitated interactive IBDL format. Interactive methods are required to insure that learning is taking place. Non-interactive IBDL is a useful method for expanding the learning opportunities for learners but provides no assurance that learning is taking place. Less-experienced instructors should consider a “web-enhanced” program, which is a typical classroom program enhanced with a web site for homework assignments, reviews, supplemental information, test administration, asynchronous discussion and live chat. Using a web enhanced course approach can help instructors to become familiar with this type of learning before using it in place of classroom instruction.

Continuing Education

Supporting convenient, cost-effective, and enjoyable continuing education will lead to a greater participation in continuing education, perhaps beyond the minimum requirements. Non-interactive content that can be easily accessed online at home or work, can stimulate utilization and professionalism among EMS providers. Although utilization can be tracked, this form of IBDL will not meet the regulatory requirements in most jurisdictions because of the missing interactive knowledge assessment component. Written or audio-visual Instructor monologues with post-tests as

interactive educational events suffice for this type of learning and provide a record of knowledge assessment for certification purposes. Educators generally agree, however, that providing learners with more extensive opportunities to interact with instructors, fellow learners, or instructional materials is always a preferable education method. Automated programs with multiple segments to engage the learner in participation are highly useful. For example, on-line learning material can present a scenario and a series of questions. The learner chooses an action which may be right or wrong for the situation. A brief explanation is presented and the learner can advance to the next segment where more scenario information and treatment choices are given. This process is repeated until the exercise is completed. The interactive scenario exercise might be followed by a post-test, which must be passed to earn education credits. Interaction can also be generated through moderated discussion boards. This type of program encourages the exchange of ideas and learning beyond the confinements of a monologue. This format works well for morbidity and mortality reviews.

Refresher Training

The use of IBDL for refresher training provides alternative settings for providers to pursue this important professional activity. IBDL can yield considerable cost and scheduling benefits for organizations and EMS providers. In contrast to the more expansive curricula that usually encompass continuing education, refresher training requires a review and assessment of core knowledge and skills required for the competent treatment and care of EMS patients. The extended length and need for continuity of this training is often burdensome on EMS organizations and providers in both urban and rural environments. IBDL's asynchronous environment and flexible schedule opportunities allow for greater inclusion of experts and provides a more convenient way for participants to complete this time-intensive education activity. As with initial training, non-interactive IBDL methods generally are not useful for refresher training from a regulatory standpoint because of the need to assess competency. Non-interactive methods can be used to enrich the information available during a refresher program. IBDL can offer a variety of information sources encompassing interactive and facilitated interactive activities that allow participants to individualize their learning experience. Cost restrictions for IBDL-based psychomotor skill refresher and assessments will likely preclude their use except in those situations where costs or geography limit face-to-face classroom or lab activity.

Implementation Considerations

As with any new venture into a system that involves change of approach, routine, or method, moving into the new frontier of IBDL requires a shift of educational focus. This focus combines education delivery with new technological foundations. Several key considerations are relevant to this topic.

Technology and Psychomotor Skills

Sophisticated mannequins and simulators, as well as high-definition audio-visual transmissions, allow instructors to train students from a distance (Treloar, 2001), even in fields requiring extensive psychomotor skills like surgery (Schulam, et al., 1997).

However, few EMS educators rely on IBDL technology for psychomotor skills training primarily because appropriate technology is very expensive, it is not widely available, and EMS educators have little experience with its use. Utilization of this technology in EMS for initial psychomotor skills training in place of clinical settings is controversial in part because there is no research evidence in EMS that supports the efficacy of replacing clinical training with technology resources. These technologies have potential to be very useful for refreshing little-used skills after they have already been learned clinically, particularly for EMS providers practicing in rural or remote locations and for high-risk procedures that are rarely encountered even in urban environments.

Instructional Design

Instructional design is a process of developing instructional specifications in a systematic manner, in order to provide a framework for creating high-quality learning environments based on learner needs, anticipated outcomes and content requirements. Instructional design for online learning is often a team effort involving a professional instructional designer, Internet education technologists, content experts, and instructors. In many settings the EMS instructor will function in more than one of these roles. Careful planning of instructional design is crucial to harnessing the potential and power of quality IBDL. This planning helps the instructional designer (when available) and an instructor to understand the learners and their needs and to develop and implement a program that will provide the best learning strategy possible.

Meeting different Learning Styles

There is no clear consensus on how different learning styles of adults should affect the design of IBDL. Some learners prefer visual over audio or text presentations; some learners prefer hands-on learning; still others learn better through self-discovery. However, Smith and Ragan (1999) caution that learning styles are generally self-reported, and that most studies about learning styles fail to account for how the content impacts learning activities. Additionally, The Institute for Higher Education Policy rejected a benchmark on addressing individual learning styles in quality distributed learning, saying respondents in its study felt such benchmarks “...were often platitudes with little basis in research and were very difficult to accomplish” (Phipps and Merisotis, 2000, p. 24).

Technical Design

The technical design of IBDL enhances student interactivity and has impact on their psychological approach to learning. Technical design should include the following considerations:

- *Structure and navigation:* The content is grouped into segments that contain a manageable concept; the navigation guides the learner through the segments in a sequence that builds on previous knowledge or makes logical connections with other segments.

- *Look and feel*: Choice of colors, icons, fonts and recurring graphics sets the mood and gives the learner important clues about how the content is arranged, what the key points are, and how elements are related.
- *Text elements*: Decisions about how the content is arranged physically on the page and how navigational text items are placed improve readability, as well as giving learners clues about the content and what to expect when they choose a link.
- *Video and animation*: These devices are useful for concepts that are difficult to explain using text. They also help maintain learners' interest.
- *Interactive elements*: Quizzes and activities with computer-generated feedback and sophisticated simulations to help reinforce learning, provide drills for memorization or help learners with decision-making skills.
- *Communication elements*: Audio and video conferences, E-mail, discussion boards and list servers foster communication between learners and/or between learners and the instructor who are physically separated.
- *Graphics*: Graphics are invaluable for improving the appearance of the content, as well as their value as part of the content, and convey what written text alone cannot.

Ultimately, the design of IBDL programs in large part will reflect the skill and knowledge needs of the learners, the nature of the instructional content, the teaching preferences of the individual instructor, and the technological resources and delivery strategies available to them. Regardless of the online teaching strategies employed by the instructor, there should always be a direct link between the learning goal, learning objectives, activities and knowledge assessments of any IBDL offering. For this reason, CECBEMS IBDL course approval requirements are designed to emphasize these linkages. When seeking continuing education credits for a curriculum, CECBEMS requires that an IBDL CE curriculum specify each learning objective along with the learning activities and knowledge assessment strategy for each objective. Additionally the evaluation strategy to determine the overall effectiveness of the IBDL continuing education curriculum must be presented. (CECBEMS, 2001)

Conclusion

Internet Based Distributed Learning is a powerful and effective vehicle that can incorporate a variety of learning methods and activities across the spectrum of EMS education. IBDL allows for creative combinations of text, animation, video, hypertext linking, drill and self-tests with immediate feedback, and group learning via discussion boards, live chat, email or audio-video conferencing. Further, well-designed IBDL offers adults more control over their learning, while providing a vehicle for instructional strategies tailored to their individual learning style. Although IBDL has strengths, insuring high quality instruction using this method requires careful attention to technical capabilities of of instructors and learners and utilization of instructional design principles.

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