DEVELOPMENT OF A LEARNING CONTINUUM FOR THE NAVY LEARNING NETWORK (NLN)

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ABSTRACT

One of the benefits of Online Learning Networks is the capability to define and administer a continuum of learning that is tailored to each individual learner based on job task skill and knowledge requirements. This structure provides a method of linking learners to required organizational training and education requirements that will be key to any Return on Investment (ROI) strategy. This paper covers the steps that were followed to derive an initial curriculum continuum structure for the Navy Learning Network (NLN) supporting a potential audience of 1.2 million people. The lessons learned are addressed as well as long term vision and strategies to create individually tailor learning continua. The NLN implementation includes the structure for mapping a curriculum continuum to each learners career path. This structure allows individual learners a method for adding their own personal training and education goals. The short-term continuum structure is a starting point that has defined curricula mapped to a specific pay grade and job series. The initial structure for the NLN accounts for individual and group relationships of one-to-one and one-to-many curricula. College degree programs related to specific job requirements can be integrated into the short-term continuum. NLN design also provides for the addition of leader development and professional education. This comprehensive NLN vision builds a direct relationship to the organization long-term health and stability as well as to specific job skill development. As each variable is added to NLN, the level of complexity grows. Recommendations and strategies are presented to assist those who want to implement a similar approach.

AUTHORS BIOGRAPHIES

Conrad Bills is the Instructional Design Lead for the Navy Advanced Distributed Learning (NADL) Program, now Navy Learning Network (NLN). He is also Training Program Manager for the F-16 Mission Training Center (MTC) program. He serves multiple training system activities in Instructional System Development (ISD) for Lockheed Martin, Akron, Ohio, covering all phases of the ISD process. He joined Loral, now Lockheed Martin, in 1993 upon his retirement from the U.S. Air Force. Before his retirement, he directed the project that updated the Air Force ISD process. He holds a doctorate from Kent State University. Dr. Bills has over 25 years of experience in scientific management, applied psychology, and instructional system development. He is a member of the International Society for Performance Improvement and the Air Force Association.

Linda Brent has over 15 years of extensive experience designing, developing, implementing, and managing training and simulation systems. She has published research articles in the field and has made numerous presentations at international, national and state level conferences and association meetings. Having received her doctorate at the University of Rochester in the area of curriculum and instruction, she has managed multiple large scale training development programs. She joined Lockheed Martin over seven years ago, and in prior years served as a faculty member at several major universities, teaching, and conducting research in training effectiveness. Currently, she is the Manager of Advanced Programs, and directs multiple government programs and contracts. She is also a member of the Executive Committee of the National Training Systems Association, and numerous other professional and civic organizations.

Barbara Stankowski has over twenty years of experience in planning and managing large multi-faceted technical programs including extensive experience program management, strategic planning, assessment of overarching requirements and developing funding strategies. She holds an advanced degree in Computer Science from the Naval Postgraduate School and is an expert facilitator / trainer. Ms. Stankowski acted as the government program manager and direct liaison with the Chief of Naval Operations for two special programs. First, the development of

the training strategy, curriculum and implementation of the DoN Total Quality Leadership program; and secondly, the development of the Navy Leadership Continuum including the training concept; curriculum structure, content, and development of eight tiered Leadership Continuum courses. Currently, as a principal consultant with Alpha Solutions Corporation she is a member of the Chief of Naval Education and Training program management team for the implementation of the Navy Learning Network, a major distributed learning initiative, and continues teaching in a number of Executive Leader Development programs.

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INTRODUCTION

The Navy Distributed Learning Planning Strategy outlines a strategy for implementing a Navy-wide Distributed Learning (DL) System. It presents requirements, issues, and a phased approach for transitioning from the current "in-residence" focused education and training environment to a global DL system designed to deliver training, education, and information "on-demand" as a continuum to support the Naval operational readiness (Available at: https://tngopspns.external.lmco.com/nadl/info.html).

The draft Operational Requirements Document (ORD) for Navy-Wide Distributed Learning, (10 May 1999), discusses the impact of changes in Navy mission and operations, as well as advances in weapon systems technology which are significantly increasing the performance demands on Navy personnel. The current Navy education and training system does not provide the flexibility to keep pace with rapid advances in technology, or the accessibility needed to meet the dynamic mission requirements of network-centric information warfare. To support the evolving reality, Navy training and education must change to ensure Navy professionals keep pace with emerging technologies, and are prepared to successfully meet critical network-centric information warfare mission requirements.

Today student load frequently exceeds formal schoolhouse quota capacity resulting in large numbers of students Awaiting Training (AT). Initial skills resident training pipelines are increasingly long with growing student populations Not Under Instruction (NUI) for a variety of reasons (awaiting transfer, medical, legal, etc). Each delay in the student pipeline decreases manning in the operating forces. To overcome current limitations the Chief of Naval Education and Training initiated the development of the Navy Learning Network (NLN). The goal of the NLN is to provide increased access to the highest quality education and training, tailored to individual needs, delivered cost effectively, anywhere and anytime.

One of the benefits of an online learning network, like the NLN under development by the Navy, is the capability to define and administer a continuum of learning that is tailored to each individual learner based on job task skill and knowledge requirements. This structure provides a method of linking learners to required organizational training and education requirements that will be key to any return-on-investment (ROI) strategy. This paper covers the steps that were followed to derive an initial curriculum continuum structure for the NLN. NLN is designed to support a potential audience of 1.2 million Department of the Navy (DON) personnel. The NLN is consistent with the DoD s vision and goals for Advanced Distributed Learning (ADL).

DoD Advanced Distributed Learning Vision

The Department of Defense (DoD) Strategic Plan for Advanced Distributed Learning (30 April 1999) delineates the following DoD vision for ADL.

Training and learning models developed for the 21st century revolve around two new concepts: (1) the learning organization, and (2) advanced delivery systems. A learning organization continuously enhances and expands its collective capabilities to create better results in order to meet mission requirements. It includes several notions:

- Learning is the bridge from information to understanding;
- Learning is most effective when coupled to experience;
- Learning leads to changes in thinking and behavior; and
- Learning requires time for reflection and integration.
- Effective delivery of learning must use new network-based, modular content and modern telecommunications tools, and It must take into account what we have discovered about human learning.

The DoD vision is to ensure that DoD personnel have access to the highest quality education and training that can be tailored to their needs and delivered cost effectively, anytime, anywhere. The goal identified in Joint Vision 2010 and the DoD strategic plan is to be able to train our forces effectively and rapidly, whether they are at home station, at home, en route, or in the theater of operations. The strategic plan notes that providing *anytime-anywhere* instruction is a key to maintaining military readiness in the information age and one of DoD s foremost priorities. To achieve this vision, *anytime-anywhere* learning must be distributed, just-in-time and on-demand, and enabled with resource development and exploitation of learning technologies.

The ADL strategy is to:

- Pursue emerging network-based technologies.
- Facilitate development of common standards.
- Lower development costs.
- Promote widespread collaboration that satisfies common needs.
- Enhance performance with next-generation learning technologies.
- Work with industry to influence commercial off-the-shelf (COTS) product development.

Navy Vision and Implementation

Chief of Naval Education and Training in a memorandum on Navy Distributed Learning Planning Strategy (7 Dec 1998), stated:

> *Navy Training and Education is an investment in readiness. The Navy s Learning Vision to deliver quality education and training to the right people, at the right time, and at the right place is possible with the application of appropriate technologies.*

> *This vision embraces a career long training continuum supporting Navy operational readiness and personal excellence.*

> *In an effort to maintain Navy readiness and continue to meet future operation requirements, it is essential that we exploit all available learning strategies and technologies. We cannot afford to continue business as usual, but must challenge ourselves to take advantage of capabilities technology has to offer and challenge industry to develop technology solutions to support our requirements.*

> *Distributed Learning technologies are critical components of our efforts to re-engineer training and education with the goal of providing more technically competent warriors to the Fleet in less time.*

The learning vision articulated above is possible with the application of appropriate technologies. This vision embraces a career long training continuum supporting Navy operational readiness and personal excellence. The strategy for implementing the vision is shown in Figure 1. Projected Evolution of the Navy Learning Network.
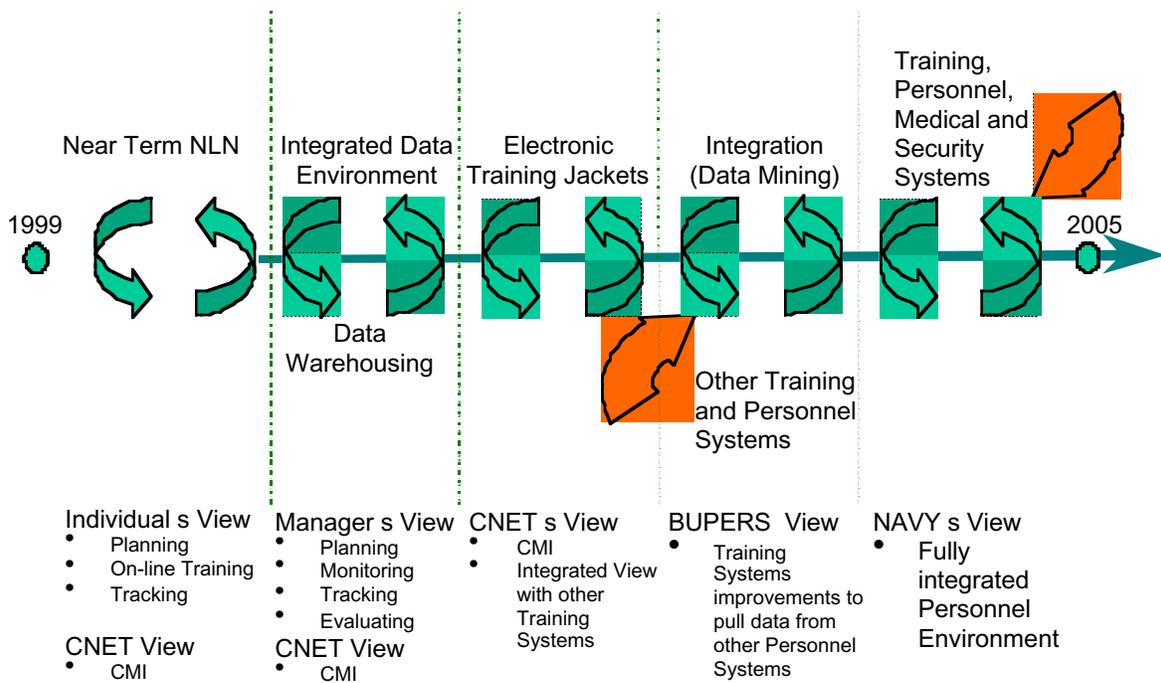
Figure 1. Projected Evolution of the Navy Learning Network

The overall NLN concept includes the following capabilities required by the draft Operation Requirements Document (ORD) for Navy-Wide Distributed Learning (DL) (10 May 1999):

- *Provide learning environments across time and space* —the essence of distributed learning is the ability to bring the education and training resources to the student when and where needed. Through the use of various learning media, instruction must be delivered in a learner-centric, network-based model. The Navy-Wide DL system must exhibit the accessibility, reliability, interoperability, and reusability characteristics necessary to support growth and cost effective operation.

- *Manage the learners and learning to ensure readiness across career continuums* — providing enterprise-wide management of metrics and learning system data. Learning system data includes the learning objects for distributed learning —the building blocks of instruction required to compile the education and training needed for a specific learner at a specific time. The system shall provide the management and security tools necessary to

support a career long education and training philosophy for all active and reserve naval personnel.

- Provide decision support through an Integrated Data Environment (IDE) and decision support tools —decision support is in the broad context of the Navy Enterprise. The Navy-Wide DL system will be fitted within the Navy Enterprise Network and integrated with a variety of other data management and learning systems.

Navy Learning Network (NLN) Initiative

The NLN consists of the initial operational capability (IOC) and the full operational capability (FOC) phases. This phased approach transitions Navy instruction from the current in-residence focused education and training environment to a global, network-centric Distributed Learning (DL) paradigm. Near term NLN capability is a combination of contractor and government provided services to achieve initial operational capability (IOC). The near term NLN capability is the first step toward implementing an advanced distributed learning vision, service-wide. The IOC system is a model and foundation for the long term advanced capability.

This long-term vision is described in the draft Operational Requirements Document (ORD) for the Navy-wide Distributed Learning.

Near term NLN capability includes:

- The development and configuration of a standards based, scaleable open architecture, network centric distributed learning function,

- A repository function which is scalable for future growth and integration into various data storage architectures,

- A life cycle support function to maintain the system, and

- Functions that permit assessment of learning effectiveness, which will contribute to the improvement of the overall readiness of Navy personnel.

The FOC is intended to be an expansion of the IOC. It will build on the IOC architecture and lessons learned through in the initial implementation and operation of the NLN. The IOC architecture is open and leverages existing Navy infrastructure, emerging technologies and industry standards, to provide a design capable of growth to meet the FOC described in the draft ORD for Navy-wide Distributed Learning. The development of the IOC capability and migration to FOC is framed by the Instructional System Development (ISD) process incorporating concepts for career-long learning continua (general and community-specific), human system interfaces, and cognitive learning process.

BACKGROUND

An updated form of the Instructional System Development (ISD) process is used for development of the NLN shown in Figure 2. NLN Instructional System Development (ISD) Process. This iterative process relies on feedback throughout all phases of training system acquisition. The overall mindset is continuous performance improvement (Golas & Bills, 1993).

Instructional design, per se, is a technology for the development of learning experiences and environments that promote the acquisition of specific
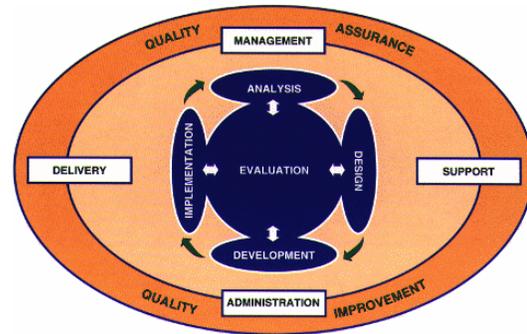
Figure 2. NLN Instructional System Development (ISD) Process

knowledge and skill by the learner (Merrill, Drake, Lacy, Pratt, & ID2 Research Group, 1997). The acquisition of different types of knowledge and skill require different conditions of learning (Gagn , 1985). If an instructional experience or environment does not include the instructional strategies required for the acquisition of the desired knowledge or skill, then learning the desired outcome will not occur. NLN demands instructional strategies that enhance training and education through distributive learning.

The objective of Navy education and training is a continuum of learning across a Sailors career. A new skill is trained in context of the big picture. As much as possible, meaning gained by the Sailor comes in a natural way. Situations are presented to facilitate cue discrimination for goal achievement. Those situations are presented in a broad context so that skills are more adaptable and become more robust with experience. The application of a total training approach can enhance the retention of skill, improve motivation for continued advancement, and lead to development of expertise.

Return on Investment and NLN Success

The Office of the Deputy Under Secretary of Defense for Readiness and Training reported benefits of ADL. Summary of ADL study results indicated that the use of ADL technology-based instruction reduces cost of instruction by 30 60%; reduces time of instruction by 20 40%; increases effectiveness of instruction by 30%; increases student knowledge and performance by 10 30%; and improves organization efficiency and productivity. ADL also improves costs and efficiencies by distributing instructional components inexpensively to physically remote locations and simulating expensive devices for both operator and maintenance training. (See ADL Net, available at: http://www.adlnet.org/).

Success of the NLN initiative will be based on the evaluation framework outlined in the NLN Evaluation Plan which is based on five levels for evaluating training programs to explicitly compute

ROI (Kirkpatrick, 1998; Phillips, 1997). The five levels are:

- Level 1 (Reaction) measures the satisfaction of those who participate in the education or training program.

- Level 2 (Learning) measures the extent to which participants attending the education or training program improve knowledge, increase skill, and/or change attitudes.

- Level 3 (Behavior) measures the extent to which change in behavior has occurred because the participant attended the education or training program.

- Level 4 (Results) evaluates the results that occurred because the participant attended the education or training program.

- Level 5 (ROI) compares the monetary value of the results with the costs for the program.

The evaluation questions address the goals of the NLN and include:

Was instruction delivered to the right people, at the right time, and at the right place?

1. Was instruction part of career-long education and training continuum?

2. How effective was management of learners and learning to ensure readiness across career continua?

3. Was decision support, through data warehousing and decision tools, adequate?

4. Were existing architecture facilities leveraged adequately?

5. Was preparation adequate to take advantage of the emerging infrastructure and facilities that will be available in the future?

6. How well were the standards for ADL incorporated into the NADL program?

7. Was cost sharing achieved?

8. Was an adequate ROI achieved?

EXISTING CURRICULUM

The Chief of Naval Education and Training (CNET) NLN initiative is the outgrowth of several earlier efforts to gain an understanding of how to provide distributed learning Navy-wide. The first such effort made approximately 350 information technology (IT) courses available to Department of Navy personnel. The downloadable courses where hosted and available through four servers and provided minimal user support and tracking capability. This DL architecture did not address the full NLN system requirement of ensuring future interoperability in electronic learning environments. The initiative did provide valuable information for the design of the NLN. Over 35,000 registered users have accessed the Information Technology courses to date.

A second ongoing initiative has been the CNET Video Teletraining (VTT) network. VTT delivers multiple classes at multiple locations via a live instructor. Partnerships have been established with four universities (Old Dominion, Georgia State, Troy State, and St. Francis) to deliver educational opportunities to deployed sailors through the VTT network.

The definition of the NLN has expanded to embrace both web-based learning and VTT. Curriculum delivered to the Navy workforce over the NLN must be tied to Navy training and education requirements if ROI projections for distributed learning are to be realized.

CAREER LONG TRAINING CONTINUUM

The NLN embraces a career long training continuum concept to support Navy operational readiness and personal progression to excellence. The challenge is to create individually tailored learning continua that can be mapped to required job performance knowledge and skills. The NLN implementation includes a structure for mapping defined groups to corresponding curriculums using Pathlore s Online Learning System (OLS) (formerly known as PHOENIX NetWorks/Web') computer-managed instruction (CMI). This capability sets in place the structure for building a curriculum continuum corresponding to each learners career path. The structure also includes the ability for individual learners to incorporate their own training and education goals within their continuum.

The short-term continuum structure is a starting point that has defined curricula mapped to a specific pay grade and job series. The initial structure for the NLN accounts for individual and group relationships of one-to-one and one-to-many curricula. College degree programs related to specific job requirements can be integrated into the short-term continuum. The design is to add leader development and professional education to the continuum. Professional education builds a direct relationship to the organization long-term health and stability, but does not necessarily equate directly to specific job skill development.

As each variable is added to the continuum, level of complexity grows. Management of this growth in complexity required a structure supported by CMI. CMI makes possible the mapping of people into groups and then assigning curriculums to the groups, one-to-many or many-to-one. NLN uses Pathore s Online Learning System (OLS) for CMI and distributed learning.

ONLINE LEARNING SYSTEM¤

Pathlore s Online Learning System¤ provides CMI that lets instructors and administrators control student learning paths. Online Learning System¤ also supports advanced features like mastery enforcement, course/topic order enforcement, pre-and post-tests, and question randomization. Online Learning System¤ can record and store start dates, student responses, and scores, helping administrators document, evaluate, and cost-justify training efforts.

Online Learning System¤ provides 32-bit support for Windows 95/98 and Windows NT desktops. The Online Learning System¤ training platform is truly open with support of new media types, third-party courseware, and a foundation for future learning objects standards such as Sharable Courseware Object Model (SCORM). The SCORM purpose is described below.

> *SCORM. Developed under the auspices of DoD's ADL Initiative, the Sharable Courseware Object Reference Model (SCORM) provides the foundation for how the Department of Defense, and others, will use learning and communications technologies to build, and operate in, the learning environment of the future.*
>
> *ADL SCORM is a set of technical specifications that apply to learning content and learning management systems. The purpose of SCORM is to enable sharable, durable, and reusable learning content. Version 1.0 of the SCORM specification was released in January 2000.*

Online Learning System¤ provides full ActiveX support for incorporating the latest controls and streaming media types; and supports ODBC databases such as SQL Server, Oracle, Sybase, and Access. Online Learning System¤ supports embedded HTML, PowerPoint¤, and other common file format courses; supports virtual classroom software for instructor-led and self-paced courses; provides TCP/IP support for intranet and Internet delivery; and provides open access to the Training Management system to support non-Online Learning System¤ courseware management. The Online Learning System¤ product line is Aviation Industry CBT Committee (AICC) certified and supports all of the requirements for near-term NLN. Supported requirements include student tracing, storage of performance data, development and maintenance of individual learning plans, configuration management

of courseware, and access to instructional materials by third party vendors, such as NETg.

Online Learning System¤ delivers enterprise-strength reliability, and it's compatible with the Navy s information technology (IT) infrastructure. With Online Learning System¤ 32-bit version, Pathlore continues its commitment to provide a robust platform for delivering online training to the enterprise, in an integrated environment that supports authoring, administration, and courseware delivery.

Online Learning System¤ builds on the intrinsic value of a database-driven approach to content management and assembly. The components of this approach to training are the NLN Server, Administrator, and Desktop.

NLN SERVER

The NLN Server stores student scores centrally for easy access, assigns training plans, depending on student proficiency from novice to expert, and manages and dynamically assembles course elements media, controls, templates to suit student needs. The server streams courses to student desktops without monopolizing network bandwidth.

NLN ADMINISTRATOR

NLN Administrator registers users interactively or in batch mode. During self-registration, NLN gives control needed to ensure security. From administrator, curriculums and CMI properties can be tailored to the needs of each user. Courses can be added, removed, ordered, and modified. From administrator, user statistics can be managed through reports and statistics to evaluate training effectiveness. Custom reports can be created using any standard SQL report writer, such as Crystal Reports or Microsoft Access. Administrator provides
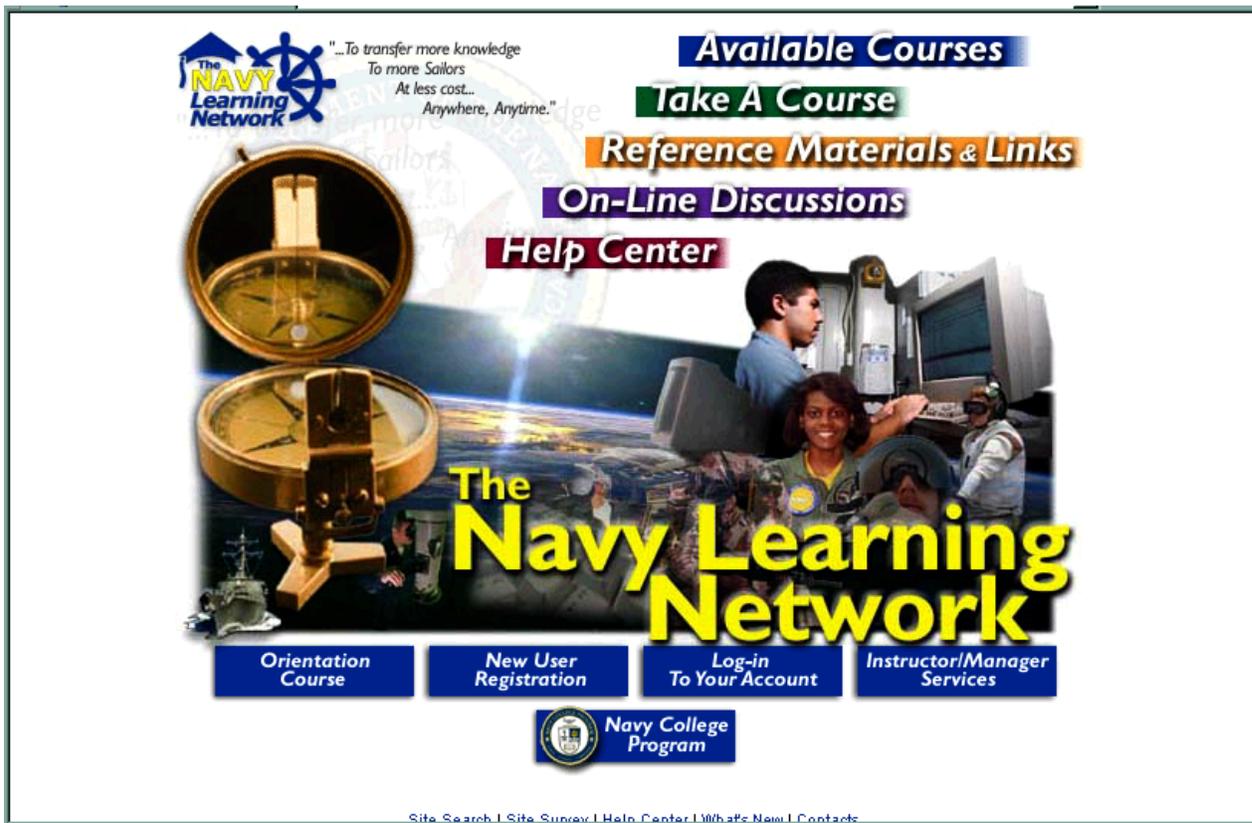
Figure 3 Navy Learning Network (NLN) Home Page

access to data such as scores, status, averages, and responses.

NLN DESKTOP

The NLN Desktop gives students the option of self-paced learning by making courses and curriculums available as needs arise and time allows. Students see only the curriculums assigned to them. Students can request additions to their assigned curriculums to meet personal learning goals. From the desktop, students are offered immediate feedback about performance to reinforce learning. Students have the opportunity to practice skills and review concepts as needed to ensure mastery.

NAVY LEARNING NETWORK

The NLN strategy is to provide a single, integrated portal on the World Wide Web for access to all Navy education, training and information. The NLN will support 1.2 million Department of the Navy users, Navy and Marine, active duty and reserve, officer, enlisted and civilian.

Existing Web Sites

The NLN provides a web-based education and training system. The Web site is located at http://www.navylearning.navy.mil. Its home page is shown in Figure 3   Navy Learning Network (NLN) Home Page.

Mapping NLN Users to Career Learning Continuums

The implementation of the training and education continuum concept required resolution of the following issues. First, the USERID needed to be one that never changes. Second, the different level of user types needed to be mapped into NLN. Third, the student group hierarchy needed to be established. Fourth, the curriculum nomenclature needed to be identified and then set into a curriculum hierarchy. Fifth, the curriculum nomenclature should agree with SCORM standards.

Issue 1: USERID. The USERID in NLN should be one that never changes for an individual. NLN uses the DoD Defense Enrollment Eligibility Reporting System (DEERS) database for authentication of valid

users. For DEERS authorization, the user was first required to enter his/her social security number (SSN), date-of-birth (DOB) and last name. Then it was proposed that the USERID consist of SSN/DOB/DON/___ [first 3 characters of the last name]. These two approaches did not conform to never changes rule. The DON and last name could change. Therefore, the USERID was shorted to SSN/DOB. The SSN + DOB are the unique identifier. Using this strategy, a user s data will follow them throughout their life in the NLN.

Issue 2: User Types. CNET assessed the expected NLN user community and identified the sets of user types. These NLN user types were mapped to the NLN Administration functions of Administrator, Instructor, and Student. All users are identified in the system as students. User types are mapped in NLN as follows:

Training and Education Administrators

System Administrator — NLN Administrator

Course/Student Continuum Administrator — NLN Instructor

IT Maintainer — Not an NLN user

Instructor/Professor — NLN Instructor

Student Management

Training Manager — NLN Instructor

Functional Manager — NLN Instructor

Students Operational/Immediate Supervisor — NLN Instructor

Learners/Students

DON Students — NLN Student

Other Students — NLN Student

Issue 3: Groups Hierarchy. The groups hierarchy is to provide a systematic way of ordering the Navy into logical curriculum management subsets. The grouping of Navy personnel into a groups hierarchy determined as a high priority because it put in place that structure that will allow for long-term growth and maintenance. Groups were confirmed by using data that was pulled from the Navy Training Management and Planning System (NTMPS). When personnel self-register on NLN, they are authenticated through DEERS and then they are matched with their descriptive information from NTMPS. Through this identification process, personnel are mapped to the groups to which they belong. Based on this structure, a curriculum (a defined set of course(s)) can be mapped to a group defined by Navy requirements.

According to the NLN Administrator Guide, a group consists of users who share a common job responsibility or training need. The mapping of curriculum to a group determines which curriculums are accessible to a user. Organizing groups into the hierarchy serves the purposes of managing curriculum/courseware assignments as well as establishing instructor-level administration.

NLN hierarchy groups are designed to organize personnel by two types. The first type is for administration from the All Navy level.

Groups of Type #1 can be set up according to:

Branch of Service

Classification (Enlisted/Officer/other)

Pay Grade/Pay Plan

Rate/Designator/Series/Specialty/Sub-specialty/Navy Enlisted Classification (NEC)

The second group is for administration from the local unit level.

Groups of Type #2 can be set up according to:

Branch of Service

Unit Identification Code (UIC)

Pay Grade/Pay Plan

What this means for NLN is that administration of students can be handled at a service level as well as at the UIC level as shown in Table 1. Navy Learning Network Personnel Group Assignments by Type. A student will be a member of at least two groups, a group of Type #1 and a group of Type #2.

When students have multiple NEC s or sub-specialties, they can be assigned to as many of the groups of Type #1 that apply. The assignments can continue throughout the student s career.

Local Unit Administration. Local instructors can be assigned to manage the unit s student population. The designated NLN Administrator makes local instructor assignments. The NLN Administrator must assign the unit instructor to the NLN Instructor type under the right UIC.

Table 1. Navy Learning Network Personnel Group Assignments by Type

Personnel Information	Group Assignment
Type #1 (All Navy)	
NAVY	Branch of Service
NAVY/ENLISTED	Branch of Service/ Enlisted
NAVY/ENLISTED/E7	Branch of Service/ Enlisted/ Pay Grade
Type #2 (Local Unit)	
NAVY/32274	UIC
NAVY/32274/E7	UIC/Pay Grade

Database Hierarchy. The NLN database has the group hierarchy shown in Figure 4 Navy Learning Network Database Hierarchy for Student Groups.   This hierarchy is designed for long term implementation to handle organization of the projected 1.2 million users. Greater granularity can be added as required as NLN grows to maturity.

Issue 4: Curriculum Nomenclature. Establishing the curriculum nomenclature will provide for the organization of any type of course hosted on NLN for listing in the syllabus and for meeting the SCORM standard (Available at: http://www.adlnet.org/).

Minimum courseware nomenclature will be available for IOC, but the design will provide for expansion as additional structure is added. There needs to be a standard format for future input so that new courses will have the information that can drop into the NLN structure. Actions to be taken include the following:

- Determine the nomenclature within SCORM guidelines, i.e., Course Structure Format (CSF), Run Time Environment (often inaccurately referred to simply as the API -- it's really the API and the data model, each of which are distinct), and meta-data. Note: SCORM is a reference model, and will continue to updated to reflect the best thinking of all of the good work ongoing within AICC, Instructional Management System (IMS) Project, Institute of Electronic and Electrical Engineers (IEEE) and many other organizations and vendors.

- Define NLN CSF, i.e., sequence of "units," and identify sub-elements, i.e., reference/ guidance documents, prerequisites, and completion requirements. The CSF is an XML representation of course structure intended to represent the "intended behavior" of a course for the purpose of moving a course from one place to another.

- Define meta-data so these "learning objects" are self-described for NLN courses, sharable learning content, and raw media elements. and can provide the means for searching and finding [requires a listing identification system for the catalog and associated classification system].

- Determine RTE in basically two parts: the API -- the way content "connects" to the Learning Management System (LMS), and the data model -- the precise data that goes between the LMS and content. For content to be really sharable, it must be able to be launched and tracked by all SCORM-compliant LMS environments. This means that both the LMS and learning content must use the same API and data model.

Catalog/Syllabus Presentation

NLN has two operational modes. The first is the Open Mode, which is made available to anyone who goes to the NLN Home Page. The Open Mode contains a listing of all the courses hosted on NLN.

The second operation is the Closed Mode, which is only available to personnel who register and are authenticated as valid users. Once authenticated for entry into the Closed Mode, students will only have access to curriculum that has been previously assigned to the group(s) to which they belong. The curriculum catalog is available to students in the Closed Mode. The following is an outline of the student path in the Open Mode and in the Closed Mode of NLN.

1. Open Mode Presentation

   Upon opening the Web page, the person will see:

   - Sufficient information to understand what applies to him/her
     - Services available
     - How to get help
     - How to browse, select, and take a course
   - Catalog of courses offered (Navy & other)
     - Training index/categories mapped to Navy specialties
     - Education opportunities
   - How to select a course
   - Course summary information
     - Information on how to Log IN

2. Closed Mode Presentation

Upon Log IN and entering NLN, the student will see:

- Assigned curriculum
  - All Navy (Microsoft Office)
  - Personnel Group/Pay grade specific
  - Specialty/Rating (specific)
  - Supervisor defined (specific)
  - How to select specific course
  - Detailed syllabus
  - How to begin taking the course.

```
Navy (1)
   |--- Catalog of Navy Courses/Other Approved Courses (All Navy Required/Optional Curriculums)
   |-------- Civilian (1)
   |              |---Curriculum for Civilian Course Requirements
   |           |----Grade
   |           |      |---Curriculum for Course Requirements by Grade
   |           |----Rating
   |           |      |---Curriculum for Course Requirements by Rating
   |           |----Specialty
   |           |      |---Curriculum for Course Requirements by Specialty
   |-------- Enlisted (1)
   |              |---Curriculum for Enlisted Course Requirements
   |           |-----Grade
   |           |      |---Curriculum for Course Requirements by Grade
   |           |-----Rating
   |           |      |---Curriculum for Course Requirements by Rating
   |           |-----Specialty
   |           |      |---Curriculum for Course Requirements by Specialty
   |-------- Officer (1)
   |              |---Curriculum for Officer Course Requirements
   |           |-----Grade
   |           |      |---Curriculum for Course Requirements by Grade
   |           |-----Rating
   |           |      |---Curriculum for Course Requirements by Rating
   |           |-----Specialty
   |           |      |---Curriculum for Course Requirements by Specialty
   |-------- Warrant Officer (1)
   |              |---Curriculum for Warrant Officer Course Requirements
   |           |-----Grade
   |           |      |---Curriculum for Course Requirements by Grade
   |           |-----Rating
   |           |      |---Curriculum for Course Requirements by Rating
   |           |-----Specialty
   |           |      |---Curriculum for Course Requirements by Specialty
   |-------- Limited Duty Officer (1)
   |              |---Curriculum for Warrant Officer Course Requirements
   |           |-----Grade
   |           |      |---Curriculum for Course Requirements by Grade
   |           |-----Rating
   |           |      |---Curriculum for Course Requirements by Rating
   |           |-----Specialty
   |           |      |---Curriculum for Course Requirements by Specialty
   |---------UIC
   |              |---Curriculum for Course Requirements by Unit
   |           |-----UIC 1 (1,2)
   |           |      |---Curriculum for Course Requirements by Unit
   |           |-----UIC 2 (1,2)
   |           |      |---Curriculum for Course Requirements by Unit
   |           |-----UIC n (1,2)
   |-------- NON-DEERS: [For example: Foreign Officer\Other (1); requires special approval]
   |              |---Curriculum for Approved Courses
NON-Navy (1,2):
   |---------DEERS: [For example: Retirees and Dependents (1,2); requires special approval]
   |              |---Curriculum for Approved Courses
   |---------NON-DEERS: [For example: High School Students (1,2)]
   |              |---Curriculum for Approved Courses
```

Figure 4 Navy Learning Network Database Hierarchy for Student Groups

Continuum of Training

The NLN capability of mapping curriculum to groups can provide individual training continuums. Course sequences and prerequisites are included. Individual progression is tracked.

An instructor or administrator can manage a continuum. NLN allows administrators or instructors to set up structured curriculums and control user progression or allow users to choose training and set their own pace. A student can provide input for alterations of his/her continuum based on personal goals, such as a college degree program.

NLN will:

1. Deliver and track any browser-based content regardless of authoring tool.

2. Manage Web and non-Web courses in one database.

3. Deliver Web courses without players, plugins, Java, or helper applications on user machines

Data Collection/Reporting

CMI provides data collection and reporting, which includes the following capabilities:

- The student will be able to monitor progress while taking the course and know results at end of the course. Student feedback is expected to include a summary of progress to date and a course completion certificate at the end of each course.

- The instructor responsible for the course will be able to monitor how many students are taking their course, the summary compiled from data collected while students take the course, and student feedback about the course.

- The supervisor will be able to get feedback on courses being taken by his/her personnel and the results upon course completion.

The instructor and student have the option of using CHAT for collaboration on questions and concerns.

EVALUATION

Managers will get the data they need to support ROI decisions. An evaluation of the effectiveness of the initial strategy is ongoing through an independent agency. As data in analyzed, recommendations will be compiled to assist those who want to implement a similar approach.

SUMMARY

NLN opens a new era for the Department of the Navy. Like any new training technology, advanced distributed learning (ADL) required a total review of the instructional system to insure all functions are accounted for in the implementation strategy. A total training systems approach ensures integration within the existing instructional system and capitalizes on the advanced training capabilities of distributed learning.

Application of Instructional System Development (ISD) to NLN has guided development of network training in the NLN environment. Like any new technology, if the right instructional strategies are not employed to bring about learning, then it has no instructional value. Evaluation of NLN is ongoing to determine the training effectiveness as well as the ROI. Data will be made available to parties interested in similar applications.

The NLN design provides the opportunity for an individualized continuum of learning for each student on the network. This student-centered approach can enhance the retention of skill, improve motivation for continued advancement, and lead to development of expertise. As steps are taken to standardize the distributed learning (DL) approach through initiatives such as SCORM, obstacles for implementation can be overcome such as barriers posed by independent systems, proprietary processes, and the lack of interoperability among various organizations. The vision is student progression through individualized continuum becoming a career-long learning experience.

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