THE IOWA PROJECT:
AN OPERATIONAL TEST OF INTEGRATED DISTRIBUTED LEARNING

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Abstract

Recent advances in computer and communications technology present the U.S. Army Armor School at Fort Knox, Kentucky with opportunities to attain greater effectiveness in its resident instruction–and wider dissemination of its learning programs–through the use of advanced distributed learning. This paper describes the conception, development, implementation, evaluation, and outcomes of an operational test conducted by the Armor School in collaboration with the Iowa Army National Guard to deliver instruction to a remote site using a variety of distributed learning media: videoteletraining, Internet based asynchronous and synchronous training, computer based training, and conventional paper based products. The *Iowa Project* employed synchronous and asynchronous elements, successfully prototyping a model for selecting and integrating several different, low-cost distributed learning media to prepare students for resident instruction. Further, the Iowa Project validated concepts for converting existing resident instruction into multi-phased, and multi-media, integrated distributed and resident learning. Armed with experience gained from the Iowa Project, the Armor School has embarked on a multi-year project to convert their courses from purely resident instruction into integrated distributed learning instructional programs.

Author's Biographical Sketch

Mr. David E. Robinson is a Senior Analyst with A B Technologies, Incorporated in Alexandria, Virginia. He joined A B Technologies in October 1996 upon retirement from the U.S. Army as a lieutenant colonel with over twenty years service. In his last military assignment he was the Deputy Chief of Staff, National Defense University, Washington, DC.

An armor officer and veteran of the Persian Gulf War, Mr. Robinson served nine years in regimental armored cavalry units in Germany and Texas, four years at the U.S. Army Armor School, one year at the U.S. Army Sergeants Major Academy, and one year at the U.S. Army Air Defense Artillery Center. In 1989 he was a member of the Army Chief of Staff's "Noncommissioned Officer Leader Development Task Force," and he has designed, developed, delivered, and evaluated several functional and professional military education courses for officers and noncommissioned officers.

Since joining A B Technologies Mr. Robinson has been project lead for the Army Model and Simulation Office's "Educate the Force" study, the Defense Modeling and Simulation Office's "Modeling and Simulation Staff Officer Course," and the U.S. Army Armor School's "Iowa Project." He is currently engaged in several projects, including the conversion of Armor School lessons to various distributed learning formats.

A graduate of Florida Institute of Technology (BS, Management Science, 1975), Webster University (MA, Human Resources Development, 1991), and the U.S. Marine Corps Command and Staff College (1993), Mr. Robinson resides in Alexandria, Virginia with his wife and two daughters. His avocations include home improvement, automotive repair, gaming, and homebrewing.

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OVERVIEW

In early 1997 the United States Army Armor School (USAARMS), Fort Knox, Kentucky wanted to conduct and evaluate an operational test of the technologies and techniques needed to deliver instruction from one site to a remote site using a variety of distance learning (DL) media. For the test, USAARMS selected a portion of the 20-week resident Armor Officer Advanced Course (AOAC) curriculum for conversion to distance learning (AOAC prepares junior officers, typically Army captains with 4 to 5 year's service, for command of company-level units and assignment to staff positions at the battalion and brigade level).

USAARMS teamed a group of Army instructors and training developers with contractors from A B Technologies, Inc., IBS Interactive, Inc., Global Information Systems Technology, Inc., and Magideas, Inc. to perform the four month test. Collaborating with the Iowa Army National Guard (IAARNG) for students and resources to deliver the DL, USAARMS launched the *Iowa Project* in August 1997.

Ending in January 1998, the project's results had immediate applicability to on-going work at Fort Knox in the conversion of courses to the Total Army Training System (TATS), an Army-wide program designed to implement common standards for all training tasks performed throughout the Active Army, the Army Reserve, and the Army National Guard. Developers at the Armor School began converting AOAC lessons in early 1998 using Iowa Project outcomes, revising the content, methods, media, and staffing of the AOAC for Active Duty and National Guard students.

Objectives

Project Objective In addition to the technical objectives of the operational test, the Armor School conducted the Iowa Project to derive first-hand experience in the conversion of existing courses from purely resident to mixed resident and distance learning strategies.

Instructional Objective Students participating in the Iowa Project were given this instructional objective:

Performing as an Assistant Brigade S-3, produce a course of action (COA) statement and sketch for a heavy brigade attack that meets the required criteria in accordance with Fort Leavenworth Student Text 101-5 (Chapters 1-5).

This objective had sufficiently narrow scope to enable rapid creation of an instructional program while providing the students with relevant, useful learning.

Description of the Environment

Instructional Environment The current 20 week resident AOAC is composed of nine "volumes." Beginning with *Volume 1, Foundations*, the students progress through three volumes on offensive operations at the brigade, battalion, and company level; three volumes on defensive operations at the same levels; one volume on stability and support operations (SASO) at the company level; and a final volume on *Taking Command*. The instructional material chosen for the Iowa Project is integrated with lessons on unit operations in the AOAC's introductory volumes, and is not taught as a separate subject.

Three software products that support the subject were on-hand: the PC- and Internet-based *Military Decisionmaking Process (MDMP) Tutor,* the Web-based *Mission Analysis Distance Learning (MADL)* module, and the PC-based *Military Graphics and Symbology (MGS) Tutor* from the Center for Army Tactics. USAARMS had experience with these products, and they were a cornerstone for creation of the project's stand-alone COA instruction.

Organizational Environment Following are the roles and functions performed by the groups participating in the project.

USAARMS provided funds, teaching facilities, content, an instructor/subject mater expert (SME), training developers, and information technology (IT) support.

IAARNG provided four students, learning facilities, and a coordinator for the project. A fifth "student" was an instructor from the Combined Arms and Services Staff School (CAS3), U.S. Army Command and General Staff College, Fort Leavenworth, Kansas who collected information for their DL plan and program.

A B Technologies, Inc. performed the role of learning systems integrator, and provided the contract project lead, a course administrator, training developers, an evaluator, and content design.

IBS Interactive, Inc. provided listserv administration, Web site development and design, IT integration, IT support, IBT software development, and the *MADL* module.

Global Information Systems Technology, Inc. provided the *MDMP Tutor* and related IT support.

Magideas, Inc. provided the *ClassWise* software and related IT support.

Technical Environment USAARMS delivered lessons via videoteletraining (VTT) and the Internet. Internet based training (IBT) was asynchronous (AIBT; communications between participants separated in time) and synchronous (SIBT; communications between participants simultaneously in real-time). AIBT consisted of lessons provided from a Web site, e-mail communications between the instructor and students, and file transfer protocol (FTP) exchanges of learning materials between the instructor and students. SIBT used *ClassWise* to conduct a lesson between the instructor's networked PC and student networked PCs.

USAARMS employed its local area network's (LAN) connection to the Internet for delivery of the AIBT and SIBT lessons, and deployment of lesson material via FTP. It used its Teletraining Network (TNET) facility for synchronous lessons, bridging its signal via the Army Training Support Center (ATSC) and the National Guard Bureau (NGB) to the Iowa Communications Network (ICN).

IAARNG employed its LAN at the Sioux City armory for reception of the SIBT lesson, and its VTT facility at the armory for reception of the synchronous lessons, with the ICN providing connectivity.

The students and instructor used their PCs at home, work, and other locales to exchange e-mail and FTP materials, and access the AIBT lessons.

Physical Environment The project employed existing facilities at Fort Knox (Skidgel Hall, Boudinot Hall, and Gaffey Hall) and Iowa (Sioux City armory). The instructor conducted all synchronous instruction from Fort Knox and some asynchronous instruction (mostly e-mail) from home. The students received all synchronous instruction at Sioux City, and asynchronous instruction at home, work, or wherever they could gain access to the Internet.

MAJOR EVENTS

The project spanned a period from mid-August 1997 to mid-January 1998 (see Figure 1).

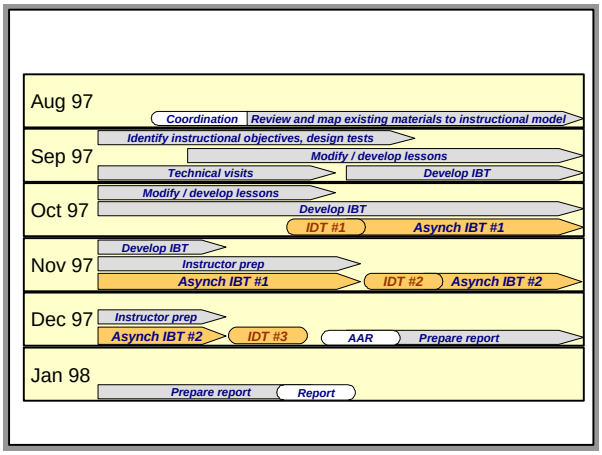

Figure 1. Timeline and Milestones

Instructional Events

From the student's perspective, the Iowa Project began with a telephone call from the instructor during the week of October 13, 1997. The first synchronous lesson was a course introduction via VTT on October 18, 1997 (see Figure 3), with distribution of student handbooks by the site

coordinator at Sioux City. During AIBT Phase #1, the students worked through the AIBT lessons, the *MGS Tutor*, and the *MADL* module. The instructor delivered the second synchronous lesson with *ClassWise* during IDT #2 on November 22, 1997, and the students performed a dry run with the *MDMP Tutor* in preparation for AIBT Phase #2. Students submitted their completed brigade COAs to the instructor using *MDMP Tutor* during the second AIBT phase, and the instructor returned their COAs with comments using the same software. The third synchronous lesson on December 6, 1997, via VTT, was a course wrap-up where selected students presented their COAs in a DL small-group format, ending with a student after action review (AAR) of the project.

Coordination Events

The project's initial coordination meeting between USAARMS and the contractor team occurred on August 13, 1997 to shape the nature of the instruction and clarify roles. On August 19, 1997 USAARMS leaders and selected members of the contract team visited the IAARNG at Camp Dodge, and briefed the Adjutant General, Deputy AG (Army), and State Area Command (STARC) staff regarding the project. IAARNG provided points of contact for further coordination, and gave permission for their members to participate. Once underway, frequent in-progress reviews (IPRs) proved essential to the project's success. The team conducted five IPRs by the project's end, scheduling three of them one or two days before the IDTs to perform last-minute coordination and tests of the synchronous DL technology.

Development Events

Development visits filled the schedule over the first six weeks of the project. Members of the contract team visited Fort Knox three times, and the USAARMS SME visited A B Technologies two times. Each visit lasted five days, and they proved fruitful as the collaboratively produced materials exploited the best ideas of each contributor. It soon became apparent that the volume of source materials, and the depth required of the AIBT lessons to provide sufficient coverage of the subject, precluded a traditional develop–test–deploy schedule for all lessons simultaneously. By late September the team adjusted the AIBT implementation schedule to stagger lesson development and allow just-in-time deployment, with the first lesson coming online October 15, 1997 and the last on November 7, 1997. The team also applied this technique to the synchronous lessons, delivering their materials during the week prior to the IDTs–which worked well because the instructor was intimately involved in their development.

Evaluation Events

The team created an evaluation plan to collect and process observations from the participants. Linked to instructional events, the plan gathered comments on-the-fly during and immediately following various sessions. The team held two AARs to discuss and refine the evaluation comments: the student AAR previously mentioned and a project team AAR on December 16, 1997.

METHOD

Integrating Distant and Resident Instruction

One of the Iowa Project's objectives was to explore the integration of distance learning with resident instruction. This technique has worked before, as in the pre-resident phase of CAS3 taught at Fort Leavenworth, Kansas. The difference, though, is that CAS3 was designed from the beginning as a two-phase program, whereas AOAC will have to convert its existing, purely resident format into a multi-phase Active and Reserve Component course. Like CAS3, the intent of this conversion is to have students arrive at resident instruction already conversant in the course's content, thereby allowing reduced time spent in residence.

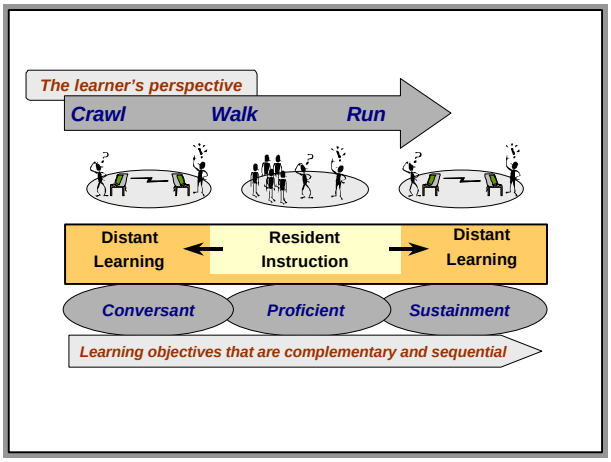

Figure 2. Conceptual Model

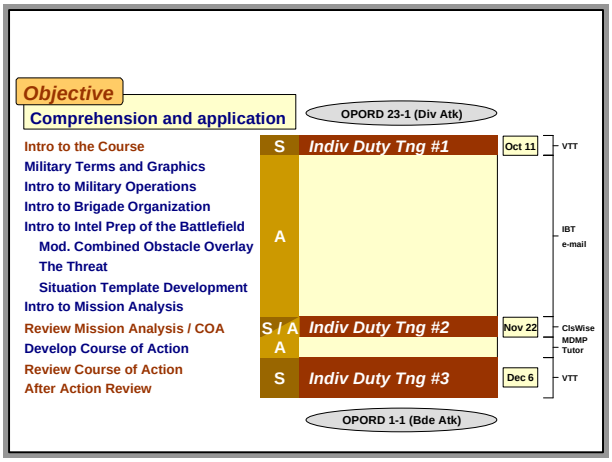

Figure 3. Instructional Model

The model (see Figure 2) of this concept shows conversion of selected resident instruction to pre- and post-resident distance learning opportunities, with intended outcomes for levels of competency portrayed in the ovals below the central bar. The Iowa Project focused on the "conversant" portion, or pre-resident phase. Participants discussed post-resident "sustainment" training, but the project's scope precluded testing this concept.

Application Of Systems Approach To Training

To convert the existing lessons into DL formats, the team modified the Army's systems approach to training (SAT) process. Discussion of the five phases follows.

Analysis The target audience and its instructional requirements were identical to current AOAC students, so analysis was attenuated.

Design The team modified existing instructional objectives to match the goals and media of the Iowa Project, and they implemented a modest test plan. The objective required comprehension of the MDMP, with production of a course of action statement and sketch for a brigade attack.

Development With the performance outcome defined in the design phase, the team modified existing materials during development to focus instruction only on those skills necessary to support the project's instructional objective. The team created a "course map," or instructional model, to guide development (see Figure 3).

Listed on the model's left are the titles of each lesson developed for the project, and listed on the right are the media used to deliver the lessons. Synchronous and asynchronous instruction are distinguished with the letters "S" and "A."

Students used the AOAC's 23rd Armored Division Operations Order (OPORD) 23-1 as the basis for developing COA materials that would support creating OPORD 1-1 for the division's 1st Brigade. The lessons wove the division OPORD into the instruction by relating teaching points contained in doctrinal material to examples derived from the OPORD and, in some cases, historical vignettes. The team downloaded appropriate doctrinal references from the Army Doctrine and Training Digital Library (ADTDL) Web site and created links within lessons to related passages from the texts.

During this phase the team simultaneously developed content and AIBT courseware, SIBT materials, and VTT materials–a challenging and fast-paced eight weeks involving reconciling review comments, managing lesson status, and testing courseware for several lessons.

Implementation The implementation phase went relatively well, with minor coordination issues between the students, instructor, and support personnel (unsurprising in an operational test of a first-run project). Descriptions of the tested synchronous and asynchronous DL media follows (see Figure 4).

E-Mail: The students, instructor, and administrators used e-mail to discuss topics and exchange ideas.

Computer Based Training: Two products, the *MGS Tutor* and the *MDMP Tutor* were employed for CBT. The *MGS Tutor* augmented the AIBT lesson on military terms and graphics. The *MDMP Tutor* provided a hybrid application, as its main component is a CBT lesson that utilizes file transfer protocol (FTP) to exchange MDMP products between the students and instructor. The students employed the *MDMP Tutor* between IDTs #2 and #3 to provide the instructor with their draft COA statements and sketches.

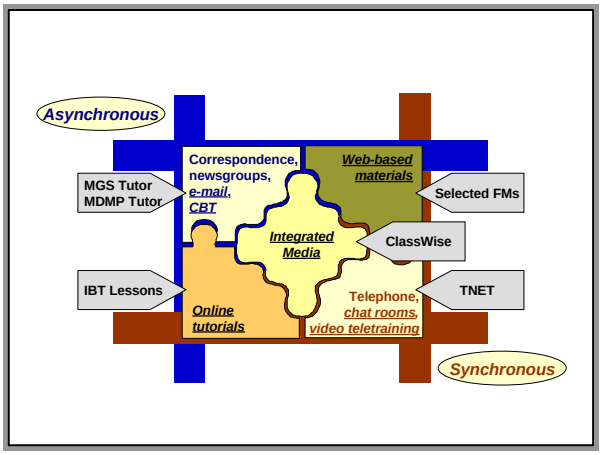

Figure 4. Distance Learning Media

Online Tutorials: The bulk of the development effort, and the central piece of the project, were the AIBT lessons created by the SME, A B Technologies, and IBS Interactive. Prototyped on an IBS Interactive Web site, these lessons were transferred to the USAARMS Digitized Training Access Center (DTAC) for student access.

Web-Based Materials: IBS Interactive downloaded selected field manuals (FMs) from the ADTDL, and established links between the AIBT lessons and the digital FMs within the consolidated Web site they created for the project. They did this, rather than provide hot links to the ADTDL site, in the interest of better response time for the students and reduced risk of online references being "moved out from under" the file locations to which the hot links pointed.

Chat Rooms: IBS Interactive established a chat room for the instructor and students, but it was not used because e-mail proved sufficient to handle the dialog that arose between IDTs.

Videoteletraining: Fort Knox and Sioux City conducted the first and last IDTs using VTT. TNET and the ICN produce incompatible signals, so USAARMS and IAARNG bridged the sessions through ATSC and NGB facilities.

Integrated Media: The *ClassWise* package from Magideas, offers synchronous and asynchronous capabilities. In the synchronous mode, it provides a one-way audio lecture capability with a simultaneous PowerPoint presentation from the instructor to the students, and a two-way chat and whiteboard function between instructor and students. Synchronous events can be captured and stored on a server, and students can view these later over the Internet in an asynchronous mode. The project tested *ClassWise* during IDT #2.

Evaluation Whereas most evaluation plans focus on how well the students master performance objectives, the Iowa Project's plan primarily focused on the technical aspects of implementation. The team collected observations and comments from the students, instructor, and support personnel who participated in the project. These observations were then discussed and validated during two AARs: one for the students and instructor at the end of the last lesson, and one for the instructor, developers, and support personnel on December 16, 1997.

AFTER ACTION RESULTS

The team collected, assessed, and grouped after action comments into eight categories, synopsized in this section. Each comment contains an observation followed by a recommendation in italics.

Learning Materials

Involvement of SME in Material Development Existing learning materials used at AOAC proved inadequate for non-SMEs to convert into DL formats. The USAARMS SME was indispensable to the retention of doctrinal veracity in the conversion process. *Augment AC SMEs with contract or RC SMEs, as the workload requires.*

CBT and IBT Development and Deployment Process The team truncated the traditional phases of software development, "alpha-beta-deployment," to accommodate the project's tight

schedule. This resulted in courseware bugs leaking through to the learning environment, and lack of coherence in the instructional flow in some lessons. A clearly defined development process linked to attainable milestones is essential for efficient, effective deployment. *Create a well-defined process for development of courseware, and implement it within a reasonable schedule.*

Development of Asynchronous IBT Lessons
The students remarked that interactivity is key to retention of their interest during AIBT (a point also true for CBT). Engaging games, simulations, streaming audio and video, and dialog with the instructor and fellow students all provide interactivity. The students enjoyed a navigation feature that allowed them to visit pages of examples and explanations for certain instructional concepts, and they offered these design tips: provide a feature to bookmark their place should they have to disconnect in mid-session; provide appropriate transitions between lessons to retain instructional continuity; publish a guidebook, preferably available online and in hard copy, that provides a synopsis and projected range of completion times for each lesson (similar in format to *TV Guide*); base the length of lessons on the intensity of the content and its "fun factor." *Retain successful design elements from the Iowa Project's AIBT products, and implement the suggestions provided above.*

Paper Media Electronic media generally available to today's students and instructors provides insufficient resolution to adequately display minute features, and activities requiring detailed study of 1:50K maps and their overlays–such as terrain analysis–still require paper media for successful learning. Current display technology lends itself to the graphic portrayal of broad, conceptual diagrams in support of learning events. *Retain use of paper maps for those tasks requiring their use, and other paper media for tasks requiring close study of detailed information that loses clarity when displayed on monitors.*

Handbook for Students A digital, online handbook would provide a low cost means for distribution, but a small paper based guide should also be provided for ready reference when students are not online. *Produce a brief, paper-based guidebook that provides an overview, course outline, points of contact, and log-on instructions and requirements, then place all other student materials online in a variety of formats determined most suitable for download and accessibility.*

Computer Literacy Ramp-Up for Students
Although the Iowa Project's sample size was small (five students), the range of computer literacy among the students was large. They suggested providing some form of basic computer instruction to future students before participation in similar learning. This issue may become less important as computer literacy becomes more common. Until that time provisions should be made to accommodate students who need initial computer instruction before they can effectively participate in computer based DL programs. *Survey target populations to determine the existing level of requisite skills before developing a basic computer instruction program, and tailor the program to address the specific skills required for the media, methods, and software used in the computer based DL lessons.*

Frequently Asked Questions (FAQ) Online
The students' questions for the Iowa Project most often involved software installation and configuration, or use of the CBT and IBT. These questions were handled as they arose, and for this project that presented little difficulty as there were only five students. Larger groups of students would certainly benefit from a FAQ page. *Establish an online FAQ to provide students information relating to administration, subject matter content, and courseware.*

Technical Implementation (Infrastructure)

Synchronous IBT The nature of the Internet precludes absolute certainty regarding the quality of connections. Some nodes will always receive their data earlier or later than the average. If one student experiences this "latency" during an SIBT session, the instructor will have to slow the lesson's pace to accommodate the slowest connection in the group. Excessive latency experienced by all students causes discontinuity in the lesson as the instructor inserts lengthy pauses and initiates feedback opportunities to determine the students' location relative to the material. The latency experienced during the Iowa Project was approximately 5 seconds which, although it sounds insignificant, gave the participants the

impression that it was much longer. *Employ a technical assistant to monitor the connections' latency during SIBT sessions, providing feedback to the participants regarding the extent of any delay so the pace of instruction can be adjusted accordingly.*

Technical Implementation (Software)

Operating System and Browser Compatibility
The project's AIBT lessons only worked with a specific version of Microsoft's Internet Explorer (IE) browser. This lack of cross-platform compatibility caused unnecessary difficulty for some participants–students and developers alike–as they expended additional time and resources obtaining the required version of IE. *Develop all Web IBT to be browser independent.*

MDMP Tutor Residual Issues The *MDMP Tutor* was not designed to work on Windows NT systems, which caused problems for those students whose PCs did not have Windows 95. This highlights the need to design software to work on as wide a range of operating systems (OS) as practicable. *Determine Army policies and information architectures regarding operating systems, with particular emphasis on projected OS deployment Army-wide, before embarking on further CBT development.*

System Requirements Although much of the software and some of the Internet material currently published requires at least a Pentium processor, many people still only have access to older PCs. For applications deployed throughout the Army, every attempt must be made to balance minimal system requirements with maximal application capability. *For the foreseeable future, design software to function with PC systems that are 2 to 3 years old on the date of expected deployment.*

Welcome Screen for IBT The Iowa Project's Web site was hastily assembled, and it lacked certain amenities that have become almost industry standards in Web site design. These usually include a homepage that outlines the site's browser and plug-in requirements ("This site best viewed with…"), with links to free downloads and instructions on their installation. Homepages also contain information about site navigation, mechanisms for feedback to the Webmaster and content specialist, and the organization sponsoring the site. The deployment of larger IBT programs to wider audiences will require sites with greater self-sufficiency and easier navigation–especially at the point of entry and administrative pages. *Create homepages for future AIBT that provide site requirements, links to downloadable browser enhancements, and administrative information for the IBT program.*

Instructor

Distance Learning Platform Skills Developing "platform skills" for delivery of DL presents an additional requirement for the Armor School and its instructors. The most pronounced aspect of SIBT noted by the instructor in the Iowa Project was the dramatic reduction of non-verbal cues that we all rely upon to facilitate our conversations, such as facial expressions, gestures, eye contact, etc. Instructors assigned DL tasks require additional training to develop the skills necessary for effective use of e-mail, SIBT, and VTT. *Review and revise the instructor training course to incorporate techniques and procedures tailored to the distance learning media employed.*

Intensity of Concentration Using ClassWise
The instructor remarked that the *ClassWise* session was unexpectedly demanding. He noted that the amount of concentration required a sustained level of heightened attentiveness throughout the session, aggravated by the absence of traditional feedback mechanisms (see previous comment). The instructor acknowledged that more experience and specialized training would no doubt reduce the stress associated with *ClassWise* sessions, or sessions with other SIBT software. Although these comments reflect the project's experience with only one of several SIBT software products available today, we believe this comment would apply to all. *Require instructors to rehearse and practice with SIBT software several times before delivering actual sessions, and consider the use of assistant instructors during SIBT sessions.*

Establishment of Rapport Developing an unambiguous relationship between students and instructor proved key to the project's success. The instructor spoke with each student by telephone during the week prior to the first IDT, and the use of VTT at IDT #1 enabled the

students to associate a person with the voice and e-mail they received during the project. In future DL programs, the students should be given some sense of an accessible and interested instructor who will monitor their progress and hold them accountable for assignments. *Provide opportunities whereby instructors can establish relationships with DL students.*

Level of Computer Literacy The students required frequent assistance in installing and using certain software for the project. The contractor and government team was always available, and answers were quickly provided because all team members had immediate access to the software developers. However, these circumstances were unique to the Iowa Project's developmental and operational test environment, and it is unlikely that such services could be affordably reproduced in a mature, deployed DL program. This highlighted a potential future requirement for DL instructors–a greater level of computer literacy than their peers. Topics suggested for DL instructors' knowledge include installation, utilization, and maintenance of relevant applications, and an appreciation and comprehension of PCs and networking, including hardware, software, infrastructure, and support organizations. *Develop a comprehensive DL support plan that integrates the roles and relationships of technical support personnel, instructors, and students, and consider establishing a DL instructor technical task list to aid in selection procedures and establishment of training opportunities.*

Support Personnel

Asynchronous Establishing and administering a Web site to implement AIBT requires planning for system maintenance and availability. If the students who use the site and depend on its content are scattered around the globe, the site should be hosted at a location that provides 7-by-24 support. Such support entails readily-available technicians and continuous monitoring of the site's health. Another requirement is the creation of SOPs that define maintenance procedures for the site's content. Since the site represents the organization's official presence in cyberspace, procedures must define a responsive process for the content providers while assuring the leadership that only approved materials are placed on the Web. *Develop a DL Web site SOP to coordinate the activities of technical support and content providers, and define the procedures whereby SMEs, technicians, and leaders maintain and revise the site's content.*

Synchronous To assure delivery of synchronous DL, technical support personnel must be on-hand during sessions. Instructors and students are working within narrow and unforgiving schedules, and a domino effect can occur if one or more lessons get delayed with no opportunity for rebroadcast. As in maintaining Web sites, an SOP that defines roles, responsibilities, authorities, and communications procedures is required to assure effective response to routine and emergency events. *Develop an SOP to coordinate the activities of technical support and content providers at the point of origin, the staff at student sites, and the staff at intervening network sites (as appropriate) for synchronous distance learning sessions.*

Coordination And Administration

Utility of Iowa Project Listserv Early in the project, IBS Interactive established a listserv for all participants. It provided a rapid, reliable method for dissemination of status reports, draft materials for review and comment, and requests for information and assistance. *Employ listservs for future projects.*

Maintaining Creative Flexibility Within Contractual Requirements The information technology marketplace continuously produces new, enhanced, or improved products. Often, these products become available during the development and implementation of courseware after all parties have settled on earlier, or different, versions of the enabling software. In a desire to provide the best possible solution, it is always tempting to adopt the latest or successor software as soon as it is available. Doing so, unfortunately, can disrupt development and deployment of courseware to an extent that threatens success. To balance these demands, statements of work can be written where tasks describe functional requirements and production of technical specifications. The development team would create technical specifications at selected stages of the project, and these would then provide the basis of agreement for further development. Subsequent technical specifications would build

upon the earlier ones, and any promising technologies that emerge between milestones could be evaluated for possible inclusion if their implementation complies with the previously agreed specification. *Develop future statements of work wherein tasks describe functional requirements and prescribe production of technical specifications tied to project milestones.*

Lead-Time Required for POI Implementation
All new and modified programs of instruction (POI) require lead times for implementation. This time is necessary for the personnel management system to establish attendance policies, for the field to restructure career progression in units and equip learning centers (if needed), for students to remap their career progression plans and begin acquiring computer resources for DL (if needed), etc. *Coordinate roll-out and implementation of converted courses with all activities normally engaged during induction of new courses, publicizing through all available media channels status reports and projected dates for implementation of new or modified POIs.*

Distribution of Learning Materials Hard copy learning materials were sent to the armory at Sioux City (student handbooks) and to the students' homes (situational graphic overlays, computer disks). The rationale for sending items to a central location, such as an armory, is to maintain positive control and accountability over the materials during every step of the distribution process. This is especially necessary for group sessions where all students must have the materials to participate. Sending materials to the students' homes, or other decentralized locations, makes sense for asynchronous units of instruction that have low criticality for timely completion. *Use centralized distribution for time-sensitive, event-driven instruction, and decentralized distribution for self-paced, open-ended (or long lead time) instruction.*

Other

Instructor Scheduling The Iowa Project spanned two adjacent time zones, yet that minor issue always required clarification and some discussion during coordination of every synchronous session. A one hour difference did not appreciably affect the instructor's or students' abilities to satisfy other obligations during the project, but it highlighted concern for instructor scheduling when USAARMS begins delivery of distance learning to sites of deployed forces in Europe, Asia, and elsewhere. *Schedule synchronous DL sessions with consideration for other obligations on the instructor's time, develop a policy on the most effective use of time zones during one session, and develop broadcast schedules accordingly.*

Staffing for Development, Implementation, and Maintenance As the Armor School converts existing courses to distance learning, the current staffing structure will evolve to reflect new demands placed upon the organization. Several discussions arose during the Iowa Project regarding the duties of resident small group instructors and the extent to which they should participate or interact with students enrolled in pre-resident, or post-resident, DL programs. All agreed that the work load to simultaneously perform duties as an SGI and DL instructor would prove formidable and oppressive. It appears that the best approach would have new instructors begin their assignments as SGIs, then move into dedicated DL positions. Besides instructors, other roles require staffing: instructional designers, SME (content) advisors, software developers, Web site administrators, network administrators, user support, course administrators, VTT operators, courseware directors, etc. All these roles require appropriate staffing based on the nature of the integrated program and the technological demands of the various systems. *Create models that reflect alternative staffing arrangements and conduct necessary manpower reviews to obtain the required personnel authorizations and funding.*

CONCLUSIONS

The Iowa Project demonstrated the feasibility of converting selected portions of resident instruction into a distance learning format, and then delivering this instruction with a variety of distance learning media. Of all these, the Internet and the World Wide Web offer the greatest versatility and flexibility for deploying instructional material across the nation–and to every corner of the globe. The Armor School's presence in cyberspace proved adequate during the test, and its Digital Training Access Center successfully hosted the Internet based instruction in synchronous and asynchronous modes. And although this

technology can facilitate learning, the project's outcomes underscore the importance of effective rapport and feedback between instructors and students as an essential part of quality instruction.

Increased computer literacy among students and instructors is key to the success of any future distance learning program. Many of today's soldiers have rudimentary understanding of word processing, presentation graphics, and the Web, but this knowledge is insufficient for the depth of functionality being built into distance learning software. Also, there are many soldiers who are still completely unfamiliar with personal computing and require training in basic skills. Regardless of their current proficiency with computers, all students must attain a common set of entry level skills before embarking on distance learning. Instructors will require greater technical proficiency and knowledge, because they will need self sufficiency to operate their portion of the delivery system and, in many cases, they will provide the first tier of technical assistance for the students.

As distance learning becomes increasingly computer and Internet based, Internet-capable student computers become an absolute requirement to access instruction–and today not all students own or have ready access to these machines. Many alternatives present themselves to address this need: issue computers to the students, expand access to computer equipped learning centers, deploy additional computer equipped learning centers, and provide students with reimbursement for portions of computer related expenses. These are only suggestions, as this topic was beyond the scope of the Iowa Project. But the project highlighted the need to consider this fundamental requirement for future expansion of distance learning opportunities to all our soldiers.

With this experience, the United States Army Armor School is now prepared for detailed implementation of an integrated resident and distance learning program of instruction for the Armor Officer Advanced Course that will benefit Active and Reserve Component soldiers alike.