SOLDIERS AS DISTANCE LEARNERS: WHAT ARMY TRAINERS NEED TO KNOW

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Abstract

Army distance learning courseware must address the diverse needs of adult learners, to include those of Generation X and Y learners as well as distance learners. Their needs include the requirements to: 1) know why learning the knowledge or skill is necessary, 2) direct their own learning, 3) contribute their experiences to the learning situation 4) apply what they have learned in solving real world problems, and 5) feel competent and experience success throughout the training program. In addition to needs of adult learners, trainers must also consider characteristics of Generations X and Y such as the following: their inclination for independent learning experiences that incorporate fast-paced and visually intensive instruction, their need for frequent interactions with corresponding feedback, and their strong desire to experience a sense of accomplishment. Trainers must address barriers inherent in distance learning by incorporating the following into at-distance instruction: increased student-to-instructor feedback, more interactivity, highly structured learning activities to ensure distance learners do not lose track of where they are, and highly visual presentations. Army research has demonstrated that soldiers perform statistically significantly better when trainers incorporate these four features into instruction, an activity that is imperative in light of today s trend toward proliferation of reusable courseware. Army distance learning courseware designers must be trained in instructional design techniques that address these needs. The paper goes on to discuss special challenges for multimedia delivered through CD-ROM and via the Internet.

Biographical Sketch

Millie Abell is Chief of the Technologies Branch within the Futures Training Division at the U.S. Army Headquarters Training and Doctrine Command. She has managed studies in the training and cost effectiveness of distance learning strategies and technologies. She received her Ph.D. in Instructional Systems Technology from Indiana University and has been working in the area of education and training for 27 years. She has spoken at numerous national conferences on designing learner-centered distance learning and technology-based instruction.

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OUR TARGET AUDIENCE: WHO THEY ARE/WHAT THEY NEED

Adult Learners

Learning is defined as a change, or the capacity to change, one s level of ability or knowledge. The change is relatively lasting and results from experience such as practice (Newby, 1996). An *adult learner* is defined as one who: (1) performs social roles that our culture assigns to adults (e.g., worker, spouse, soldier, responsible citizen), and (2) perceives himself to be responsible for his life (Wlodkowski, 1993). Given this definition, all soldiers within the spectrum of the Army training system are adult learners. Leaders in adult learning theory such as Malcolm Knowles (1998) and Raymond Wlodkowski (1993) describe the following needs of adults and approaches that trainers can take regardless of whether learning takes place in a traditional classroom or a distance learning (DL) environment.

Need to know. Adults need to know *why* they should learn what is being taught. This becomes even more important in training adults within Gen-X, since many have a keen sense of entitlement, often combined with little motivation to succeed (Sacks, 1998). The most powerful way to make a student aware of this need is through real or simulated experiences early in the lesson in which he discovers for himself the benefits of mastering the knowledge or skill. Trainers should follow powerful introductory scenarios with periods of reflection and discussion.

Self-direction. Adults see themselves as responsible for their decisions and want others to treat them as capable of directing themselves. For this reason, trainers should give adult learners a choice in what and how they learn. For example, trainers should allow learners to help diagnose, plan, and evaluate the learning experience. Allowing students to choose from a number of learning assignments gives them a sense of control. Rather than assigning one case study, role play, or practical exercise to all students, for example, adults prefer to select from a variety of choices. Wlodkowski (1993) claims that even allowing learners to choose a few optional questions on an exam can make a tremendous difference in motivation.

Experience. Adults come to training with much experience, and this will be true of soldiers enrolled in DL, all of whom will be beyond their Initial Entry Training. A class of adult learners will be far more heterogeneous in demographic background, learning style, motivation, needs, interests, and goals than is true of a class of youths. Prior experience becomes a rich resource for an adult learner and he needs to draw upon it. An adult learner assumes that if his experiences are not valued, it reflects negatively on him. For this reason trainers should capitalize upon students backgrounds by encouraging them to volunteer real-world, relevant examples.

Application. Adults are highly pragmatic, life-centered learners who need to use what they learn and who are motivated to learn when they perceive a personal payoff. They must see the relevance and immediacy of a task and they rarely enroll in a class to learn for the sake of learning (Bergevin, 1967). Trainers must therefore not only include hands-on application during instruction but also consider how what has been learned can be applied on the job once training is completed.

Problem-Centered Orientation. Adults have a realistic, problem-centered orientation to learning and so experiential education, with its simulations, case studies, and hands-on practical exercises lends itself to adults. They are *concrete-active* learners who learn best from those experiences that engage the senses and adults often find that their most effective learning begins with practice and ends with theory (Palloff and Pratt, 1999). Knowles cites Lindeman s view as far back as 1926: The approach to adult learning will be via the route of situation, not subjects Every adult person finds himself in specific situations which call for adjustments. Adult education begins at this point. Subject matter is brought into the situation, is put to work, when needed. Texts and teachers play a

secondary role they must give way to the primary importance of the learner (Knowles, 1998, 37). Thiagi (1999) adds that individuals do not learn from experience *per se*, they learn from reflecting on their experience. Thus, each experience should be followed by a period where the distance learner evaluates not only his learning ah-ha s but also what learning strategies worked well, what did not work so well, and why.

Motivation. Motivation energizes and gives purpose to behavior. In general adults are more responsive to internal motivators such as the desire for self-esteem. For example, an adult has a deep need to feel competent in what he is learning and his motivation declines if he has a problem with experiencing or expecting success (Wlodkowski, 1993 and Knowles, 1998). This is a challenge for those training adults, since adults often experience anxiety and ambivalence about learning (Huddleson & Unwin, 1997) that may be exacerbated in distance learning. *Accelerated Learning for the 21st Century* cites one study that found 82 percent of five and six year olds entering school had a positive self image about their ability to learn. Yet by the time students are 16 years old, only 18 percent felt positively about this ability. Consequently, four out of five teenagers and adults start a new learning experience with a feeling of inadequacy (Rose and Nicholl, 1998, 18). Providing study techniques and learning strategies that make distance learning faster and easier will greatly benefit soldiers.

Motivation is important to learning because emotion drives attention and in turn memory. Since emotion is often a more powerful influence on behavior than logic (Rose and Nicholl, 1998), conscientiously planning for motivation is so important that Wlodkowski feels every instructional plan should be accompanied by a motivational plan. Although crafting a logical structure for a lesson is fairly easy, the designer s real challenge is to integrate motivational principles into instruction (Wlodkowski, 1993). Throughout the design of distance learning programs, trainers must not only ask what they want learners to know, but also what they want learners to feel (Pike, 1994). The motivational plan should identify observable behaviors such as increased persistence and voluntary engagement in the task (Jonassen, 1998). In Todd Oppenheimer s *Atlantic Monthly* article entitled *The Computer Delusion*, he cautions that research on computers has been especially weak in measuring intangibles such as enthusiasm and self-motivation. He goes on to quote Clifford Stoll s *Silicon Snake Oil: Second Thoughts on the Information Highway*:

Computers in the classroom are the filmstrips of the 1990s We loved them because we didn t have to think for an hour, teachers loved them because they didn t have to teach, and parents loved them because it showed their schools were high-tech. But no learning happened (Oppenheimer, 1997, 48). Educators need to value computers in the classroom because they are an effective channel for delivering powerful instruction that results in relevant learning.

Adult Learners within Generations X and Y

Nested within the adult learner population are generational subgroups whose needs Army trainers must consider. Crispel (1993) makes clear that there is no standard way to define the timeframes for these groups, but presents what American Demographics has chosen as the best definitions -- Generation Xer s were born between 1965 and 1976 while the Generation Y cohort, to whom she refers as the baby boomlet, was born between 1977 to 1995. Learners within Generations X and Y have high expectations for the quality of technology-based instruction they receive. A major reason is pervasiveness of television -- 98 percent of American homes have at least one television and 98 percent of these are in color. Through exposure to the timeliness, the talent, and the superior technical quality of many television programs, learners have generalized high expectations to technology-based distance learning. In *Generation X Goes to College*, Sacks s (1998) reiterates that Gen-X ers have been engulfed in entertainment since birth. His research found that nearly half of the college students in his sample valued entertainment as the number one trait in an instructor. Television creates an expectation of how information should be presented, i.e., in a highly dynamic and multimedia form. Television relies on quickly changing images, drama, sound and music, comedy, and various other devices not often found in traditional materials. Traditional training offerings, to put it bluntly, are deadly dull compared to most television programs (Marquardt and Kearsley, 1999, 87).

In addition, Gen-X ers grew up in the 1980 s when unemployment was high, when 50 percent of this group were latchkey children, and when 50 percent saw their parents or a close relative divorce. With computers and television as their baby sitters, Gen-X ers are used to looking after themselves. In his conference presentation *Generation X: Unlocking the Mysteries of Young Learners*, Cohen (1999) identified the following characteristics trainers must consider: Gen-Xer s prefer fast-paced presentations that flood them with information and want their education to be combined

with entertainment. They also want to choose information from a continuous flow of messages from multiple sources that they can control. The caveat for trainers is that as knowledge doubles every two to three years, learners may be inundated with too much information. Chris Dede (1996) cautioned trainers and educators against using information infrastructures as a firehose to spray more low-level factual knowledge into courses and encouraged providing learners with skilled facilitators so that they will not flounder in unstructured data. Secondly, Gen-Xers want to receive frequent feedback and a daily sense of accomplishment. The also want latitude in when and where they study, and a choice of assignments. They do not want to be mentored on knowledge they can find elsewhere. Thus, diagnostics and self-pacing become important in technology-based training. Gen–Xers prefer experiential assignments and so trainers must design attention grabbing/sustaining situations and allow learners to react and then reflect upon their experiences in those situations. Very importantly, Gen-Xers prefer visual images more than the written word, as evidenced in the statistic that 41 percent of 18-24 year olds did not read a single book that was not required for school. Cohen predicted that Generation Y is likely to display the same characteristics as Generation X, only more intensely so.

In summary, adults often prefer distance learning because it addresses their need for self-direction by giving them control over the time, place, and pace of instruction. Moreover, when at-distance courses are modular, adults learn more efficiently by testing out of modules they have already mastered. Because the distance learning instructor is either completely absent or geographically separated from students, learners must be far more independent than students in the traditional classroom, a role many adults favor. Distance learning often allows the learner to enroll in instruction at the time when he needs to apply the knowledge and/or skill to his job, and thus holds great promise for soldiers. Regardless of whether instruction is delivered in a classroom or in a distance learning environment, Army trainers must address the six basic needs of adult learners as well as generational characteristics of the target population.

Barriers to Distance Learning: More Implications for Army Trainers

Distance learning differs from traditional classroom instruction in that the former delivers training to soldiers at times and places convenient to them via technology. Despite advantages distance learning provides, this approach challenges trainers because learner motivation and in turn attention are harder to sustain. Motivation energizes the learner and directs his attention. Attention, which is prerequisite to learning, is sustained when learners are relaxed and alert to the stimuli that the trainer wants learners to perceive. According to *Accelerated Learning for the 21st Century* the major reason students do not recall instruction is because they were not paying attention in the first place (Rose and Nicholl, 1998). Wlodkowski (1993) finds a 90 percent criteria helpful -- when less than 90 percent of the learners are paying attention, an intervention is required, whether it be a break or a change in the lesson activity. The following four barriers reduce distance learner motivation and in turn attention: (1) Distance learners feedback to the trainer is reduced, (2) Distance learners become passive, (3) Distance learners lose track of where they are within instruction, and (4) Distance learners are *told*, not *shown*. The skills trainers need to develop effective at-distance instruction must address not only needs of adult learners described in the previous section, but also the four barriers to distance learning that follow.

Distance learners feedback is reduced. In and of itself, face-to-face communication is difficult, with communication experts projecting that as much as 70 percent of the message an individual sends may be misunderstood by the receiver (Wlodkowski, 1993). Communication is even harder in distance learning where learner feedback to the trainer is reduced. In both one-way video teletraining and in audio-graphic instruction, for example, the instructor cannot see the learners looks of boredom or confusion, both of which cue the trainer to change his instructional strategy. Moreover, the common fear a learner experiences when asking questions in a traditional setting is magnified in distance learning when what he fears might be dumb questions are telecast across the country or are preserved electronically for worldwide distribution. With this reduction in feedback, three skills become far more critical to trainers -- questioning, listening, and feedback.

Galbraith (1998) regards questioning as the single most influential teaching behavior because of its potential to impact learning. A companion to questioning, Stolovich (1999) considers listening to be the most important instructor skill because it allows him to redirect the learner s attention or deepen his thinking. Related to questioning and listening, Cyrs (1998) maintains that the most important way for trainers to gauge learner understanding is by listening for the level of questions that learners ask. For example, if a lesson objective requires a distance learner to think critically (e.g. to analyze a situation, synthesize a

recommendation, or evaluate a course of action), but the learner s questions indicate a lower level of cognition (e.g. he asks for definitions, principles, or rules) the instructor is cued to change his strategy.

Related to questioning and listening is feedback, which Wlodkowski considers to be perhaps the most powerful instructor intervention. He describes good feedback as being: 1) Based on performance standards rather than on personal opinion. 2) Followed by new action. 3) Quantitative, since numerical feedback indicates small improvements that produce changes in learner performance in the long run. 4) Prompt, but not necessarily as soon as possible. Designers must consider whether delay is beneficial, remembering that excessive delay decreases motivation, weakens the feedback, and increases learner anxiety. Research shows that a moderate delay in feedback can enhance cognitive learning because the delay allows learners to forget incorrect responses and therefore reduce interference with learning the correct response. It should be noted that none of the studies that support prompt over immediate feedback waited longer than 24 hours to administer feedback. 5) Frequent, since an accumulation of errors can reduce motivation. If multiple errors are established, the new behavior the feedback seeks to encourage is foreign to learners. 6) Positive, emphasizing correctness rather than mistakes, and 7) Differential, indicating improvement the learner made since he was last evaluated (Wlodkowski, 1993).

Distance learners become passive. Nicholas Negroponte, Director of the Massachusetts Institute of Technology s Media Lab, states that 1960 s pioneers in computers and education advocated self-paced, individualized drill-and-practice to teach the same God-awful facts more effectively. He says that with today s multimedia, closet drill-and-practice believers think they can capture the pizzazz of a Sega game to give learners more information more productively. Negroponte cautions that the unfortunate price paid by educational systems that cram facts is that learners are often more or less dead on arrival upon entering higher education (Negroponte, 1995, 198-199). Genuine learning comes from exploration. Until the computer, the technology for teaching was limited to audiovisual devices and distance learning by television, which simply amplified the activity of the teachers and the passivity of children (Negroponte, 1995, 199). Negroponte adds that computers can make learning by doing the rule rather than the exception. Unfortunately, Greenspan (1997) cautions that a growing trend is the abandonment of genuine interaction in much Computer-based Instruction (CBI) in favor of a mechanical response to the learner.

With a target population heavily conditioned by passively watching television programs in which no overt reaction is expected, trainers must vigorously solicit distance learner involvement so that they will not generalize passive viewing to distance learning. Trainers should engage distance learners within the first two minutes of instruction and sustain participation throughout the lesson. In general, trainers should involve learners at least 30 percent of the time for synchronous instruction and up to 40 to 50 percent of the time for asynchronous instruction (Ostendorf, 2000). Periods of learner involvement should be planned throughout the lesson and should include student-student interactions (e.g. discussions, role plays, games and simulations), student-instructor interactions (e.g. questions), and student-content interactions (e.g. mind-mapping, sequencing, ranking, student teaching, exemplifying, hypothesizing, analyzing, or comparing and contrasting content). Moreover, research shows that an effective way for learners to handle content is to summarize in their own words what they have learned. Students who give such explanations show 30 percent increases in achievement after learning, compared to 20 percent gains for those who do not summarize or paraphrase. The more the student explains the content, the greater the learning gain (Howard, 2000). Finally, the distance learner should follow each interaction with a period of reflection and make it a habit to ask two questions -- (1) What is the most important thing I learned? (2) What am I going to do about it?

Distance learners lose track of where they are in instruction. Synchronous distance learning technologies often present transient rather than persistent stimuli, where a distance learner, for example, can receive real-time video teletraining or audio graphic instruction one moment, but it disappears the next. When stimuli are transient learners become frustrated if they lose sight of the lesson s organization and, as noted earlier, their confusion and frustration may go unnoticed in distance learning if feedback to their instructor is reduced. For this reason, trainers must craft clear organization into at-distance courses.

Experts recommend five activities for structuring distance learning in order to help students stay on track. First, trainers should begin lessons with context, i.e. telling learners what came before, where they are now, how the task fits into combat (or the job), and what will come next. Secondly, incorporate pretests since research has shown that learners who take pretests do better on finals than those who do not. Moreover, learners who take pretests requiring recall do better than

those who take pretests requiring recognition memory (Howard, 1997). Thirdly, incorporate redundancy into DL by inserting reviews periods after an hour, a day, a week, a month, and after six months. This sequence has increased recall by 400 percent, and studies show that 70 percent of what is learned can be forgotten within 24 hours unless the learner attempts to remember the information (Rose and Nicholl, 1998). Fourthly, require learners mind-map the content. This is a graphic technique for helping them structure information and focus on and understand relationships between a subject and its main themes (Buzan, 1993). Fiftly, use a whole-part-whole presentation sequence because it results in 50 percent faster learning over a part-whole method (Rose and Nicholl, 1998). Lastly, design compelling beginnings and endings to lessons, and find ways to reinforce the middle of instruction. Research shows that recall is highest (95 percent) at the beginning of a sequence and at the end (65-90 percent) of a sequence, but is reduced (20 percent) in the middle (Pike, 1994).

Distance learners are told, not shown. How memories become permanent is a function of how strongly information is registered during initial instruction, and that is why learning through hearing, seeing, saying, and doing is so powerful (Rose and Nicholl, 1998). Although instruction presented in multiple modalities is most robust, visual communication is usually the most important sense during instruction because learners take in so much more information visually than through other senses (Stolovich, 1999). Pike states that we gain 75 percent of what we know through vision, 13 percent through hearing, and 12 percent through smell/touch/taste. Because the average learner speaks at about 110 to 160 words per minute (WPM) but thinks at a rate of 400 to 500 WPM, visuals become an important way to hold attention. Pike also cites studies at Harvard and Columbia that show between 14 to 38 percent retention improvement through use of audio-visuals. Moreover, studies at the University of Pennsylvania and the University of Minnesota demonstrate that the time needed to present a concept was reduced up to 40 percent when visuals were used (Pike, 1994).

In working with Army trainers to produce distance learning instruction, Dr. Tom Cyrs, then Director of New Mexico State University s Center for Instructional Development and Evaluation, maintained that the instructional developer s most important skill is the ability to think visually, using both word-pictures and iconic representations. In support of this, research shows that a picture is three times more effective than words alone, and words and pictures together are six times more effective than words alone (Pike, 1994). Moreover, objects and pictures of objects are better remembered than their names because pictures include features that make them more memorable (Fleming, 1993). Buzan s *The Mind Map Book* (1993) sites one study in which recognition accuracy for pictures (over 2500 photographs) is between 85 and 95 percent. Not only is memory for images better than memory for words, but memory for concrete words is better than memory for abstract words (Howard, 1997). Garrand (1997) went further in stating that writing for film is one of the most important skills for the multimedia writer because multimedia is moving in the direction of full-motion, full-screen video and animation. Trainers produce a far more powerful experience when the learner sees the results of their writing and does not just read or hear them.

Despite the tremendous importance of visual communication, Army trainers are provided greatly oversimplified guidance, focusing almost exclusively on standards for designing text graphics. Guidance to video teletrainers (VTT), for example, often reads as follows: Use upper & lower case *sans-serif* typeface, 24 point type, no more than six words per line or six lines per visual, no reds or magentas that bloom and bleed, and select a blue background with yellow text. This straightforward guidance is easy to communicate but avoids substantive considerations such as the following: What is the value of a visual metaphor and how do trainers construct them? How do trainers design effective word pictures? What is the value of triggering visual imagery with stories? Why is a visual mind-map such a powerful learning tool? What can research on film study tell us about designing multimedia that grabs and holds learner attention?

Army Research into Addressing DL Barriers: A Study on VTT

During the early stages of The Army Distance Learning Program (TADLP) development, TRADOC representatives visited numerous experts from industry and academia and found them in uniform agreement on the following: Unless a course is exceptionally well designed, trainers must reconfigure it for distance learning delivery. To the extent that trainers address the four barriers identified above, distance learning will be more likely to succeed. Since redesign can be resource-intensive, TRADOC questioned whether soldiers would perform any better if a course was redesigned for distance learning delivery. TRADOC sponsored the TRADOC Analysis Center (TRAC) in studying the impact of high quality design on learner performance. In preparation for the study, distance

learning experts from New Mexico State University guided the redesign of 40 hours of leadership instruction for VTT by producing the following: highly structured student and instructor guides; lessons embedded within meaningful context; interactive exercises to engage learners at least 30 percent of the time; a change of activity at least every 15 minutes; double the number of questions to increase learner feedback; quadruple the number of graphics to increase understanding, and inclusion of 24 short videotape vignettes to trigger discussion. In analyzing performance, TRAC found that soldiers receiving instruction redesigned to address distance learning barriers performed statistically significantly better than those receiving instruction that had not been redesigned for at-distance delivery (Lehman and Kinney, 1993). Since the time the study was conducted, high quality design has become even more imperative in light of today s trend toward reusable courseware and the proliferation of learning objects that enable the same segments of instruction to be used in multiple courses.

THE MULTIMEDIA CHALLENGE: DISTANCE LEARNING DISTRIBUTED VIA CD-ROMS AND THE INTERNET

In November 1997 the Distance Learning/Training Technology Applications Subcommittee of the Secretary of the Army s Education Committee was established to review and evaluate the status of distance learning within Army training. In its June 1999 briefing to the Secretary of the Army (Chute and Mehlinger, 1999), the subcommittee recommended that TRADOC adopt the Internet as the TADLP distribution backbone, enabling training to be Web-centric in the long term. The subcommittee, however, added that the Army must use CD-ROMs as a convenient, necessary interim measure while transitioning to the Web. Thus, multimedia distributed via CD-ROM and the Internet will be two major means of delivering distance learning in the coming years. What implications does this have for Army trainers responsible for designing and delivering multimedia instruction?

Implications of Research for Multimedia Design

In *The Media Equation: How People Treat Computers, Television, and New Media Like Real People and Places*, Stanford University researchers equate media with real life, claiming that an individual s interactions with computers and television are social, like interchanges that occur in real life. The media equation –media equals real life –applies to everyone, it applies often, and it is highly consequential Even the simplest of media are close enough to real people, places, and things they depict to activate rich social and natural responses. Many of our studies generate these responses with rather pathetic representations of real life: simple textual and pictorial material shown on garden-variety technology. The equation still holds, however. Mediated life equals real life (Reeves and Nass, 1998, 5 and 7). Stanford researchers suggest that multimedia designers benefit from the same considerations film makers use in communicating visually. Below is a summary of their findings on gender, image size, motion, and scene change in multimedia, all based on premises taken from social sciences. In addition, research from other universities on color and system response times are discussed.

Research on gender. How do learners react to a computer programmed with male and female voices? Results showed that both males and females were more influenced by male praise, that feedback from a male voice appeared friendlier, that a computer with a male voice did a better job of teaching, and that a male voice was better at teaching technical skills while a female voice was better at teaching about relationships. In another study, researchers used audio-visuals of women but altered one group of women s voices electronically to sound more masculine by amplifying lower frequencies, dampening high ones, and making the voice louder. In this study researchers found that masculine-sounding females were perceived to have more drive, willpower, reasoning skills, persuasiveness, and learning capability than feminine-sounding women. Thus, learners stereotype figures in audio-visual presentations based on voice (Reeves and Nass, 1998).

Research on image size. Multiple screen sizes are proliferating and instruction can be seen on screens ranging in size from a hand-held communication device to a standard computer monitor, to a high-definition home theater screen. Stanford researchers hypothesized that images viewed on a large screen would be more arousing and memorable. Their study found that those who viewed a large screens (90 inch versus 22 inch diagonal) remembered more than those who watched the smaller screen. Although viewers technically saw the same content, images on larger screens were more arousing. Researchers go on to say that: Movie scenes on the larger display were liked considerably more. The scenes were more exciting, the action faster, the pictures more realistic, and the viewers reported feeling more a part of the action Larger screens mean more arousal, stronger memories, and more positive evaluations of the content they displayed. And all of these results are pretty much the same in the real world (Reeves and Nass, 1998, 198). Their caveat, however, is that more research may be required in selection of

screen size for a distance learning environment, since viewers may be over-stimulated by large images to the point where they may not attend to an instructional message.

Research on motion. Research on brain activity shows that our attention to pictures is strongly associated with visual motion, just as our attention is directed by motion in the real world. For this reason, information learners need to think about should be juxtaposed with visual demands like movement. Instructional designers must realize that the motion/rest rhythm is critical to multimedia presentations, and finding the rhythm may involve more art than science. Learning improves when there are periods of visual rest, and memory is aided when learners can stop and think about content presented rather than being overwhelmed with new stimuli. Reeves and Nass (1998) caution that if motion is introduced constantly, the learner s orienting responses grow weaker with each orientation he makes.

Research on scene changes. Response to visual cuts as measured with EEG data indicates that cuts demand attention, especially one second after they appeared. In addition, researchers present an interesting finding for instructional designers that over-generalize an MTV style that uses an enormous amount of cuts per unit of time. Messages with many cuts (one per second) were given less attention than those having no cuts. Reeves and Nass (1998) conclude that media can easily exceed processing capabilities, causing the viewer to lose attention.

Research on color. Pett & Wilson (1996) reviewed over 100 sources involving studies on the use of color and although they have found mixed results, relevant findings for the multimedia designer to consider include the following: There is no significant difference in student performance between color and black and white instruction delivered via television, film, or hardcopy materials. Yet studies show that learners prefer color and attend significantly longer to color as opposed to black and white television. Color influences affective meaning of pictures and is an attention-getting device providing measurable effects on learning that cannot be accounted for by words and labels. It also focuses learners on important information and on cues that otherwise go unnoticed and reduces information processing time. With respect to color and computer screens, learners prefer light backgrounds. Moreover, trainers should avoid combining complementary colors of the same value (blue and orange; red and green; violet and yellow). In terms of legibility, contrast between letters and background appears to be more important than any color combination, with a text/background contrast of 8:1 to 10:1 being optimum.

Research on The Wayfinding Problem. In general, a computer screen presents only 25 percent of the information on an 8 _ x 11 inch printed page, requiring far more computer pages to provide the same amount of information. Compounding this problem is the fact that scrolling through electronic text is far less convenient than going through a book. The Wayfinding Problem refers to the fact that it is far easier for the learner to lose track of where he is in electronic instruction. The designer can reduce this problem in two ways. First, he can compress information presented on their screens through creating a telegraphic style rather than flowing prose and combining this with graphics. Secondly, designers can let users know where they are in the text (e.g. anchor them to the module, terminal learning objective, enabling learning objective), and give them an easy way to go back to where they have been. If a learner is to keep track of his place, it is better to provide him with broad, shallow menus rather than narrow, multi-level ones. Fewer menu options comprised of deeper layers adds to The Wayfinding Problem (Fleming and Levie, 1993).

Research on System Response Time. Low bandwidth results in excessively long time to download instructional programs. To hold learner attention, trainers should indicate when a file will take more than ten to 15 seconds to download, given the user s bandwidth. In addition, if trainers want the learner to feel as though he is directly manipulating objects on the screen, a 0.1 second response time is required. If it is unnecessary for the learner to feel a direct connection between his actions and the changes on the monitor, a response time of one second is acceptable, but longer times lead the learner to restrict his use of the system (Williams, 1998).

Role of the Internet/Web-based Training in Army Distance Learning

Web-based or online learning makes distance learning more challenging to Army trainers and students. The authors of Building Learning Communities in Cyberspace comment: What happens when instructors and their students never meet face-to-face but are connected only through text on a screen? How does that change the transmission of knowledge, the nature of the learning process, and the relationships among the people who are interacting online? The nature of teaching and learning does change when it leaves the

classroom -- sometimes dramatically (Palloff and Pratt, 1999, 4).

In a traditional classroom, students gather at the beginning and end of class to talk about the course, activities outside of the classroom, or to socialize. Yet in online learning, instructors and distance learners are represented by text on screen with nonverbal cues removed. For this reason, it is harder for a learner to establish a presence online. Instructors and their students become, in effect, disembodied. In a face-to-face situation, we are able convey in a multitude of ways who we are as people. How does one do that online? How do the participants in the online classroom become reembodied (Palloff and Pratt, 1999)?

Online Interpersonal Skills. Palloff and Pratt (1999) claim that interaction and collaboration become critical in Web-based training and an inattentive distance learner affects the group deeply. The successful online learner is a noisy learner who is active and creative in the instructional environment. Online instruction is especially valuable in motivating learners who are less likely to participate in discussion. In fact, an introvert is more likely to be successful online than an extrovert because the perceived pressures in face-to-face situations are eliminated. On the other hand, extroverts may have a harder time establishing a presence than they would in a traditional classroom.

In addition, Palloff and Pratt (1999) feel that relationships online have the potential to be more emotionally intense because barriers associated with face-to-face communication are eliminated. In the traditional classroom, the quality and intensity of relationships are not large issues because the instructor simply disseminates knowledge, the students absorb it, and social interaction is not a concern. In the online classroom, on the other hand, knowledge is generated through relationships and interactions among students and so these relationships must be nurtured.

Trainers must remember that the Internet evolved as an information storehouse. In The Psychology of the Internet (1999), Wallace reminds trainers that although we use very powerful database technologies such as browsers and engines that search rapidly expanding content, the software and services to facilitate human interaction are not as developed. He describes people in general as appearing cooler, testier, more disagreeable, and less polite because of the limitations of the medium. Unfortunately, people receiving such messages respond in kind and hostility can escalate. Online group members *could* have typed simple phrases to express more agreement and release tension if they had realized the impact of their remarks on the group. Though their emotional intelligence might have been high in real life, it was less acute online (Wallace, 1999, 17). Wallace cites research comparing computer-mediated with face-to-face communications and found more swearing, insults, name-calling, and hostile comments among computer users.

Developing trust in virtual teams will become an issue as distance learners collaborate on assignments. How do teams composed of learners who have never met establish trust? Research from the University of Texas at Austin found that members of successful teams exchanged messages often, were optimistic, were excited, and were clearly oriented to the team s mission. They were able to establish swift trust in others with whom they had no prior interaction. By interacting frequently, emphasizing the positive tone, volunteering for assignments, and then going the extra mile to meet their commitments, they were able to overcome the obstacles that led to poor performance in many of the other teams (Wallace, 1999, 86). Conversely, Wallace claims that teams that failed had noncommittal members who communicated infrequently (waited up to eight days) and rarely reacted to other members contributions. Palloff and Pratt (1999) recommend that each learner submit a minimum of two relevant and substantive posts per week. By this the authors mean that the learner must support his statements or begin a new topic.

A major reward for online learners is attention. Wallace (1999) says we can use attention to reinforce behavior we want to promote by just responding to a person s post with a statement like I agree . Beyond that, praising a fellow online learner s comments is even more powerful. For Wallace, a praise-criticism-praise sequence can be effective in disagreeing while showing respect for the learner.

Group Size. In synchronous instruction, the group should be small enough (five to ten students) to allow each student to participate and to prevent infoglut. Asynchronous groups can be larger (20 or more students), depending upon a number of factors such as the instructor s facilitation skills, the content being discussed, and the nature of assignments. In addition to limiting group size, students need to see a high level of instructor involvement and presence in order to feel like they are getting their money s worth (Palloff and Pratt, 1999).

SUMMARY

Army distance learning courseware must address the diverse needs of adult learners, Generation X and Y learners, and the fundamental barriers to distance learners. As adults, all Army personnel have unique learning needs. These include: a need to know why learning is required; a need to direct their learning; a need to contribute their experiences to the learning situation; a need to apply what they have learned to solve real world problems, and a need to feel competent and experience success throughout the learning program. Secondly, many soldiers have additional learning requirements characteristic of Generation X . These include: a desire for independent learning experiences that incorporate fast-paced and visually intensive instruction; a need for frequent interactions with corresponding feedback; and a strong desire to experience a sense of accomplishment. Lastly, soldiers needs as distance learners include the following: increased student-instructor feedback since face-to-face communication is reduced or absent; frequent student interactions to prevent distance learners from becoming overly passive; highly structured learning activities to ensure distance learners do not lose track of where they are; and frequent and effective visuals since imaging is critical to learning.

Army research shows that distance learners perform statistically significantly better when trainers pay close attention to the quality of courseware design and delivery. More recent media research from Stanford University shows how gender, image size, motion, and scene change affect learner attention. Other considerations trainers must address when using electronic distance learning technologies include the following: use of color in computer displays, ways to minimize The Wayfinding Problem, ensuring system response times are acceptable to learners, enabling students to acquire those interpersonal skills that facilitate collaboration and community building, and limiting group size to that which is appropriate to the content and nature of assignments.

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