U.S. Army Research Institute
Special Report 49
May 2002

Distance Learning:
The Soldier's Perspective

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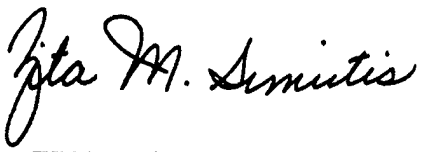
Forward

The goals of the U.S. Army Training and Doctrine Command (TRADOC) include increasing training opportunities for soldiers, improving the quality of instruction, increasing access to training, and reducing the time soldiers spend away from their units. The Army considers distance learning at least part of the solution toward achieving these goals.

The U.S. Army Research Institute for the Behavioral and Social Sciences has been examining the use of distance learning technologies since January 1997, when we signed a Memorandum of Agreement with TRADOC in support of distance learning research. In that time, it has become clear that training in the future, in particular training delivered through online communications technology, will favor a soldier-centered rather than a classroom-based learning model. Although there is ample evidence that self-regulated, web-based training can work quite well, there is another factor to consider: What do soldiers think about this impending change? This report portrays the soldier's perspective as revealed through numerous experiments, studies, and surveys.



ZITA M. SIMUTIS
Acting Director

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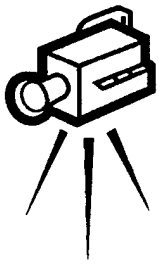
U.S. Army Distance Learning:
The Soldier's Perspective

Introduction

This report focuses on distance learning (DL) applications within the U.S. Army. It provides a brief history of these efforts along with a discussion of a variety of topics such as why DL is important to the Army, its cost-effectiveness, and current and future plans for further integrating DL technologies into Army training functions. A primary focus throughout the report, however, is the attitudes of soldiers towards this method of training delivery.



Scene I (Fort Riley, KS)

SSG Bill Hurst looked forward to his scheduled Battle Staff NCO Course. The six week course, conducted in residence at the Sergeants Major Academy, provides the skills and knowledge to serve as a member of the battle staff and to perform the daily operations of command posts. Being away from his family for that long a time was a drawback, but in the end SSG Hurst was pleased with the experience. In his evaluation he said "I enjoyed the course .... It taught me the total Army concept by allowing me to interact with other Senior NCOs about how to prepare and conduct combat operations."

Scene II (Fort Bragg, NC)

SSG Cynthia James took the Battle Staff NCO course through Video Teletraining (VTT) at Fort Bragg, her home base. She went into this experience with doubts, despite the fact that it meant she didn't have to travel. She was concerned that the interactions with the instructors would be limited and that it might be more difficult to ask questions and get feedback. Her doubts were not erased by the experience. Afterwards, SSG James reflected "I feel the distance learning course is an excellent way for the Army to save on spending; however, I still believe that one-on-one training is more beneficial."

These perceptions of distance learning are common amongst soldiers. For example, in a recent Army-wide survey soldiers were asked, "Compared with the traditional classroom, how effective do you believe the Internet is for individual learning?"[1]

About one-third (35%) of the random sample of nearly 10,000 soldiers saw online training through the Internet as being about the same or better than the classroom. It is interesting to note that 50% of those that had experienced online courses said the Internet was equally or more effective as the classroom, as compared to 30% of respondents with no such experience.

This report examines distance learning from the soldier's perspective. It is based on research findings, comments, surveys, and various studies that have

Effectiveness of Internet vs. Classroom Instruction

	Percentage
Internet is more effective ▶	9
Both are about the same ▶	26
Classroom instruction is more effective ▶	41
Not sure ▶	24

"I am no fan of distance learning and this course confirms my aversion to this style of instruction. I understand the economics behind distance learning, but the standard of instruction is so compromised that I don't think it provides an economy." [2]

examined the acceptance and effectiveness of distance learning. First, though, it is useful to examine what is meant by distance learning and what plans are underway for its increased use in Army training.

What is Distance Learning?

With the development of the internet, DL has come to be thought of in many quarters as being synonymous with Internet-based learning. In fact, however, this form of DL represents just the latest trend in a long history of teaching at a distance. Over time this has taken many forms, from simple paper-based correspondence courses to the sophisticated video teletraining, as seen in Figure 1. Over time, many definitions of DL have been offered. According to the U.S. Army, DL is:

> *"The delivery of standardized individual, collective, and self-development training to soldiers and units anywhere and anytime through the application of information technologies."* [3]

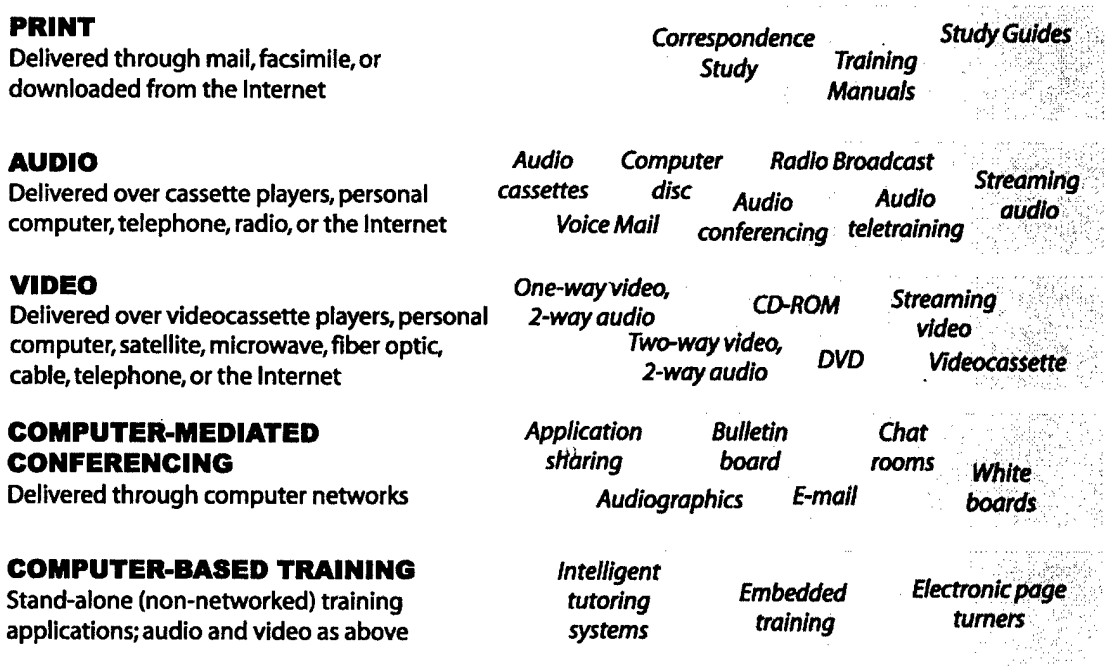


Figure 1. A Summary of Types of Distance Learning
Source: Wisher, R. A. (2001). *Measuring performance in distance learning environments.* Alexandria, VA: U.S. Army Research Institute.

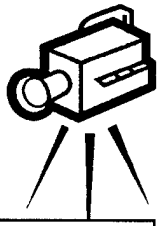
A more generic definition was tendered by Moore and Kearsley:

> *"Structured learning that takes place without the physical presence of the instructor."*[4]

It is the latter distinction which seems common to most definitions of DL, that being the separation of students and instructors. This is one characteristic that describes all distance learning formats, whether or not they are technology based. An additional requirement is that there be some means of communication between teacher and student. This can include one or more media, such as writing (correspondence courses, asynchronous computer training), audio (teleconferencing, audiographics), or visual contact as in video teleconferencing.

A Brief History of Distance Learning

The earliest roots of distance learning can be found in the development of the postal service in the 19th century. This inspired the creation of commercial correspondence courses that could be made available to anyone within the reach of the mail. The University of Chicago established a home study division in 1882, soon followed by other colleges and universities. In the early 1900s, radio became a means of providing instruction at home; over ten percent of broadcast radio stations were owned by educational institutions. When the Federal Communications Commission assigned television frequencies in 1952, one of the goals was to keep open some portion of the airwaves for instructional television.



The U.S. military began employing print-based correspondence courses in the 1940s. In the early 1950s, the Army Signal School began experimenting with the use of television as a medium for training. In one project, researchers compared 14 hours of basic training delivered in a standard stand-up manner with that delivered via television and found the latter to be at least as effective.[5] Other media were explored. In the early 1970s, the Air Force's Institute of Technology began using "teleteach," which involved commercial dial-up tele-

Scene III (Fort Dix, NJ)
Autumn 1943

Private Robert Wilson eagerly awaited the fourth in a series of 50-minute films in the "Why We Fight" series. The films were professionally produced by the War Department to acquaint members of the Army with factual information on the events leading up to the United States entering the war and the principles for which we are fighting. Private Wilson was about to see "The Battle of Britain," which dealt with the dramatic British resistance to German air attacks during the fall of 1940. Like many of his fellow soldiers, Wilson felt that some parts of the films were a little biased, but he still felt he learned a lot and they provided a nice break from the daily training regime.

> *"This is the first time for me to receive instruction in this type of environment. I think it is a good experience."*
>
> *A recent graduate of a VTT course*

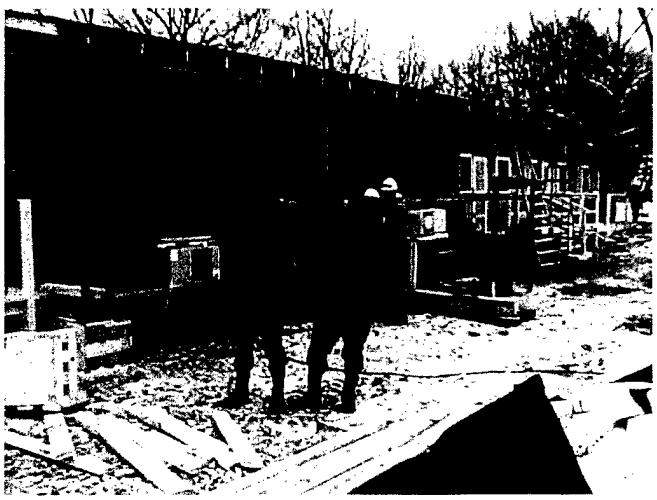
phones to provide limited duration instruction to remote locations. This was expanded later that decade to include electronic blackboards.

In more recent times, distance learning has seen an explosion of new initiatives. Several factors have fueled this growth, with the major impetus coming from the increasing rate of technological advances. This has had two effects. First, the fast pace of change has underlined the need for life-long learning. At the same time, technology has opened up the doors to new methods of providing instruction at a distance. The proliferation of personal computers has leveled the playing field, allowing more and more citizens to capitalize on instructional opportunities. Results from the Fall 2000 Sample Survey of Military Personnel indicated that two-thirds of Army personnel had a computer at home, while 45% had access to a PC at work. Further, nearly half report that they access the Internet every day or almost every day. Only 19% of soldiers had no access to a computer.[6]

A quick Internet search reveals over one million hits when searching for information on distance learning. According to the National Center for Education Statistics, nearly 80% of public, 4-year postsecondary educational institutions offer DL courses. There are more than 50,000 courses offered online from 1,000 universities across the country.[7]

The United States military has also seen an expansion in distance learning efforts. In fact, the Department of Defense is one of the leading parties in the Advanced Distributed Learning Initiative that grew out of Executive Order 13111, "Using Technology to Improve Training Opportunities for Federal Government Employees." In many ways, distance learning appears to be a perfect match for the Services' training needs.

A DL facility was set up for troops serving in Bosnia.



Why is DL Relevant to the Army?

In Fiscal Year 2000, the United States Army enlisted just under 67,000 new recruits to active duty and 55,000 young men and women to the Army National Guard and Reserves.[8] For the most part, these individuals entered service after graduating from high school and had little in the way of formal, relevant job skills. They were recruited to serve in a wide variety of jobs

in a score of technical and non-technical areas. For the military as a whole, only about 17% of active component enlisted personnel are in occupations designated as infantry, gun crews, or seamanship. At the same time, nearly 20% of the job offerings involve electrical or mechanical equipment repair. Other technical specialties include electronic equipment repair (10%), communications and intelligence (9%), and medical and dental (7%). Clearly, this represents a huge training burden that is faced year-in and year-out.

Each year the Army must train thousands of new recruits in a wide variety of technical and non-technical occupations.

But it is not only new recruits who have to be trained. Studies have demonstrated that soldiers spend less than half of their time performing the technical tasks for which they have been trained.[9] This lack of constant reinforcement opens up the real possibility of skill degradation. Further, with advances in technology, job functions are continually in a state of flux. According to one estimate, the shelf life of technical skills is now about five years.[10]

Another concern of the Army is with part-time soldiers. The Reserve Component makes up about one-half of the Army's combat arms units and medical personnel, and accounts for over half of administrative and electrical/mechanical repair positions.[11] Training is a particularly critical function for these soldiers, who only devote a portion of their time to their Army duties.

A factor that makes Army training a particularly challenging task is the geographical dispersion of its troops. At any given point in time, active duty soldiers in the same occupation can be stationed at various places around the country and the globe. The Army National Guard includes 3,200 units located in 2,700 communities across the country. Similarly, there are some 1,700 Army Reserve units around the nation. Bringing together soldiers from diverse locations for training obviously presents a huge logistical and financial challenge.

For all of these reasons, the Army and other Military Services have made a substantial investment in distance learning technologies.

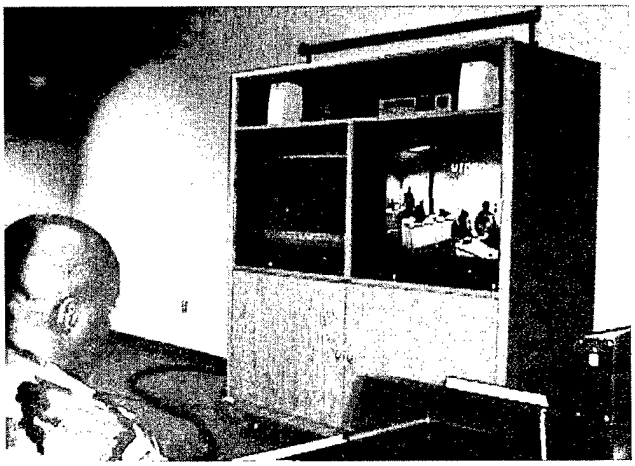
Major Army DL Initiatives

The guiding force behind Army DL initiatives is The Army Distance Learning Program (TADLP). This initiative was created and approved in 1996 to "gain consensus and approval for a DL program to support Army training requirements, establish required funding levels, and identify program objectives."[12] Fielding of the Digital Training Facilities (DTF) started in Fiscal Year (FY) 1998, with completion envisioned by FY 2010. Over 200 DTF will be established consisting of more than 700 classrooms. Over 500 courses are scheduled for redesign to a DL format in this period. Included in these facilities are two videoteletraining systems. The Satellite Education Program, under the direction of the Training and Doctrine Command, and the TNET system operated by the Army Extension Training Directorate. The former involves one-way, full-band-width video with provision for audio interaction. TNET offers two-way compressed video.

Another recent major initiative is the Army University Access Online (AUAO). This is designed to allow eligible soldiers access to college degree programs through the Internet. It involves creation of the largest online education system ever designed for soldiers, eArmyU.com. At the present time, 85 certificate and degree programs are offered, with more scheduled to come online in the future. Twenty-three education institutions around the country are taking part. Among the offerings are certificate programs in business management, Associate Degrees in applied technology and criminal justice, Bachelor's Degrees in health care administration and accounting, and Master's Degrees in adult education and computer information systems. These are offered at no cost to soldiers, who are also provided laptop computers, printers, and Internet service accounts to allow them to

The increased digitization of Army functions effects troops across levels and jobs.

participate. One indication of the potential success of this program is that, even in its relative infancy, more than 15,000 students have been enrolled.



Video teletraining can involve one- and two-way video access.

In addition to Regular Army initiatives, the Army National Guard developed a demonstration system under congressional direction called the Distributive Training Technology Project. This resulted in a DL network that includes all 50 states and 4 territories. Although the primary use for the system is to maintain the readiness of soldiers in the Guard, the program includes a "shared use" concept in which the system is made available to the surrounding civilian communities when not in use for its primary purpose. There are four classroom configurations, differentiated on the basis of such characteristics as the number of workstations and the range of communication options offered. The Army Reserve is also active in DL initiatives, having established the Distance Learning Futures Group that is examining alternatives to traditional classroom training as a means for maintaining troop readiness.

All of this activity virtually ensures that DL will have an impact on Army training far into the future. And as these efforts advance, it is important to solicit and take into account the views of the most important element to their success—the trainees themselves.

What do Soldiers Think?

An essential element to the success of the DL initiatives described is the acceptance by the population at which they are directed. So the question arises: What do soldiers think about distance learning in general and web-based training specifically? The Sample Survey of Military Personnel (SSMP), conducted in the Fall of 2000, included several questions about these domains. Nearly 10,000 soldiers took part, and the results are provocative in that they suggest a certain wariness among this group about the effectiveness of at least some forms of DL for training. This despite the fact that, as we have already seen, the vast majority of soldiers have access to computers and the Internet and visit the web on a regular basis.

This level of familiarity with computers and the Internet might lead to the expectation that this group of soldiers would be very open to using this tool for education and training purposes. However, the

"Distance learning is great when someone is simply teaching facts. But when you are attempting to teach a complex subject, it is virtually impossible to get a quality education over this DL system."

A recent DL class graduate

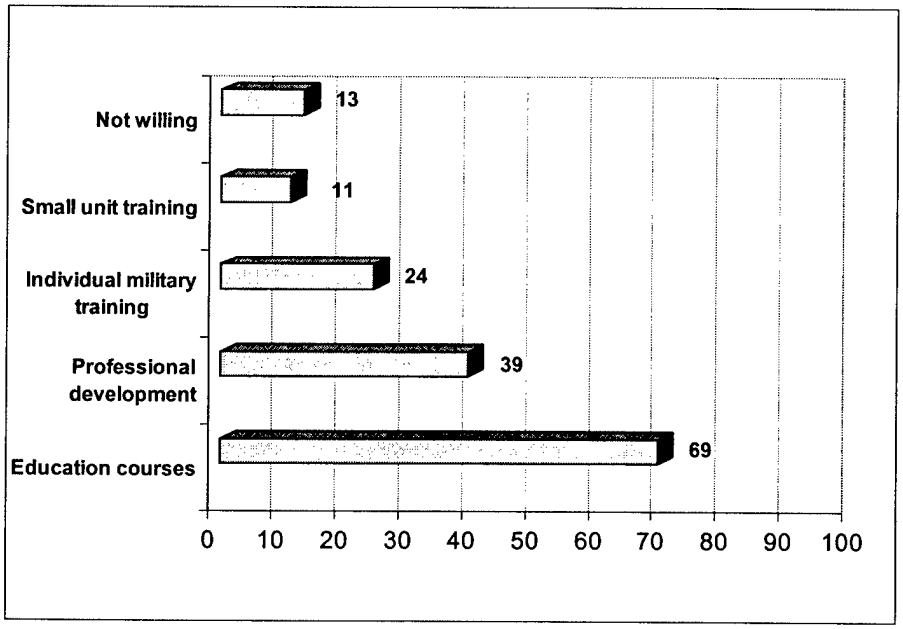
SSMP data are not that clear on this point. Although 85% of respondents expressed at least moderate confidence that they could complete an online education or training course, as mentioned earlier, two-thirds either felt that classroom training is more effective or were not sure which was better.

Another interesting finding in the SSMP data is the apparent distinction these soldiers make between different types of courses and the Internet. As seen in Figure 2, while respondents were generally willing to consider taking education courses using this medium, they were much more circumspect about its application in the area of military training. Less than one quarter indicated a willingness to take individual or small unit training courses using the Internet.

As might be expected, there were relationships between background characteristics and the opinions regarding Internet training. For instance:

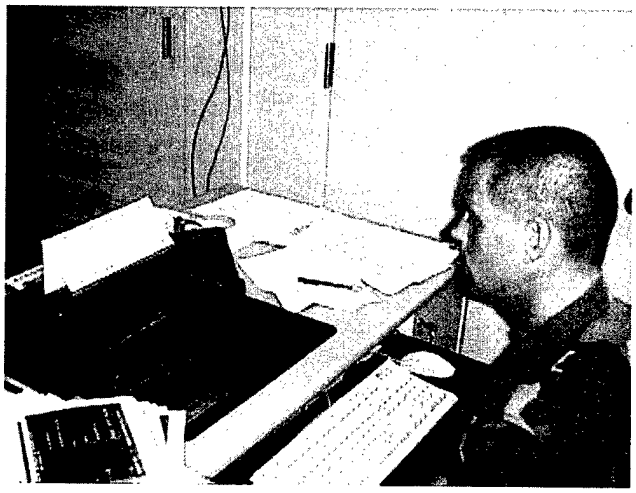
- Those who connect to the Internet on a daily basis were somewhat more likely to express confidence in their ability to complete a course using this medium.
- Younger respondents were more likely to rate Internet instruction as more effective.
- Those with more years of education appear somewhat more wedded to traditional classroom instruction.
- A higher proportion of soldiers who had taken an online course (Internet or CD-ROM) rated this medium as equally or more effective.

Figure 2. Willingness to Take Various Education/Training Courses via the Internet



It is also worth pointing out that these data focus specifically on the Internet and not other forms of DL. But, as we shall see, feedback from a variety of studies suggests that the introduction of DL on a large scale may require not only an investment in hardware and conversion of courses, but also the conversion of the trainees themselves.

What Do The Data Say?



Results from the Sample Survey of Military Personnel showed a greater acceptance of Internet-based training among soldiers who had participated in an on-line course.

There is a substantial literature on distance learning, including a wide variety of books and several journals. Included in this are a slew of evaluations of specific DL programs. However, as pointed out by several authors, these evaluations often have methodological flaws that make straightforward interpretation of their meaning problematic.[13] Among the problems cited is the fact that most evaluations focus on DL in education as opposed to training settings. Further, there is a tendency to gear the focus to such factors as the usability of the equipment and learner preferences. Outcome measures—the basis used to decide if a given program "worked"—are often relegated to user satisfaction with the experience, as opposed to what was actually learned and retained. Other difficulties include the frequent failure to randomly assign subjects to DL or traditional learning environments, in those instances where there is a comparison group at all. This lack of random assignment is particularly troubling in cases where there are post-instruction measures only. With no indication of how much students knew before going through the course, there is no way of judging relative gains that result. Finally, in cases where there are achievement measures, their reliability and validity are often questionable.

With these flaws in mind, the results of the DL evaluation literature that does exist are remarkably consistent. And these can be summed up in three simple words: no significant difference. That is, when student achievement after DL courses is compared to that resulting from traditional face-to-face classroom instruction, no differences are found that are larger than would be expected by chance. The majority of these studies replicated classroom practices, so it is not surprising that the learning outcomes were also replicated. A few representative military studies demonstrate this point.

- Audio teletraining was used to conduct a Unit Clerk Course for Army National Guard soldiers, while another group received standard, in-class instruction.[14] The soldiers who experienced the audio teletraining were found to have a higher pass rate based on the first test taken following the course, although all soldiers eventually were successful.

- A National Guard Information Operations Course was delivered using instructor controlled graphics and two-way audio (i.e., audiographics), and no differences were found between DL and in-class trainees in terms of outcomes on a final written test.[15]
- One module (66 hours) of a Reserve Component Engineering Officer Course was conducted in both classroom and computer-mediated conferencing formats, and no reliable differences were found between the two groups on their test, homework, or practical exercise scores.[16]

Although learning outcomes are generally found to be equivalent—or even to favor distance learning—there are criteria on which DL typically fails to measure up. One of these is course completion rates. For instance, in the Engineering Officer Course study cited above, only 64% of the students in the computer-mediated version of the training completed the instruction. This compares to a resident training completion rate of 95% or better. In another instance, Reserve Component soldiers took part in an air traffic control course under two different modes.[17] A residence course was delivered at Fort Rucker, Alabama over an 11-week period. The distance learning version of the instruction was extended over an 11-month period to accommodate soldiers' schedules. Test results indicated that the two groups were nearly equal in terms of subject matter knowledge at the completion of the course, but the in-residence group performed better on hand-on skill tests. Further, of the 32 students who took part in the DL course, only 12 entered the final in-residence portion at Fort Rucker. This represents a 62% attrition rate as compared to 12% among in-residence students. The reasons given for failing to complete included family and job conflicts.

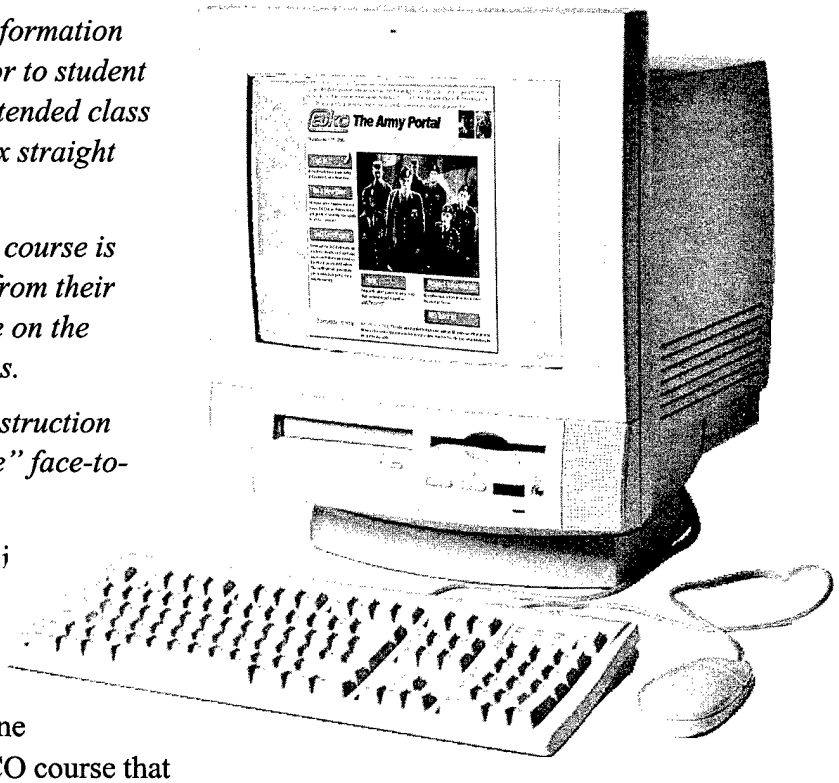
Evaluations of DL programs have generally found no differences in outcomes when compared to traditional instructional methods.

Another outcome that is often found when DL training is compared to traditional methods is lower satisfaction rates among the distance learning participants. For instance, a recent administration of the Battle Staff NCO Course via VTT elicited the following reactions from soldiers who participated.

VTT can be difficult to grasp all the information being presented based on the instructor to student ratio. The majority of the students I attended class with would have preferred to attend six straight weeks at Fort Bliss.

I also strongly feel that the residential course is great because it gets the NCOs away from their home station and they can concentrate on the course without any outside distractions.

I strongly oppose the VTT course of instruction due to students not having actual "live" face-to-face with instructors at Fort Bliss.



Course completion rates have often been found to be lower when instruction is delivered at a distance.

One interesting result that has been found i a variety of studies is that there is apparently little relationship between attitudes towards a DL experience and learning outcomes. This conclusion is borne out by the results from the Battle Staff NCO course that was the basis for the comments above. Sometime after the class was delivered in both classroom and VTT formats, researchers went back and administered job knowledge tests to the soldiers who took the course.[18] They also carefully constructed job performance measures based on the course content and had the supervisors of the attendees complete them. They found no difference between the groups. So despite the reservations of the VTT students, they appear to have learned just as much—and were able to apply it just as well—as soldiers who received more traditional training. This is not an anomalous finding. An author who conducted a review of a variety of research projects concluded that, "learner attitudes do not appear to impact learner achievement...learner achievement does not appear to impact learner attitudes."[19]

"Learner attitudes do not appear to impact learner achievement...learner achievement does not appear to impact learner attitudes."

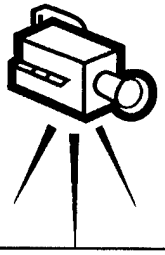
"The collaborative experience can still be had, but you need a robust instructor and an IT team behind the scenes."

A Reserve Component Officer

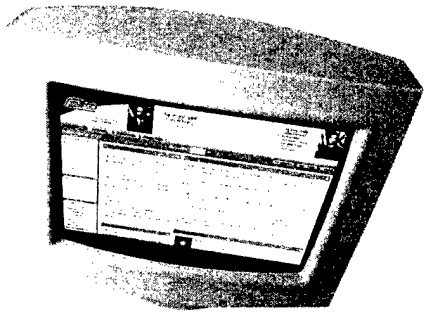
What's Different About Distance Learning?

Given that there appears to be some question in soldiers' minds about the value of DL as compared to traditional forms of training, it may be worthwhile to examine the differences between the two. Doing so may highlight some of the root causes behind the apparent misgivings that many soldiers—as well as trainees in other environments—have about DL.

Perhaps the major difference between distance learning and traditional instructional methods is the increased role of the student in all phases of the process. In fact, with the advent of learning on demand, there are many situations in which it is the learner who initiates the process by deciding that he or she has a knowledge gap that needs to be filled. Depending on the medium selected to address this need, it can be largely up to the student to maintain the motivation to stay with the program of instruction. Unlike traditional classrooms where the immediate presence of an instructor and fellow students bring about social pressures to continue involvement, in at least some forms of distance learning that pressure must come from within. Often in DL environments, the student must also play a more active role in locating information needed. Although instructors are typically available, if an immediate need-to-know situation arises, the learner may have to call on his or her own investigative resources to address that need.



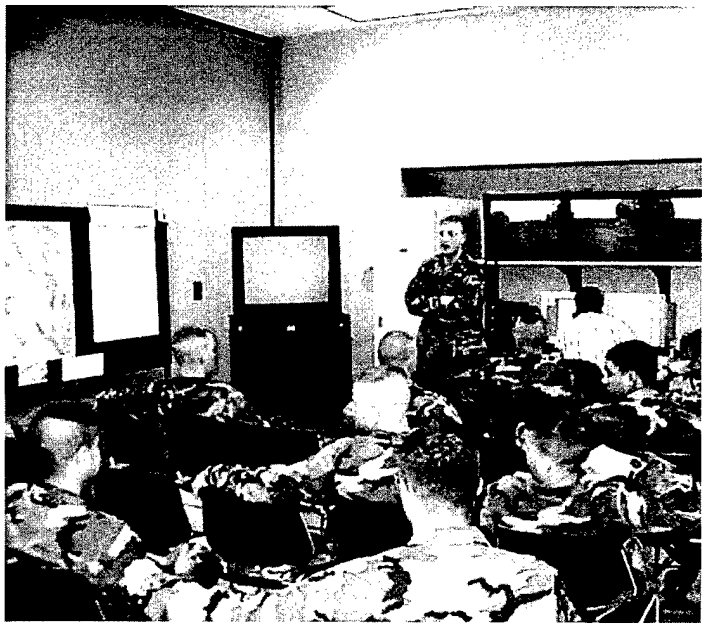
Scene IV
(a soldier's home. Summer, 2010)



1LT Mary Wright had mixed feelings about her training assignment. She looked forward to logging on to her "My Training" portal on the World Wide Web and collaborating on a course of action analysis with her virtual classmates as part of her Captains Career Course. She found the collaboration techniques to be an excellent instruction vehicle, but the intensity of the training was fatiguing and she was not pleased with having to spend so much of her own time as a self-directed learner. She sometimes also felt frustrated with the lack of immediate access to an instructor, but the corrective feedback she would receive the next day on her wireless digital assistant was always enlightening.

Another element that often distinguishes DL from traditional classroom settings can be the lack of social contact. This can be important for several reasons. Other trainees or students can be a source of both social support and information. Knowledge can also be gained and ideas generated through group discussions both during training and in

off hours. Through this type of interaction, information can be obtained, integrated, and committed more firmly to memory. It should be noted, however, that research involving synchronous, web-based instruction has demonstrated that as much of one-third of the on-line communication between students was social in nature.[20] This suggests that, depending on the medium used, DL is not necessarily incompatible with student collaboration and interaction.



DL presents unique challenges to instructors.

DL also presents unique challenges to instructors. As one author noted, "Anyone who says that teaching at a distance is the same as traditional teaching is dead wrong. Instructors need more planning time, more instructional support, and additional training to modify courses for all of the potential delivery formats for distance teaching."[21] This same author goes on to note several areas of expertise that are essential to the DL instructor. These include the ability to organize and plan the course, encourage teamwork among trainees, present questions effectively to reinforce information, and involve trainees in coordinating activities at field sites.

It is important to recognize the differences between DL and traditional training so that accommodations can be made to make up for the relative weaknesses and capitalize on the strengths. To simply assume that materials developed for the classroom can be used as is in a DL environment—no matter what the specific format—is a mistake that can have significant consequences for student achievement. And so the question arises, what is it that makes good instruction in a distance training mode? This has been the subject addressed by many authors who have offered a variety of useful suggestions.

What Makes Effective DL?

Over the years, a good deal has been learned about the characteristics of effective distance learning programs. It should be noted that there is overlap between DL and traditional training in terms of effective design and development principles. For this reason, many authors emphasize that the first step in course conversion to a distance format is to evaluate the existing training. Instruction that

"The expansion of the instructor role is important. He/she must recognize that some students will need help with the material and with their motivation. The instructor's role is to work with the student until all efforts to help him/her succeed have been exhausted. Instructors must go beyond the traditional lecture techniques."

An Army Officer

is ineffective in the classroom is unlikely to be any more so when conducted in a DL environment, no matter what the media. It is also true that there are instructional design principles that are unique to certain mediums. For instance, effective instructor presentation techniques that are essential in a VTT course are not applicable to a course conducted over the Internet. However, there are some common threads that apply across media and that have a significant impact on the effectiveness of the instruction that results. The following provides a brief overview of these tenets.

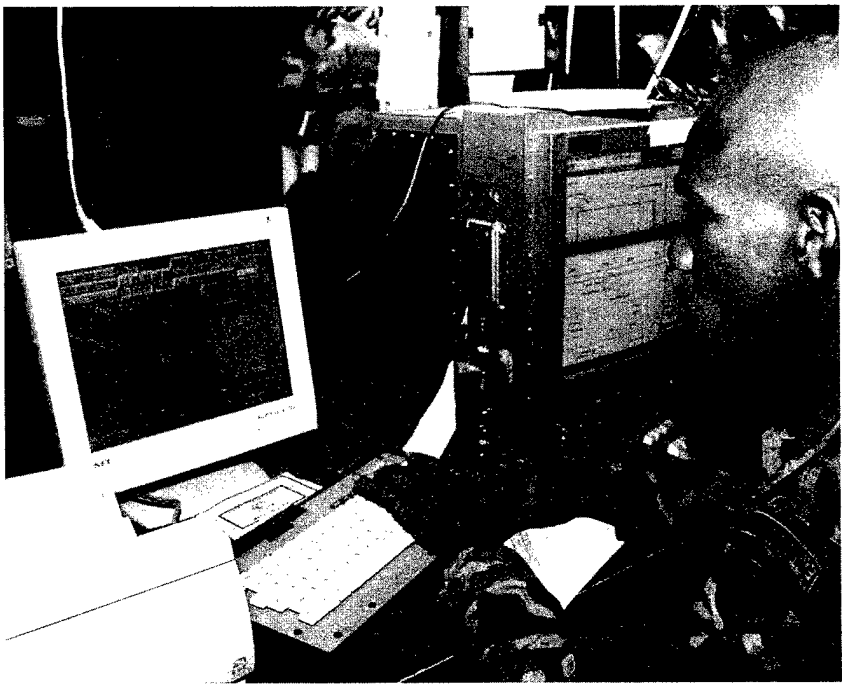
Learner orientation. Learners must know what to expect. They need to know the rules for participating. When will their input or questions be sought? What form will feedback take and when will it be received? What other requirements will they be expected to meet?

Interaction. As mentioned, in the DL environment the demands involved in learning tend to shift away from the instructor and towards the student/trainee. This makes it all the more important that opportunities for interaction be built into the instruction. Wagner (1997) defines three types of interactions: between the learner and the instructor, among learners themselves, and between the learner and the material they are trying to master.[22] Of particular importance is interaction with the instructor. Research has demonstrated that satisfaction with DL increases as the amount of contact between students and instructors increases.[23] Further, as satisfaction increases so does the likelihood of course completion. Interaction can take many forms depending on the particular media. It can be verbal (audio teleconferencing), verbal and nonverbal (video teleconferencing), in written form (e-learning), or some combination of these. To the degree that the trainee is interacting with someone or something, he/she is taking an active role in the learning process, which facilitates that process in the short- and long-run.

DL is not necessarily incompatible with student collaboration and interaction.

Feedback. One essential form of communication is instructor feedback to the student. Research has demonstrated that a lack of feedback or delays be-

tween student actions that require input and the time that input is provided decrease motivation and learner satisfaction.



Prompt instructor feedback has been shown to increase student satisfaction and motivation.

Understanding and reliability of equipment. To the extent that DL involves technology, it is very important that instructors and students be prepared to play their role in employing that technology. Resources must be available to deal with problems encountered and resolve them quickly. This can take the form of instructor/student training in the use, maintenance, and troubleshooting of equipment and/or having someone available to take on this role. Technological difficulties can have a direct impact on student motivation, understanding, and success.

Materials design. Printed materials need to be geared to a level that is appropriate for the student population. This is particularly essential to the degree that students will be operating more independently than in a traditional training setting. Adjustments may have to be made to ensure that it is clear to students how various components (e.g., books, on-line resources, videotapes) should be used in conjunction with one another. These modifications may be quite simple, as in the course mentioned previously that employed audio teleconferencing. In this case, reference materials were color coded to make it easier for the instructor to direct students to the correct resources. Graphic materials may need to be redesigned to ensure that they appear as clearly to the students as possible given the transmission medium. In short, careful thought needs to be devoted to the impact of switching to a DL environment on the course materials used in traditional classroom settings and how this, in turn, will affect student use and comprehension.

Appropriate learning strategies. Given that DL shifts the instructional focus from instructors to students, this may require a corresponding shift in the strategies that are used to communicate and reinforce information. In the early 1990s, the American Psychological Association developed a list of learner-centered psychologi-

cal principles that have direct relevance to DL instruction (see page 21). Abell (2001) incorporates many of these principles into guidance specifically geared to Army trainers as they develop or translate instruction to DL environments.[24] She cites various authors who have identified characteristics of adult learners that need to be taken into account in designing programs:

> Adults like to know why they need to know what is being taught (e.g., context).
>
> Adults like to play a role in the learning process, so offering choices of what and how to learn can be of value.
>
> Adults bring a great deal of experience with them to the learning environment, and trainers should capitalize on this by trying to relate the information being taught to what the students already know.
>
> The application of knowledge should be stressed by emphasizing the immediate, real-world value of what is being taught.
>
> Motivation is built through success, so strategies should be employed that heighten the probability that students will be able to conquer the material and see its immediate value.

Abell goes on to cite several characteristics of the generation of soldiers who are the primary targets of Army training that can effect its design. These include the fact that they are used to high quality video and graphics presentations and expect a certain standard to be met in this regard. They also expect highly dynamic presentations, constant feedback, and freedom of choice in the sequence of what they see and learn. Several barriers to effective distance learning that need to be addressed are detailed, including the need to compensate for the reduced amount of feedback often encountered in DL settings, the importance of keeping trainees involved rather than letting them become passive, and the need to provide constant guideposts to prevent learners from getting lost in the instruction.

Expectations of learners must be taken into account when designing DL programs that are technology-based.

Six Unwarranted Assumptions Regarding Distance Learning (adapted from Richard Clark[25])

Assumption	Reality
1. Media influences learning.	There is little evidence that some media are better than others for delivering instruction. Rather, the quality is determined by the instructional methods employed.
2. Online instruction increases learner motivation.	The research in this area is incomplete, but there is evidence that the opposite may be true, making attention to this aspect of the instructional design especially important.
3. Active screen designs (e.g., busy screens) help learning.	Screens filled with lots of images and animation may lead to student overload.
4. Discovery/problem-based learning and extensive learner control are the most effective instructional techniques.	This may be true for more advanced or capable students, but others may be left behind. Ideally, techniques should be incorporated that allow for these features after learners have demonstrated their ability to handle them.
5. Traditional training methods are adequate for complex online learning environments.	When the subject matter is complex, room must be made for integrating the material through increasingly large and inclusive practice exercises. Demonstrating mastery of "chunks" of material is not enough; learners must also be challenged to integrate those chunks if adequate outcomes are to be expected.
6. Online instruction should be adjusted to accommodate different learning styles.	Aside from making provision for learners with different levels of incoming knowledge and ability, there is little evidence to suggest that varying instructional techniques to account for different learning styles (e.g., visual or verbal) has any impact on outcomes.

These are a few of the elements that need to be taken into consideration in the design of instruction to be delivered through DL. Perhaps most important is simply the realization that there are differences between traditional training and that delivered at a distance. It is not enough to simply try to mimic the classroom when designing DL courses. Rather, the uniqueness of the setting needs to be recognized and addressed.

Cost Effectiveness

As mentioned previously, the costs of maintaining a fully-trained Army are substantial. Not only must some 67,000 new active duty recruits be trained each year, but enlisted and officer personnel throughout the force must receive ongoing training to keep their skills fresh and their knowledge up to date. Given the widespread

dispersion of this population and the constant nature of the need, bringing the training to the troops seems to be a logical option. Not only does this cut down on expenses associated with travel, it also is efficient in that it means less time away from soldiers' day-to-day jobs. Finally, allowing soldiers to remain at their home base on a more consistent basis means less disruption to home and family lives, which may result in higher Army life satisfaction, less attrition, and higher reenlistment rates.

But conversion to a DL format is not without its costs. Depending on the format, these can include hardware, software, transmission costs, the expense associated with converting courses to the new environment, and training time for faculty and staff.[26] Most of these are encountered up front, and can be amortized over the life of the system. However, the question remains, are they justified, given the results achieved? The evidence already reviewed—however flawed—suggests strongly that DL is at least as effective as traditional training methods. Therefore the real question is just what are the associated cost savings?

Several of the evaluations already mentioned examined the cost-effectiveness issue directly. For instance, the Engineer Officer Advanced Course for the Reserve Component involved one module (66 hours of instruction) that had been converted to asynchronous computer conferencing in combination with print materials, CAI lessons, videotapes, and synchronous computer-based group activities.[27] No difference was found in learning outcomes. However, when taking into account the expense of equipment and conversion and calculating a per-student cost over a 7-year period, the authors estimated that there was a net savings of 33% per student. The National Guard Unit Clerk Course conducted via audio teletraining was found to result in higher student grades on the first end-of-training test. In this case, the authors estimated a per-student savings of $1,044. A Navy study estimated that the use of VTT for training and conferences saved over 7 million dollars in travel and per diem expenses over a 5-year period. Similarly, the U.S. Air Force estimated a 5 million dollar savings through the use of VTT to deliver its Acquisition Planning and Analysis Course in just one year.[28]

So, the evidence seems clear that cost savings associated with DL are substantial. This, in combination with the various findings that suggest it is equally or more effective—instructionally speaking—as

"DL was sold as a money saver. The biggest savings, though, is time. The three biggest benefits to DL are the time saved, keeping soldiers in their units while they are learning, and the ability to train more soldiers at one time."

An Army Officer

more traditional forms of training, seems to make a strong case for investing in DL over the long term. And, as highlighted earlier, the Army is doing just that.

The down side to all of this is seen in the comments and survey results from the soldiers themselves. These reflect a real sense of doubt regarding DL, along with some resistance. Future development of DL programs must address soldier concerns and overcome the doubts that exist.

The Department of Defense is the leading player in the Advanced Distributed Learning Initiative.

The Future of Distance Learning

So what does the future hold for distance learning? First, it seems inevitable that with the ever increasing array and availability of technology, opportunities for the development and use of distance learning will continue to grow.[29] And with that growth will come additional challenges. One of these that is being addressed already is how to coordinate the various development activities so that they can borrow from one another where appropriate and thereby capitalize on successful efforts. In fact, DoD is the lead player in this arena through the Advanced Distributed Learning (ADL) initiative. Among the ambitious goals of ADL is to be the impetus for large-scale development of interoperable education and training products and services that will meet the needs of both the military and the nation's workforce of the future. The creation and reuse of learning content will occur through open standards rather than proprietary practices. The intent is to identify barriers to the effective use of current and emerging technologies and work together to overcome them. This is being accomplished through a partnership between DoD, other agencies within the Federal government (notably the Department of Labor), academia, and the private sector.

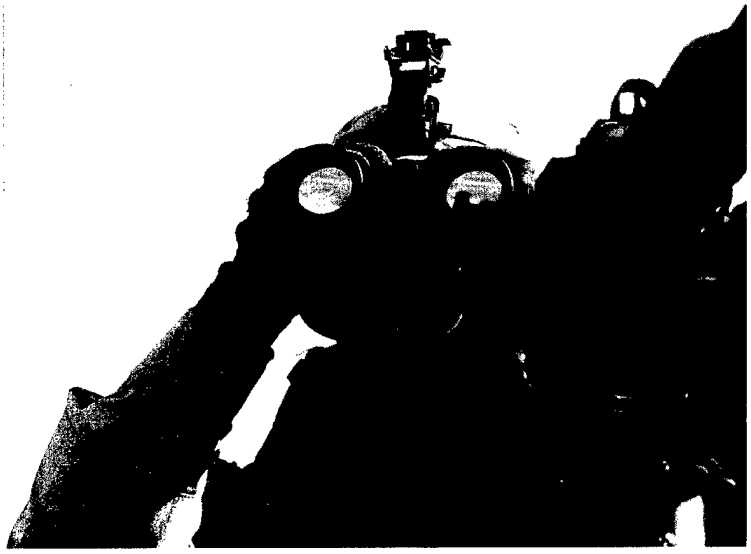
But more needs to be done. In particular, several authors have noted the need for more research and sharing of knowledge regarding the selection of media and methods to best match content.[30] The mere

fact that a technology is available does not mean that it is the appropriate means for conveying information to students. For instance, the Army has concluded that DL is not an effective medium for experiential learning, problem solving, or applied leadership—at least as yet. The creation of tools that will assist training managers in drawing links between course content and the most effective and efficient media and methods for conveying that content will be of great value in insuring the appropriate use of technology for training in the future.

Students, too, will have to break the mode of traditional learning environments. Making training available anytime, anywhere puts a bigger burden on the learner to be his or her own training manager. This includes recognizing that there is a knowledge gap, being astute enough to know where to go to fill it, recognizing when additional help is needed, and maintaining the motivation to stick with it until success is achieved.

The Army's primary concern should be the development of instructors and instructional strategies that most effectively capitalize on the powers of new media, as well as addressing their shortcomings. Conversion of training from traditional forums to those which are technology-based involves more than just the downloading of lecture notes and briefing slides. Trying to mimic the traditional classroom through the use of advanced technologies is a disservice to the power of those technologies and the students who are trying to learn through them. Instructors need to rethink their approach so that interaction can be maximized and student attention and motivation maintained. The sharing of approaches taken to achieve these goals will be an essential element of DL's continued growth and success.

Given current trends, it seems that distance learning will be play a key role in Army training efforts for the foreseeable future.



Learner-Centered Psychological Principles[31]

1. **Nature of the learning process.** The learning of complex subject matter is most effective when it is an intentional process of constructing meaning from information and experience.
2. **Goals of the learning process.** The successful learner, over time and with support and instructional guidance, can create meaningful, coherent representations of knowledge.
3. **Construction of knowledge.** The successful learner can link new information with existing knowledge in meaningful ways.
4. **Strategic thinking.** The successful learner can create and use a repertoire of thinking and reasoning to achieve complex learning goals.
5. **Thinking about thinking.** Higher order strategies for selecting and monitoring mental operations facilitate creative and critical thinking.
6. **Context of learning.** Learning is influenced by environmental factors, including culture, technology, and instructional practices.

Cognitive and Metacognitive Factors

7. **Motivational and emotional influences on learning.** What and how much is learned is influenced by learner motivation. Motivation to learn, in turn, is influenced by the individual's emotional states.
8. **Intrinsic motivation to learn.** The learner's creativity, higher order thinking, and natural curiosity all contribute to motivation to learn. Intrinsic motivation is stimulated by tasks of optimal novelty and difficulty, relevant to personal interests, and providing for personal choice and control.
9. **Effects of motivation on effort.** Acquisition of complex knowledge and skills require extended learner effort and guided practice. Without the learner's motivation to learn, willingness to exert this effort is unlikely without coercion.

Motivational and Affective Factors

10. **Developmental influences on learning.** As individuals develop, there are different opportunities and constraints for learning. Learning is most effective when differential development within and across physical, intellectual, emotional, and social domains is taken into account.
11. **Social influences on learning.** Learning is influenced by social interactions, interpersonal relations, and communications with others.

Developmental and Social Factors

12. **Individual differences in learning.** Learners have different strategies, approaches, and capabilities for learning that are a function of prior experience and heredity.
13. **Learning and diversity.** Learning is most effective when differences in learners' linguistic, cultural, and social backgrounds are taken into account.
14. **Standards and assessment.** Setting appropriately high and challenging standards and assessing the learner as well as learning progress—including diagnostic, process, and outcome assessment—are integral parts of the learning process.

Individual Differences

Endnotes

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REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave Blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	May 2002	Special Report – Apr 2001– Mar 2002

4. TITLE AND SUBTITLE
Distance Learning: The Soldier's Perspective

5. FUNDING NUMBERS
Program Element Number: 633007
Project Number: A792
Task Number: 208
Work Unit Number: C01

6. AUTHOR(S)
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7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Human Resources Research Organization
66 Canal Center Plaza, Suite 400
Alexandria, VA 22314-1591

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
U.S. Army Research Institute for the Behavioral and Social Sciences
ATTN: TAPC-ARI-II
5001 Eisenhower Avenue, Alexandria, VA 22333-5600
Alexandria, VA 22333-5600

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11 SUPPLEMENTARY NOTES
COR: This report is published to meet legal and contractual requirements and may not meet ARI's scientific or professional standards for public.

12a. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution is unlimited.

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words):*
The primary purpose of this report is to examine distance learning (DL) from the perspective of the soldier. A summary of the history of DL describes its applications in the Army and plans for additional uses. Findings from research and comments from surveys are examined to reveal how well soldiers accept DL as an effective teaching method within different types of training courses (e.g., small unit training versus individual professional development). The strengths and weaknesses of DL are discussed, leading to a list of recommendations to help trainers produce effective DL courses.

14 SUBJECT TERMS
distance learning, distributed learning, training, learning, attitudes

15. NUMBER OF PAGES

16. PRICE CODE

17 SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	Unlimited