NAVAL RESERVE SENIOR ENLISTED ACADEMY– USING TECHNOLOGY TO PUT A NINE WEEK COURSE IN A TWO WEEK BOX

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ABSTRACT

The Senior Enlisted Academy is one of the Navy's most prestigious professional enlisted training opportunities. This course prepares selected members of the Navy's senior enlisted community (E-8's and E-9's) for greater professional responsibility and opportunity, and attendance is considered to be career enhancing. Until now, it has been extremely difficult for members of the Naval Reserve to attend the course and gain entry into the ranks of SEA alumni. The course of instruction takes nine weeks, while most reservists are limited to a two week Annual Training (AT) period each year.

The convergence of several distributed learning support technologies has enabled the creation of a Senior Enlisted Academy Non-Resident Course that leverages asynchronous distributed learning with a resident training component to achieve training equivalent to the Senior Enlisted Academy for Naval Reserve personnel. The Naval Reserve Professional Development Center, New Orleans, and the Naval Education and Training Professional Development and Technology Center, Pensacola, have developed a facilitated Interactive Multimedia Instruction/Web Based Training course of instruction to be taken at home by reservists. This Distributed Learning (DL) component comprises seven weeks of instruction, to be completed in a five-month period. At the conclusion of the DL component, reservists will report to NRPDC, New Orleans, for a concluding two-week resident training component, which will contain those portions of the course unsuitable for delivery as DL.

Special consideration was given to creating numerous collaborative activities in the course to foster the same sense of community and cooperation among the course participants as that experienced by those attending the 9-week course. This was particularly challenging due to the necessity to ensure all activities were performed asynchronously to accommodate the variable schedules of reservists. This facilitated IMI/WBT hybrid course could potentially become a model for delivery of other professional or technical training, extending the range of educational opportunities for both reservists and active duty personnel.

ABOUT THE AUTHOR

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INTRODUCTION

In May of 2000, the Navy Reserve Professional Development Center (NRPDC), New Orleans, LA, approached the Naval Education and Training Professional Development and Technology Center (NEPTDTC), Pensacola, FL, for assistance with a challenging training requirement. At the request of the Naval Reserve Force Master Chief, NRPDC had been directed to determine a method to deliver training to Naval Reservists equivalent to that provided at the Navy's Senior Enlisted Academy (SEA) in Newport, Rhode Island, through the application of emerging distributed learning technology.

Navy Senior Enlisted Academy History and Purpose

To offer greater career opportunities to chief petty officers and enhance retention beyond the 20-year point, Congress established the senior and master chief petty officer ranks in 1958. For the next 20 years, considerable debate occurred regarding exactly what role the SCPO (E-8) and MCPO (E-9) should play and what additional responsibilities they should assume to differentiate them from the CPO rank (E-7). In 1979, the Chief of Naval Operations ended this debate by issuing policy defining an expanded role for E-8's and E-9's. Under this policy, their role would be to perform as mid-level managers, rather than senior technicians. As a result, commands throughout the Navy appointed many senior and master chief petty officers to positions of greater responsibility. While some performed well in their expanded roles, others lacked the education and training needed to carry out their new managerial duties.

To assist senior and master chief petty officers' transition from technicians to positions as middle managers, the Navy founded the Senior Enlisted Academy in September of 1981. The Academy provides instruction in areas outside the range of typical technical training, including communication skills, leadership and management, national security affairs, and an overview of Navy programs, as well as physical fitness. Participants must submit an extensive application package and pass a rigorous screening process prior to acceptance. Instruction is provided in a group facilitated seminar format. The program has been so successful in preparing senior enlisted leaders for positions of greater responsibility that graduation is now mandatory for assignment to an active duty Command Master Chief or Chief of the Boat billet.

A Reserve Training Dilemma

The Senior Enlisted Academy is one of the most prestigious and career enhancing training opportunities available to CPOs. It is nine weeks in length, however, which has effectively excluded reservists from attending. The typical reservist is limited to one drill weekend per month and a single two-week Annual Training (AT) period each year. In the event that a longer training period could be arranged, most reservists are unable to spend nine weeks away from their primary careers. Because of these factors, only a handful of Reserve CPOs have had the opportunity to attend the Senior Enlisted Academy.

Desiring the ability to offer Reserve CPOs training opportunities similar to their active duty counterparts, the NRPDC set out to determine if a way could be found to utilize emerging distributed learning technologies to provide training equivalent to the Navy's Senior Enlisted Academy in a form that a drilling Reservist would be able to successfully complete.

A Challenging Proposition

When representatives from the NRPDC first sat down with NETPDTC personnel in May of 2000, the Reserve identified three key goals for their program. First, they wanted to aggressively utilize web-based distributed learning to create a program offering training equivalent to that offered at the Senior Enlisted Academy, while requiring no more than two weeks of actual resident time to complete. Second, while there was money available, this was definitely *not* a cost-is-no-object environment; total development cost had to be clearly identified in advance and held to under (well under) one million dollars. Finally, they wanted it completed and delivered by October of 2000. NETPDTC instructional designers responded with

stunned silence to this last requirement. A quick glance at the calendar indicated that to meet this goal, we would have just slightly over four months to design, develop, review, test, and deliver from 50 to 100 hours of interactive multimedia instruction (IMI). In our preliminary meeting, we agreed that the first goal was very achievable, the second was reasonable, but the last was an impossibility. We outlined to the NRPDC representatives the ADDIE model of instructional design that NETPDTC applies (Analyze, Design, Develop, Implement, Evaluate), the stages involved in development of interactive multimedia instruction, the time necessary for things like storyboard review and check disk acceptance testing, and proposed what we felt was a reasonable 16 to 18 month timeline for completion of the task. This, unfortunately, was unacceptable, and after extensive (and sometimes heated) discussion, we finally agreed to a nine-month period of performance, commencing the first of June and concluding with delivery of a completed product at the end of February 2001.

To accomplish the project within the extremely aggressive schedule required by the Reserve, we realized that several instructional design steps that should properly be done in series would have to be accomplished in parallel. For instance, we determined that over 60 days could be saved by developing storyboards in two sets (first half, second half), reviewing each, and beginning programming on the IMI for the first half while instructional designers continued working on the second half. Check disk testing would also have to be performed in two halves, with the entire product not completely coming together in its entirety until just prior to the final delivery date.

Even with these scheduling efficiencies, there were undoubtedly still going to be numerous late nights and long weekends for the development team, especially because the Christmas holiday season fell in the later, critical review stages of the project. It was risky, but it was possible, and loving a challenge, we committed to delivering the product the Reserve required in the time agreed to.

THE DEVELOPMENT PROCESS

After reaching agreement to proceed, the next step was to thoroughly analyze the curriculum and course requirements, determine the technological approach to apply, and translate it all into a Statement Of Work (SOW) so that the project could be placed for bid under our existing multi-award instructional products and services contract.

Analysis

The NRPDC had already done an excellent job of reviewing the existing Senior Enlisted Academy curricula, and had identified seven weeks of instruction from the nine week curriculum that they felt could be taught via distributed learning. The remaining topics were aggregated into a two-week "capstone" course to be taught in conjunction with an Annual Training period at the NRPDC, and would consist of those topics and requirements that could not effectively be performed via DL. This included such topics as public speaking, which requires students to prepare and deliver several oral presentations, and presentations by guest lecturers.

As NETPDTC instructional designers worked through the lessons with the NRPDC representatives, certain critical design considerations became evident. First, it was clear that many of the lessons were delivered in a seminar format, supported by extensive student discussion, feedback and interaction. NETPDTC instructional designers therefore attempted to determine appropriate opportunities to inject similar student interaction in the DL version.

To maintain a learning environment as close as possible to that at the actual Academy, NRPDC desired that course facilitators be actively employed in the DL component to guide and assist the students' efforts. As analysis progressed, it became evident that these facilitators would become key to achieving many of our course functional objectives, acting as "enablers" allowing us to incorporate a wide range of collaboration activities and written exercises, as well as fulfilling a necessary student monitoring and control role.

Next, NRPDC had determined that to offer equivalent instruction, an instructional environment as similar as possible to that at the Senior Enlisted Academy had to be maintained. The SEA enrolls students in classes of 60, divided into three groups of 20, (blue, gold, and khaki), each lead by an instructor/facilitator. The representatives from NRPDC had determined that they desired to maintain this structure, and the course had to be designed to support a maximum class size of 60 students, evenly divided into separate groups of 20 each, (blue, gold and green were used in the SEA NRC due to difficulties in differentiating between gold and khaki on a computer monitor), and supported by a facilitator. Thus, actively facilitated, collaborative instruction became the goal the designers would strive for.

Design

The design effort for this project was conducted in two phases. The overall program capabilities and functionality first had to be developed by NETPDTC designers in order to complete the SOW. The resulting document went into considerable detail on the specific design and functional goals of the completed product, with the technical details for implementation to be left to the contractors.

There were two design considerations of primary importance. First, it was NRPDC's intent that most students would access the course from home on their personal computers. We pointed out that accomplishing from 50 to 100 hours of instruction online could be burdensome to the students' families, because they could lose the use of their telephone while the student was accessing the course. We felt this was unacceptable for a course of this duration, and we proposed that the DL portion of the course be developed as a hybrid product providing most lesson content on a CD-ROM, with only a portion coming via the Internet. In addition to minimizing phone line usage, this would give us the advantage of being able to deliver richer media content than would have been acceptable for a Web-based course intended for delivery via the limited bandwidth of a dial-up connection. Because this would mean that the student would have to transition between stand-alone IMI and Web-based training, NETPDTC designers determined that *all* courseware should be delivered via a browser to maintain a consistent look and feel between both courseware components. Moving between the two components would be handled by simply establishing an Internet connection.

The second primary consideration involved the incorporation of collaborative activities into the courseware. Wherever possible, we wanted the students to be involved with each other. Our goal was to ensure enough interaction between students so that when they ultimately reported for their two-week resident training course, they would be familiar with each other and not be 60 strangers. Because the students were reservists, and only able to devote time to this course at irregular intervals, we determined that it would be extremely unlikely that any form of synchronous activity would be effective. Any group or collaborative efforts would have to be designed to be performed asynchronously, and therefore could not involve chat or other real-time interactions. The specifics of how collaboration could be incorporated were left to the contractor to determine.

In addition to these primary considerations, there were a host of secondary issues to be addressed. Extensive thought was given to the issue of monitoring and controlling student progress through the course. With seven weeks of instruction covered over a five-month period, there was considerable potential for students to get widely "spread out" through the course, which would add to the facilitators' challenge and possibly negate the value of the collaboration features we foresaw. The NRPDC wished to conclude each topic of instruction with a brief online quiz, and NETPDTC made a suggestion to utilize this quiz to control student progress. In the model we proposed, topic completion would be indicated by a student logging onto the central course web site and successfully completing an end-of-topic quiz, access to which would be controlled by the facilitator.

In the resulting course model, we agreed that all course content, both on the CD and the web, would be accessible and open to support exploratory learning, but that the facilitators would unlock the concluding quizzes in a specific sequence and at specified intervals, controlling when the students could actually complete each lesson. This would ensure that students maintained a consistent overall progress rate.

Because students would primarily be accessing the course from their home computers, we stated that both Internet Explorer (4.01 and higher) and Netscape Communicator (4.06 and higher) should be supported, including the version of Internet Explorer provided with America Online™. To ensure that all student-prepared written assignments would be easily accessible by course facilitators, it was determined that a single word processing format should be adopted, and the SOW included a requirement that the contractor determine a way to provide students who did not possess Microsoft Word with a compatible word processing program that would produce Word compatible files, but would not require them to purchase an additional piece of software.

Finally, to maximize the effective lifetime of the course and reduce the lifecycle management requirements, we identified those course items subject to frequent change and specified that these should be contained in the Web-based course component where they would be more easily updateable, rather than on the CD. We additionally required the adoption of an underlying data structure and courseware design that would be easily expandable, in the event that after implementation, demand for the course exceeded its design capacity of 60 students.

Once all course design considerations and requirements were outlined in a SOW, the contracting officer issued a Request for Quotation to our prime contractors. The second phase of courseware design was conducted by the winning contractor, and consisted of translating the NRPDC/NETPDTC developed capabilities list and functional requirements into a technical specification. In accordance with the guidance provided in MIL-PRF 29612A, and as required in the SOW, the first contractor deliverable was an Instructional Media Design Package (IMDP) consisting of a Course Design Document (CDD) and Prototype Lesson.

Course Design Document

The CDD, in approximately 100 pages, outlined the contractor's procedures and strategies for course design. This included intended levels of interactivity for all lessons, interface design and controls, test design strategies, performance tracking control features, and a description of the programming tools and database technology to be employed in development. Among the specific technical solutions proposed by the contractor was the use of Toolbook II Instructor authoring software for development of both the CD based and Web-based instruction, delivered through a browser using the Neuron plug-in. This package was selected due to its ability to provide an identical interface for both CD and Web-based courseware, and the capability to integrate streaming media, audio, video, Flash animations, Microsoft Word documents, and Microsoft PowerPoint presentations. The specific tools proposed by the contractor are outlined in Table 1.

The contractor met the requirement to provide students who did not possess a copy of Microsoft Word with a means of saving their files in a Word .doc format by contacting and obtaining permission from Sun Microsystems to distribute a copy of Star Office with the course CD. Star Office is a freeware office productivity software suite that is capable of opening and saving Word, PowerPoint, and Excel files in their native format.

Collaboration Features

As part of the course design, the contractor provided ideas on how to incorporate asynchronous collaborative activities into the instruction. The primary mechanism to support student interaction would be through the use of threaded discussions. Each lesson concludes with several recommended discussions topics, which students debate and discuss online. The facilitators are responsible for ensuring each student participates at a minimum required level. An additional feature of the product the contractor selected to support threaded discussions (Netbula Anyboard) is the ability to conduct polls or votes. Facilitators have the ability to post controversial or thought provoking statements or issues, and solicit student feedback through polling or voting, with associated discussion.

Next, the contractor identified an opportunity for collaboration in the course's numerous written exercises. Many lessons include writing assignments that students must complete and submit to their facilitators for grading. The contractor suggested that these exercises be submitted for peer review prior to submission to the facilitator. Each student submits their completed exercises to two (or more) other students for preliminary review and correction prior to final submission to the facilitator.

To specifically support the requirement to become familiar with their fellow students, a class roster accessible by all students was created where students can post a photograph, e-mail address, and personal biography. And recognizing that the most effective socialization often occurs outside the classroom, the course includes a "virtual student center." Called the Chief's Mess, this area of the course is used for discussions and postings not specifically related to course content. The idea was to give the students a place to tell "sea stories" or compare careers, without cluttering up a lesson-related threaded discussion.

Component	Product
CD-ROM based and Web based Interactive Multimedia Instruction	Click2Learn Toolbook II Instructor 7.2 delivered using the Neuron plug-in.
Multimedia Elements	Macromedia Flash
Server-side Database	Microsoft SQL Server 7.0
Server side scripting language for generation of active content	Javasoft JRun Professional 3.0
Collaboration Forums	Netbula LLC Anyboard
Quiz generation and delivery	Learningware Quiz Factory 2
Microsoft Word compatible Word Processor (for students not possessing a copy of Word)	Sun Microsystems Star Office

Table 1. Senior Enlisted Academy Courseware Development Tools

Prototype Lesson

In addition to the Course Design Document, the contractor also delivered a Prototype Lesson. This consisted of a representative sample of course content, delivered on CD, demonstrating all proposed course templates and including examples of the types of media to be included in the course.

Development

Upon acceptance of the completed IMDP, storyboard development for both the IMI and Web based training components began in earnest. Due to the considerable time and effort that was applied during the design phase, both in the government's requirements definition effort and the corresponding technical and instructional approach developed by the contractor, actual product development proceeded very smoothly. Due primarily to the fact that we were working from an existing, stable curriculum, few problems were encountered related to our dividing the Storyboard and Instructional Media Package (IMP) development stages into two halves.

As proposed, IMP programming commenced immediately following review of the first half storyboards, and continued simultaneously with the development of the second half of the storyboards. First half IMP programming concluded at about the time second half storyboards were delivered, and following their review, the remainder of the programming was completed. This allowed for a very efficient use of development staff, with virtually no down time between development phases or while awaiting review comments.

We firmly believe that this process would have been considerably less successful if the Senior Enlisted Academy curriculum from which we were working had not been so thoroughly validated by years of use and maintenance by a committed instructional staff, and we would be very reluctant to recommend this compression of the ISD process in situations where the curriculum is not completely up-to-date. In short, this was an exceptionally well-maintained course, which resulted in few surprises during the development process. The only specific problems encountered involved an inability to verify that necessary copyright clearances and permissions had been obtained for several referenced magazine and newspaper articles, and these were removed from the course.

One design change that occurred during the development effort came during the review of the first-half IMP checkdisk. While actually interacting with the proposed instruction as a student would, it became obvious that a computer novice could become confused in navigating through the numerous course features. Instruction, testing, collaboration tools, help features, etc., were all accessed through various menu buttons, which required the student to develop and maintain a mental model of the courseware and its fundamental design. During the review session, NETPDTC designers suggested that considerable confusion could be avoided through development of a "virtual campus," in which different course features were represented by buildings the student could move between. The contractors took this for action, and prior to the delivery of the second-half IMP checkdisk, delivered a concept for a "virtual campus" developed in Macromedia Flash (see Figure 1). Using this as the primary course interface, students can intuitively move between the various course functions by selecting the appropriate building.

Review of the final IMP was concluded in early February 2001, and the contractor proceeded to install the necessary course administration software on the NRPDC server.

Implementation

Software installation and testing on the NRPDC server was completed in mid-February, representing the first time all course components were integrated into a total package. Prior to this time, the CD based IMI, Web-based training, and course administration software were all developed and reviewed as separate entities. The NRPDC staff designated to support the SEA NRC then commenced a two-week series of course dry-runs to exercise all course functions and content. Several minor server-side programming deficiencies were identified and fixed, and the contract included provision for a week of on-site contractor support during this period specifically to deal with this eventuality.

The one significant issue discovered during this time related to the differences in the way the various versions of Windows (Windows 95, 98, and NT) interacted with the student courseware installation routines. The contractor developed a custom installation routine using the commercial product InstallShield, incorporating a system scan function to analyze a student's computer, identify its software configuration (browser version, plug-ins, etc.) and assist in the installation of necessary plug-ins and software needed to run the course. Although the contractor had performed installation testing on each of the operating systems identified in the SOW, problems requiring extensive user intervention developed on some systems during deployment. NETPDTC spent considerable time working with the contractor in our

Figure 1. Senior Enlisted Academy Virtual Campus

testing and acceptance lab (containing computers running "clean" copies of each major Windows version) to identify and eliminate the offending routines. Some problems were never fully eliminated on *some* systems running Windows 2000, but this operating system was released during development of this product, and support for this Windows version was not a requirement in the SOW. For the present time, the limited class size and relative newness of Windows 2000 makes this issue manageable. It is important to emphasize, however, that there are subtle differences in the behavior of the various versions of Windows that makes it essential to perform acceptance testing on all versions.

Following the conclusion of installation and integration testing, students were enrolled in the pilot class. NRPDC decided to limit the size of the initial class to 37 students, as course facilitators were still learning course behaviors and function. Of the 37 students who enrolled in the pilot class, 34 completed the DL component. One dropped out due to technical problems related to their hardware and browser configuration that could not be overcome. One left due to the fact that he attempted to start the course at the same time he accepted a new job, moved to a different state, and bought a new house, which resulted in overwhelming demands on his time. One left due to medical complications requiring a lengthy hospital stay. Of the 34 that completed the DL component, one decided not to attend the resident training portion, claiming other command priorities that took precedence. Of the 33 that classed up, 31 graduated on Saturday, August 18th, 2001. The two who failed to graduate passed all academic requirements, but failed to accomplish the minimum passing rating on the final personal fitness assessment. These two students will be mailed their graduation certificates when their parent commands certify that they have satisfactorily completed their PFA. NETPDTC representatives were present to observe this class and debrief the students on their perceptions and suggestions for a Phase II effort.

Evaluation

There are two issues that contributed significantly to the success of this project and enabled us to meet the extremely aggressive development schedule. First, the NRPDC detailed a single individual (a master chief

who was a Senior Enlisted Academy alumni) to ramrod this effort, and invested in him the necessary decision making authority to speak conclusively for the Naval Reserve. Without the efforts of a dedicated, knowledgeable individual championing the project at every step and empowered to make decisions, it is doubtful that the project would have been completed within the required time period. Second, all necessary Government Furnished Materials (GFM) required by the contractor, including copies of the existing SEA curriculum and all reference texts, were assembled in advance by the master chief and provided at project inception. Any delay in obtaining relevant GFM would have significantly impacted the delivery date.

It is important to note that due to the large amount of copyrighted material referenced in the course, at least 50% of the efforts of one instructional designer were devoted to identifying and contacting copyright holders and obtaining necessary copyright releases. It cannot be overemphasized how important an issue this is, or how time consuming it can be, to ensure the government is protected from liability by obtaining the rights to use any material not developed by or owned by the government.

Lessons Learned

Some significant lessons were learned during the conduct of the SEA NRC pilot class, which NETPDTC will consider in the design of future DL products:

Facilitated, collaborative distributed learning can be highly effective for education in the cognitive domain. This is evidenced by the high completion rate for this course compared to that achieved by the more common self paced individualized web-based training. Not a single student was dropped for academic reasons, and there was a high overall satisfaction rate among the students.

Properly planned asynchronous collaborative activities can be highly successful in achieving group familiarity and cohesion. Much emphasis has been placed on synchronous collaboration (live chat, white boarding, etc.) but SEA NRC demonstrates that highly successful collaboration can occur asynchronously, with a significantly lower level of technical complexity.

For DL courses designed for a Reserve student population, an expected progress rate of approximately one week of instruction per month of class is probably optimal. The SEA NRC pilot class was able to maintain a progress rate approximately 40% higher, but this was a hand-picked group of highly motivated volunteers, who still found the pace very challenging.

For DL courses designed for a Reserve student population, courses of more than a short duration (exceeding one week, for example) intended to be taken from home (rather than at a Reserve Center) should probably be designed as a hybrid IMI/WBT product whenever feasible (as SEA NRC was) to reduce the time the student's home phone line is tied up and unavailable for family use.

For the Reserve student population, parent commands of students enrolled in DL courses should be made aware of the impact on training that occurs when students are assigned concurrent duties.

CONCLUSION

The SEA NRC pilot class has now successfully concluded, and was an overwhelming success. Attendees for Class 01 have been accepted, and will commence the DL component of instruction on 15 October, 2001. Class 01 will utilize the same courseware package as the pilot class, as no significant deficiencies requiring immediate correction were identified. This is particularly gratifying in light of the extremely rapid development period (just slightly over 8 months) for this project. NETPDTC is currently at work on a list of "tweaks and adjustments" to the course, primarily to enhance certain data management features of the program. These improvements will be completed in time for the SEA NRC 02 course, which will commence their DL component in April 2002.

The exciting thing about this project is not that students are being trained via Distributed Learning, for the ability to deliver instruction via IMI and/or Web-based training has been amply demonstrated prior to now. This course does not replace, supplement, or reduce the cost of an already existing training program. What has been truly exciting about this particular project is that NRPDC and NETPDTC, through the application of distributed learning technologies, have enabled students to receive training that would not have been otherwise possible. The technologies and techniques applied to this project enabled the delivery of training in a form that overcame the inherent limitations of the two-week Annual Training period. This facilitated IMI/WBT hybrid course could potentially become a model for delivery of other professional or technical training, extending the range of educational opportunities for both reservists and active duty personnel.