Naval Inspector General Report to the Secretary of the Navy

Computer Based Training

March 2009

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Naval Inspector General Special Study
Computer Based Training

Executive Summary

In response to concerns from the Fleet about the knowledge level of Sailors reporting from "A" Schools, along with anecdotal reports regarding computer based training (CBT), the Naval Inspector General (NAVINSGEN) initiated a Special Review and Assessment on "Computer Based Training" in May 2008. To execute this study, we utilized a small team of NAVINSGEN subject matter experts (SMEs) in conducting site visits at a broad cross-section of Navy commands, including operational units across the surface, aviation and submarine communities, and Reserve Component (RC) commands.

In beginning our study, we defined CBT as individual or group self-paced instruction using a computer as the primary training medium, to include web-delivered Navy E-Learning (NEL). By this definition, CBT accounts for one-third (34%) of instruction at Navy "A" Schools, 15-33% at schools of the Officer Training Command (OTC), and 100% of instruction for Navy annual training requirements.

We found minimal governance or standardization for the acquisition, design and development, or life cycle management of CBT curricula. Courseware content and quality vary widely, and updates are protracted. Delivery systems are outdated, and funding has not kept pace with the growth of electronic training. The instructional design of CBT curricula does not capitalize on learning theory principles. It is most effective when used in a blended learning environment vice as a stand-alone training medium. We also found no mechanism in place to ensure curricula content is linked to Sailor work.

In addition, we found the generally accepted assumption that young Sailors know how to learn in an electronic environment is not valid. While a generation of young Americans may be proficient in using computers for gaming and networking, most have no experience learning academic or technical material via personal computer.

We noted a mismatch between Fleet expectations and training domain goals with respect to the "A" School graduate. The Fleet expects a "turnkey" ready operator who can also perform basic maintenance, while the training pipeline is tasked with delivering an operator, vice a maintainer. We also noted degradation in the "Sailorization" process the Fleet expects to occur in "A" School.

Increased requirements to train in the Fleet come at a time of increased operational tempo (OPTEMPO). Mission growth, combined with manpower reductions and other personnel initiatives, has resulted in fewer experienced Sailors in the Fleet and less time to train new personnel.

Our conclusions and recommendations emphasize opportunities within the Department of the Navy (DoN) to standardize the governance of CBT and ensure its optimal design, delivery, execution, and relevance to Fleet training requirements.

I. Introduction

1. During 2007 and 2008, staff of the Naval Inspector General (NAVINSGEN) heard an increasing number of concerns expressed by the Fleet regarding a declining level of rate specific knowledge of Sailors reporting from "A" Schools. In response to these concerns, NAVINSGEN initiated a Special Review and Assessment on "Computer Based Training" in May 2008 (Appendices A and B refer).

2. A team of NAVINSGEN subject matter experts (SMEs) conducted a "top-down" study of perspectives from policy makers, to the schoolhouse, to the end-user (the student), to the customer (the Fleet, who receives the trained end-user). Our intent was to assess the effectiveness of the execution and learning piece of CBT at the Sailor level by asking the question: "Does the Integrated Learning Environment (ILE), as supported by CBT, meet its goal of delivering a trained and "Sailorized" asset to the Fleet?" Our overarching goal was to review existing policies and procedures and their practical application across the Force, assessing effectiveness, identifying opportunities for improvement, and recommending specific options where appropriate. Specific areas of review are provided in Appendix A.

3. In using a top-down approach, we began our field data collection by interviewing policy makers within the training domain. We visited the Naval Education and Training Center (NETC), the Naval Education and Training Professional Development and Technology Center (NETPDTC), the Integrated Learning Environment (ILE) Manager, NETC Learning and Development Division, and the Naval Personnel Development Center (NPDC). After gathering initial information, we visited selected NPDC Learning Centers—"A" Schools and follow-on "C" Schools representing a cross-section of occupational fields to expand our insight into CBT use and application. We also visited Recruit Training Center (RTC) and various officer training programs. We then visited a cross-section of Naval activities across the surface, aviation and submarine communities where we interviewed senior officer and enlisted leadership and conducted focus groups of CBT end-users—the Sailors. We also visited reserve component (RC) commands as we recognized the unique access challenges associated with CBT for Selected Reserve (SELRES) personnel. A listing of site visits is provided in Appendix C.

4. At all sites visited, we found a cadre of knowledgeable and dedicated professionals committed to providing the highest quality of service and support to our Sailors. Though they frequently work in a resource constrained environment, they are focused on continual process improvement throughout the training domain.

5. At the outset of the study we quickly encountered differing definitions of CBT. The Naval Audit Service Report 034-97, *Implementing Computer Based Training in the Navy*, defines CBT as "a collective term for training techniques that use computer technologies within and outside the formal classroom...to include tutorials, electronic classrooms, and interactive courseware." For purposes of this study, however, we further defined CBT as individual or group self-paced instruction using a computer as the primary training medium, to include web-delivered Navy E-Learning (NEL). Our definition does not

include complex simulation programs designed to react to and provide output based on student response. These sophisticated computer programs are an excellent asset to the Fleet as training aids. They offset the need to train at sea and reduce the training budget.

6. Initial research included a review of the *Executive Review of Navy Training* (ERNT), and the resulting Revolution in Training (RIT), which sought to leverage technology to provide immediately accessible training to Sailors throughout a lifelong learning continuum. The learning model identified within the RIT focused on developing curricula to fit the learner and the learning environment, both in content and delivery method. CBT was the primary means to affect this goal. The RIT did achieve significant efficiencies, both in time to train (TTT) (Appendix D), and in resources—realizing a reduction in manpower and infrastructure.

7. We encountered difficulty in finding a valid metric by which to compare rating knowledge under legacy training systems and the CBT environment. We intended to measure the effectiveness of CBT by examining advancement test scores over the last five years. However, during a visit to the Naval Education and Training Professional Development and Technology Center (NETPDTC), we learned that other variables impact the design and scoring in each advancement cycle, rendering such a direct comparison meaningless.

8. The primary bases for our findings include direct observation in classroom settings, along with interviews of staff, course developers, course administrators, instructors, and facilitators at the activities we visited. We also conducted interviews and focus groups with Commanding Officers, Executive Officers, Department Heads, Division Officers, Chief Petty Officers, and Leading Petty Officers who receive CBT-trained Sailors at operational commands. We also met with Sailors who have been trained via CBT. The preponderance of feedback collected at the sites we visited, across all officer and enlisted ranks, communities, and ratings, represents a significant data set that warrants consideration (Appendix E refers).

9. During the conduct of our study, we reviewed the policy and procedures that govern CBT curricula design, development, and maintenance (i.e. life cycle management). We then looked at the electronic learning environment, and the systems used to deliver CBT instructional material. We considered classroom execution in terms of instructional design and its impact on learning, and we assessed course content in terms of relevancy to Sailor work requirements. We also identified best practices as found during the conduct of our study. A discussion of our findings and conclusions, along with recommendations, follow in this manner.

II. Discussion of Key Findings

1. Curriculum Design and Development.

a. Background.

Effective CBT begins with analysis directed toward design and development. Department of Defense (DoD) Directive 1322.18, *Military Training*, requires that CBT be considered as a training medium when front-end analysis determines that its use is effective and efficient. Under the Revolution in Training (RIT), the Integrated Learning Environment (ILE) was established to provide technical and administrative infrastructure for the application, storage, maintenance, and distribution of learning content. The ILE Content Developer's Handbook was released in September 2007 by the Manpower, Personnel, Training and Education (MPT&E) Enterprise, to ensure that CBT curricula meet DoD and industry standards of the Sharable Content Object Reference Model (SCORM). The SCORM is a collection of technical standards and specifications for web-based learning. It does not, however, address the accuracy or relevancy of the learning material. The expectation is that subject matter experts (SMEs) within the Enterprise review courses for accuracy and currency.

b. Findings.

(1) We found little evidence of front-end analysis, and we discovered no centralized governance or standardization for design and development across the training domain. Funding and resources allocated to analysis, acquisition, and development processes vary by Enterprise and Sponsor, causing significant variance in the content quality of CBT curricula. In many cases, legacy curricula were hastily converted to CBT format and pushed to the field, with no evidence of front-end analysis. CBT courses were developed by multiple contractors, resulting in a mixture of both good and ineffective curricula.

(2) We found no standardized review process has been used in the development of many electronic courses. We also found little SME or instructor input in curricula development. As an example, when courseware for Journeyman Instructor Training (JIT) was developed, there was no assessment test phase prior to its premature launch. While the course content is satisfactory, the six course assessments specify incorrect answers. Course facilitators have developed a manual work around to allow students to pass the test.

(3) Over one-third of all CBT curricula are not delivered through the ILE, as only 52% of electronic classrooms (ECRs) are linked to the ILE network through the NETC Training Network (TRANET). Moreover, the ILE Secret Internet Protocol Router Network (SIPRNET) infrastructure is not fully developed, forcing "A" Schools to host classified CBT material on their local servers.

2. Life Cycle Management.

a. Background.

DOD Directive 1322.20, *Development and Management of Interactive Courseware for Military Training*, requires documented life cycle management for CBT curricula. This includes planning and funding for curriculum updates. Under the RIT, a decreased time to update course material was perceived as an advantage and cited as a reason to shift more component training to CBT.

b. Findings.

(1) We found a lack of robust life cycle management practice for CBT curricula. Contracts written for curriculum development seldom included the funding necessary to maintain the courses. The ILE Manager does not have the funding, resources or expertise available to update material as needed. Students throughout the training pipeline reported outdated training material that facilitators teach around or tell students to ignore.

(2) In practice, the time required to update courseware has not decreased, and in some cases has increased. Inability to affect timely updates to CBT curricula widens the gap between Fleet tactics and training requirements compared to lessons taught in the schoolhouse. Time to affect a change in CBT curricula can be protracted; eighteen months is not unrealistic as an average time from the point a need for courseware correction is identified to the time the revised product is contracted, developed and delivered. A lack of funding, poorly written contracts, and vendors gone out of business are contributing factors that delay timely updates. An example of a lengthy revision process is evident in the Training Integration Management System (TIMS), a software application used by Chief of Naval Aviation Training (CNATRA). A Training Change Request (TCR) requires 200 days to effect from time of initial input. As a workaround, instructors must override curriculum deficiencies manually by addressing them during instructor-led training (ILT).

3. Delivery Systems for Web-Based Technology.

a. Background.

CBT curricula are delivered through use of a personal computer (PC) or an electronic classroom (ECR) via some variant of a server system. Each CBT course is intended to be associated with a Learning Management System (LMS), which is an electronic method of monitoring student progress, recording grades and maintaining student transcripts. A LMS is intended to add efficiencies for the schoolhouse, reducing administrative manpower requirements.

b. Findings.

(1) The Navy currently maintains over 26,000 computer workstations in its network of ECRs. The average age of computer workstations exceeds six years. Many are in need of technical refreshment or replacement of older equipment. At a majority of the sites we visited, we observed problems in the ECRs that occur on a daily basis, to include bandwidth issues, internet availability, inadequate server infrastructure, outdated computers, and an insufficient number of computer terminals. Insufficient bandwidth causes computers to "freeze-up," resulting in loss of completed work and the need for students to start over. This in turn causes frustration and wasted time for students. At several Learning Centers we observed students having difficulty loading pages, with 10-15 minute lag times that often resulted in computers "timing out" and the student having to restart the course. At one "A" School, we observed that Navy Knowledge Online (NKO) had been inaccessible for two days. At the Officer Training Command (OTC), NKO had been inaccessible for two weeks. We noted that course timelines are not adjusted to account for computer or server down-time. As another example, TIMS becomes slow or unavailable in the afternoon when the Training Air Wings at Corpus Christi get on line. Administrative requirements of entering test scores and other data into TIMS also slows the system.

(2) We found significant variation in the LMSs used in conjunction with CBT curricula. In some courses, the LMS was well-designed and helped significantly with course administration. In others, it doubled or even tripled the time requirements necessary for the administrative aspects of instruction. Several courses we observed had no LMS in place. Challenges with LMS included a difficulty or inability to print transcripts, challenge questions not related to test questions, and LMS scoring correct answers as incorrect. Manual workarounds are used to ensure that students' progress is accurately reported and that they graduate on schedule.

4. Electronic Instruction and "Generation Y".

a. Background.

The ERNT recognized that American industry was "capitalizing on the tremendous benefits that technology has to offer in training," particularly with respect to "Generation Y," the generation entering the military recruiting window. It recognized Generation Y as being more "technologically savvy" than previous generations and appropriately identified that the Navy should leverage technology as a means to improve and enhance learning opportunities.

b. Findings.

During the course of our study, it became apparent that leadership in nearly all training environments believed that technological experience translated to an ability and desire to learn on a computer vice using traditional methods such as ILT in a classroom environment. The Generation Y users we interviewed acknowledged they were

comfortable using computers. However, while they enjoyed using computers for communication, entertainment, and social networking, they did not view CBT as an enhancement over interaction with an experienced instructor or hands-on-training. Few junior Sailors had experience using a computer as the primary delivery tool for education and training. They were not accustomed to learning at a computer screen for six to eight hours a day, five days a week.

(2) It appears that descriptions of a generation of young people who are "technologically savvy" have been misinterpreted as indicating that "young recruits are familiar with learning via computer and prefer this to classroom instruction." Although this was widely believed by training domain leadership, the information we gathered in focus groups suggested differently.

5. Instructional Design.

a. Background.

Instructional design is the practice of creating tools and methods to help facilitate learning most effectively and is commonly tied to the principles of learning theory (Appendix F). A widely accepted principle of modern learning theory is that people learn by different methods. The most commonly accepted learning styles are visual, auditory, and kinesthetic (the VAK model). Visual learners primarily learn through seeing and reading; auditory learners best learn through listening (lectures, discussions); and kinesthetic or tactile learners prefer to learn via hands-on experience. Instruction needs to stimulate as many senses as possible to achieve maximum effectiveness. Further, adult learning theory links learning to four critical elements: motivation, reinforcement, retention, and transference. Training needs to address all four elements to be effective.

b. Findings.

(1) Based on our observations, review of courseware, and interviews, we found that CBT, as currently designed and implemented, does not adequately address all learning styles, nor does it effectively incorporate all the elements of adult learning theory. When used as the sole teaching medium, CBT addresses visual and sometimes auditory learning, but does not effectively reach kinesthetic learners.

(2) Additionally, the inability of CBT to capitalize on the elements of adult learning—motivation, reinforcement, retention, and transference—is a function of three features of CBT's instructional design: emphasis on speed of course completion, replacement of instructors with facilitators, and removal of redundancy in course curricula. The combination of these factors impacts effectiveness of training and the level of knowledge learned and retained by Sailors.

6. Speed of Completion vice Knowledge Mastery.

a. Background.

Based on adult learning theory, motivation to do well in a training course typically relates directly to incentives offered. The use of incentives is based on the principle that learning occurs more effectively when the student experiences feelings of satisfaction. Students also find satisfaction in learning based on the understanding that the material learned will be useful to them in some way, such as ensuring success in the job for which they are being trained.

b. Findings.

(1) We found few incentives to do well in a CBT course, although students are encouraged to complete courses prior to target dates. Speed of completion is the prime motivational factor in most "A" Schools with the reward for timely completion being a priority for "class-up" to the next module, course or follow-on school. A common practice in online testing is for a student to "click" through a course as quickly as possible, memorize enough material to pass the test, and then dump the data upon successful test completion. During online testing, if a student chooses the wrong answer, he/she can usually return to the question and continue to choose an answer until the correct one is selected. Such online testing methods do not explain why a particular answer was correct or incorrect. Students strive to finish a course as quickly as possible, with little attention to mastery of the actual course material.

(2) We also noted that the most important metric of success that facilitators must meet is the established "time to train" (TTT) for each module and the overall curriculum. A facilitator's annual evaluation depends upon the number of students who successfully meet the course timeline.

7. The Shift from Instructor to Facilitator.

a. Background.

Reinforcement of learning comes from instructor-student interaction and ensures correct modes of behavior and performance. In the ILT environment, instructors are SMEs in the curriculum being taught, and they are rated on the equipment. They explain concepts and demonstrate successful techniques by displaying a particular skill and then reinforcing that skill with hands-on activity. The instructor adapts his/her instruction based on the students' level of understanding and can adjust the structure of the class accordingly. Having a person who can answer questions and share a "sea story" that relates to the application of knowledge in the Fleet helps reinforce the course content and is a proven means of effective training. The instructor is also a model of leadership in the classroom – a person whom the student may want to emulate in the future.

With the growth of CBT, instructors have been replaced by facilitators. Facilitators are usually not SMEs and are therefore not fully reliable sources of in-rate knowledge. The facilitator's role is to ensure classroom rules are followed, assist with computer-related issues, and monitor student progress. They do not provide reinforcement of learning objectives or enhance retention of course material.

b. Findings.

(1) In most courses we observed there was minimal interaction between the facilitator and students. A facilitator interacts one-on-one with students rather than teaching them as a group because the course is self-paced and each student is at a different stage of course completion. Students expressed frustration that the facilitator cannot answer questions about course content and refers them back to the course itself rather than answering the question. There is thus no standardized reinforcement of material learned or any means to relate the learning material to actual application in the Fleet. Additionally, students are discouraged from assisting one another in the CBT classroom. This further hinders reinforcement of learning through peer interaction.

(2) We found little or no training for facilitators. Uniformed facilitators have the 9502 instructor NEC but are not trained on how to facilitate CBT curriculum. In many cases, facilitators are non-uniformed civilian contractors with varying levels of training and experience.

(3) An apparent second order effect of the reduction of instructor-led training (ILT) in boot camp and Navy "A" Schools is the degradation of the Sailorization process. During focus groups, officers and senior enlisted personnel reported a noticeable decrease in military bearing, proper uniform wear, and communication skills. This may be attributed to the removal of the human element from the classroom, as students miss out on the mentoring and guidance from seasoned Sailors.

We observed an example of this first-hand during a site visit to NSTC. While walking around the base with the CO, we experienced over a dozen instances where Sailors did not salute our group of senior officers. We found that rank recognition is taught via CBT during boot camp training and the recruits do not get enough hands-on experience with rank recognition because of the self-contained learning environment now established in Great Lakes.

Also, the "isolationism" due to limited facilitator-student interface and peer interaction does not foster team-building, a vital element of Navy culture. We noted that the "Go to the Chief" concept may have become lost in the CBT environment. There are valid concerns about the possible long-term impact and how this will manifest in the Fleet within the next eight to ten years, when the seasoned, experienced Sailors have retired.

8. Elimination of Redundancy.

a. Background.

Retention reflects the actual quantity and quality of learning and is directly affected by the degree of original learning and the amount of practice or application during that learning. Thus, retention is directly related to repetition of material during instruction. A goal of the RIT, however, was to reduce the TTT. This was accomplished by eliminating the redundancy in course curricula.

b. Findings.

(1) In the courses we reviewed, information is presented once, with no practical follow-on application. Students are expected to retain information for follow-on modules or courses; this is seldom successful. The lack of knowledge retention creates a "snowball effect" as the student advances to the next phase of training or reports to the Fleet.

(2) In general, we observed that there is no viable continuum of learning from "A" School to "C" School. Many "C" School instructors, and the staff at CSCS Learning Dahlgren, stated that students are reporting to "C" Schools without the basic knowledge expected of them. A lack of continuity between "A" School and "C" School may be related to the lack of life cycle management and hence incorrect or out-of-date material being presented at "A" School, and a lack of redundancy in course curricula. We found that some "C" Schools have developed an introductory course to provide additional training prior to commencing the school curriculum. For example, the Aegis Training and Readiness Center (ATRC) proactively developed an Awaiting Instruction Program (AIP) to "re-teach" material taught in "A" School.

9. Transference of "A" School Training to the Fleet.

a. Background.

Insufficient motivation, reinforcement and retention translate into poor transference of learning (i.e. the ability to use the information taught in a course in a new setting) and correspond directly to the effectiveness of learning as it impacts actual performance in the Fleet. Effective learning requires more than retention and transference, however. Effective learning also requires that the learning content be linked to the knowledge, skills and abilities (KSAs) required in a Sailor's work environment.

b. Findings.

(1) We found little governance for content development and no effective mechanism in place to link KSAs to course content. As a result, course content varies in relevance, accuracy, and overall quality. Application of a Job Task Analysis (JTA) to identify KSAs during content development is sporadic and does not completely capture

the skill sets required of a Sailor in the Fleet. Learning objectives tend to be general in nature with no evident connection to job performance. This directly impacts Sailors' ability to be "turnkey ready" upon reporting to the Fleet. It appears that today's "A" School graduates may have theoretical knowledge but no real technical knowledge of their rate. Some commands reported that it takes twice as long to qualify a Sailor for watch standing duties as it did under legacy training.

(2) There also appears to be a mismatch between Fleet expectations and the goal of training commands. Today's training pipelines produce an operator, not a maintainer, and expect additional technical training to occur in the Fleet, while the Fleet expects a Sailor to have the KSAs needed to be an operator and perform basic maintenance tasks. The issue is more complex, however, as Fleet feedback indicates Sailors reporting from "A" School have only a marginal ability to recognize equipment and operate its components. Many are unable to recognize and use tools, operate basic equipment, read schematics, or follow basic electronics; some platforms have instituted remedial training to address gaps in the training pipeline.

(3) We found no reliable standardized feedback mechanism from the Fleet to Naval Education and Training Command (NETC), Naval Service Training Command (NSTC), or other training commands. Feedback from the Fleet about the observed knowledge level of reporting Sailors, Fleet constraints for providing on-the-job training, and changing training requirements in the Fleet are supposed to be important elements of the SCORM. Since there is no feedback mechanism, there are no metrics to measure the effectiveness of CBT implementation. We found only isolated instances where a ship or squadron proactively took the initiative to provide such feedback to an "A" school, or where a schoolhouse solicited feedback via surveys. These were sporadic in nature and not standardized Navy-wide.

10. Training Pushed to the Fleet.

a. Background.

On-the-job training in the Fleet has always been a necessary part of a Sailor's education, growth and development. Divisions historically had several leading petty officers (LPOs) and leading chief petty officers (LCPOs) to provide and support the training, growth and mentoring of young Sailors.

b. Findings.

(1) It is difficult for units to provide a Sailor with the additional training needed to be a productive member of the Fleet in a timely manner. Since the implementation of CBT in "A" Schools, the Fleet reports more training in basic KSAs is now required than was necessary under legacy training. This additional training requirement has come at a time when operational units no longer have a "bench". Manpower reductions, optimal manning, the Top Six Roll Down, increased operational tempo (OPTEMPO), the impact

of Individual Augmentee/Global War on Terrorism Support Assignments (IA/GSA), and a decreasing level of experienced Sailors in the Fleet have exacted a cumulative effect.

(2) We also found an unintended consequence impacting the Fleet that stems from the reduction in the number of instructors in the training pipeline. The depth of technical system, operational, and troubleshooting knowledge sent back to the Fleet following a successful instructor tour has been significantly compromised. While interviewing some of the more experienced Chief Petty Officers, they recalled that getting an instructor "roll-back" to the Fleet was a great advantage to the Division, since they had a high degree of system understanding and a greatly enhanced teaching ability. These Sailor instructors, often senior Second or First Class Petty Officers, were coveted assets for their ability to train, coach, and lead. The reduction in instructor billets and focus on facilitation have resulted in a reduced level of technical knowledge at the LPO/LCPO level—the exact people we expect to provide "on the job training" to the post "A" school pipeline Sailor. This issue may have serious long-term consequences with regard to Fleet preparedness.

11. Navy Training Requirements.

a. Background.

CBT has become the trainer of choice for meeting Navy requirements such as General Military Training (GMT), General Navy Training (GNT) and other annual training requirements. This training is normally accomplished through individual use of Navy E-Learning (NEL).

b. Findings.

(1) Navy Knowledge Online (NKO) is the portal to Navy E-Learning (NEL) although this distinction is not always obvious to the user. Many Sailors thus refer to NKO when they mean NEL. As CBT, these courses have the same challenges and issues with design, development, life cycle maintenance, delivery systems and course content as were noted above. Training delivered via NKO/NEL is perceived as complex to navigate, boring in nature, and repetitive from year to year.

(2) We found a significant creep in the number of training requirements delivered via NEL in the last several years. The individualized nature of CBT via NEL means that GMT, GNT, and other annual training requirements, that were previously the responsibility of the work center, are now left to the Sailor to accomplish on his or her own time. Given the work hours associated with this training, the challenges presented by the delivery system, and the operational demands that take priority, the training cannot be completed during the now standard 10-12 hour work days typical at many commands. We found an expectation for Sailors to complete GMT and other training requirements during "free" time or while on liberty, which negatively impacts time with family and overall quality of life. The challenges we saw in shore IT settings are more pronounced in

afloat platforms. This is particularly evident on submarines and small ships, where some work centers have only one computer available to support 15 or more people.

(3) We noted some unique challenges with respect to training requirements for Reserve Component (RC) Selected Reserve (SELRES) personnel. The focus during drill weekends is on the operational priorities as set by the supported command, with a high expectation that the reservist is to complete training and administrative requirements outside of the drill weekend. Using home personal computers for this purpose, with or without a CAC reader, is noted as a challenge. Not all SELRES personnel own personal computers, and many have limited internet service provider (ISP) services in certain geographic areas. For example, in many rural areas the only service available is "dial-up" which is inadequate to run most Navy applications including NKO.

(4) Navy's civilian workforce reported challenges similar to those experienced by SELRES personnel. There is an ever growing expectation for civilian employees to complete annual training and other requirements from home. NMCI connectivity and other accessibility issues impact their ability to work from a home computer. Version control is an issue for courses provided by disk, a common work-around to NMCI issues. The need to complete training requirements in the home setting is seen as a negative influence on quality of life, as it takes away from time with family.

III. Best Practices

The following site-specific items were identified during our study as noteworthy.

1. Hospital Corpsman "A" School.

a. In 1999, the medical community was one of the first to embrace computer based training (CBT), with the implementation of a CBT Emergency Medical Technician (EMT) course. The Hospital Corpsman (HM) "A" School moved to a CBT model in early 2006. Under the CBT model, there was an increase in failures, a large student backlog in the self-paced courses, and increased disciplinary problems. Surveys sent to Military Treatment Facilities (MTF) on HM performance indicated that corpsmen were unable to perform basic skills such as draw blood, administer immunizations or record a blood pressure.

b. In 2007, the schoolhouse reorganized and introduced the Hospital Corpsman Interactive Course (HMIC), which features a blended training environment. This training curriculum, developed by on-site instructors, was most impressive. It combines initial CBT and interactive courseware with instructor-led training (ILT), psycho-motor skills demonstrations, hands-on laboratory exercises with simulation mannequins, and clinical practicum enhancing the required corpsman knowledge, skills and abilities (KSAs). Additional self-study via CBT is available to all students. Under HMIC, there was an increase in test scores and a reduction in failure rates and disciplinary issues. Morale improved and cooperative team work efforts became commonplace.

c. By design, the HMIC purposefully fosters an *espirit de corps* among students through a cooperative learning strategy. Students view the instructors as role models, and look to emulate them once in the Fleet. We noted a great deal of pride and professional in the HM rate and its history. The HMIC provides great insight on how the latest technology can be combined with ILT and hands-on application to yield an effective training program.

2. Center for Naval Engineering.

a. Upon our visit to the Center for Naval Engineering (CNE), we found a staff that was very knowledgeable about the Revolution in Training (RIT) and its objectives and execution. CNE has devoted significant efforts to develop an "Engineering Learning & Development Continuum" that incorporates the latest technology and educational strategies in a blended learning environment. Training and testing is reiterative, and is targeted to teach the KSAs required at specific levels of performance, with an emphasis on metric measured performance and Performance Qualification Standards (PQS) qualification. Additionally, Sailors are taught to "make a habit of learning."

b. In 2007, the Basic Engineering Common Core (BECC) course initiated a full "Blended Learning Solution." It incorporates CBT, ILT, personal computer (PC) simulators, and laboratory exercises. The Engineering Plant Operators Course (EPOC),

the next step in the Engineering Learning and Development Continuum, will be implemented in 2009, and the Engineering Plant Managers (EPM) course will begin development in 2010. Both feature the similar blended learning environment as BECC.

c. CNE continues to lean forward in embracing the latest technology, such as video streaming, podcasts, and state of the art modeling and simulation, while acknowledging the benefit of practical, hands-on-practice and application. We consider their Engineering Learning and Development Continuum to be a successful model that has reduced TTT from legacy courses by successfully leveraging technology in the classroom while still acknowledging the importance of the human element and hands-on-practical application in a continuous training pipeline.

3. Center for Naval Intelligence Program Management.

a. Early in the RIT, the Center for Naval Intelligence (CNI) understood the potential benefits in utilizing CBT where appropriate. They initially converted two "F" school courses to CBT, analyzed its effectiveness and the feedback received. Based on positive results of a lessons-learned analysis, CNI took an incremental, phased approach to the development of CBT within their schoolhouses. Each phase included a thorough front-end analysis and an analysis of Fleet feedback, effectiveness, and lessons learned. Their training today uses a blended environment approach, with CBT, ILT, case studies, videos, student guides, and PowerPoint presentations.

b. Most notable is CNI's well-structured "cradle to grave" management program for CBT that incorporates front-end analysis, acquisition, design review, pilot testing, delivery methods, and lessons learned analysis. Front-end analysis ensures that CBT will be effective and efficient where applied and that funding includes acquisition, development and life cycle maintenance. CNI staff and instructor subject matter experts (SMEs) review curricula for content accuracy and have final design approval, thus ensuring their "buy-in" to the CBT portion of training.

4. Virtual Radio Room. The Virtual Radio Room (VRR) is a web-based desktop simulation containing a virtual environment that replicates an actual radio room onboard a surface ship or submarine. Originally envisioned to supplement existing submarine radio operator training conducted at the Naval Submarine School in Groton, Connecticut, to reduce bottlenecks resulting from the limited availability of Tactical Training Equipment (TTE), the scope has broadened to include surface applications and in some cases, substitute for TTE. Interactive three-dimensional graphics provide the user with a virtual environment presented on a two-dimensional computer monitor, where one can practice performing operator or maintenance procedures by interacting with equipment front panels or replicas of components. While the VRR does not fit this study's definition of CBT, we noted it as a successful model of how CBT can be used as an effective tool within the larger scope of simulator training.

IV. Conclusions and Recommendations

Centralized Governance and Standardized Management Oversight.

1. The Revolution in Training (RIT) changed the way the Navy trains Sailors. The shift to CBT enabled the delivery of standardized training across a Learning Center construct throughout a Sailor's career. The RIT achieved great success by effectively reducing the time to train (TTT), and delivered a cost savings through a reduction of manpower and infrastructure. However, the necessary centralized governance and standardize management for courseware development, life cycle management and content development have lagged behind the expansion of CBT. We need to establish a degree of centralized governance in each of these areas and ensure compliance of development with the Integrated Learning Environment (ILE) specifications. Resources must be allocated to front-end analysis and integrated into major acquisition programs.

Recommendation: Establish Navy-wide centrally managed governance for courseware development, life cycle management and content development, to include streamlined contracting procedures, front-end analysis, instructional design, content quality assurance, and standardized management processes. Ensure front-end analysis and instructional design capitalize on commonly accepted principles of learning theory to achieve the most effective training possible.

The Electronic Learning Environment.

2. The full implementation of training technologies across the Navy has been inconsistent. As the requirement to deliver CBT courses has increased, funding for Navy E-Learning (NEL) has not kept pace. Electronic classrooms are in need of technical refreshment and replacement of old equipment. Electronic learning environments afloat have lagged behind with those ashore, and the electronic transfer of classified material has lagged behind that of non-classified material. Given the current environment of fiscal constraint, resources must be optimized across the spectrum of shore and afloat training solutions to ensure optimal delivery systems for all electronic training.

Recommendation: The Manpower, Personnel, Training and Education (MPTE) Enterprise: Define the requirement for the future learning environment, both afloat and ashore. Identify the actions required and the associated cost to bring the current learning environment up to the specifications of the future learning environment. Coordinate programmatic actions with all stakeholders to achieve the required objectives, leveraging current programs and initiatives to achieve maximum efficiency.

Instructor-Led Training.

3. An unintended consequence of the RIT was to minimize the critical impact of the Navy instructor. The instructor force was downsized and centralized management was transferred to the various Learning Centers. Facilitators who were not subject matter experts (SMEs) in the course being taught replaced SME instructors in the CBT

classroom. A secondary effect was to remove the "rollback" of experienced instructors to the Fleet, resulting in fewer less experienced trainers available for afloat training. Another second order effect was to reduce the mentoring of junior Sailors in the training pipelines thus negatively impacting the Sailorization process.

Recommendation: Fully integrate the instructor cadre into the Navy training domain by returning instructor management to Naval Education and Training Command (NETC) control. Establish centralized instructor training to include renewed emphasis on the Master Training Specialist (MTS) certification program. Replace facilitators with instructors in the CBT classroom. Empower instructors to be mentors who teach not only course objectives, but also instill a sense of pride and professionalism in their students.

Training and Fleet Requirements.

4. The primary determinant of training success is the expertise a Sailor demonstrates in the performance of work; this is the fundamental deliverable of the training process. To be most effective, training curricula must be linked to the knowledge, skills and abilities (KSAs) required in the conduct of a Sailor's daily work. Defining KSAs for each validated Fleet requirement is thus the basis of curriculum development. There is no mechanism in place, however, to link the curriculum to KSAs, and no standardized mechanism by which the Fleet can provide feedback to the training domain regarding current or emergent requirements.

Recommendation: Establish a feedback mechanism for the Fleet to provide recommendations for training curriculum improvements directly linked to KSAs identified for validated Fleet requirements. Employ the Kirkpatrick training evaluation model in measuring the outcome and effectiveness of training on performance in the Fleet.

Annual Training Requirements.

5. General Military Training, General Navy Training and Annual Training. CBT delivered via Navy E-Learning (NEL) has become the vehicle of choice for General Military Training (GMT), General Navy Training (GNT) and annual training requirements. While the application of centralized governance and standardized management (as noted in recommendation number one) will improve the content and relevancy of these courses, it will not address the exponential growth in the number of requirements that must be completed on an annual basis.

Recommendation: Conduct a Navy-wide review of GMT, GNT, and annual training requirements to address the appropriateness of CBT as the most effective training media, the feasibility of a course refresher vice yearly repetition of the same material, and workload impact in terms of man-hours required.

Appendix A

Computer Based Training
A special study of the effectiveness and efficiency of computer based training (CBT) in the United States Navy

Issue: During recent Naval Inspector General (NAVINSGEN) visits we have noted increasing dissatisfaction with the effectiveness of computer based training (CBT). Concerns regarding the ineffectiveness of CBT come from the senior enlisted (Chief) level and from officer leadership (department heads) who state that they are receiving Sailors who lack basic rate-specific skills and are unable to perform routine tasks without additional training. Many attribute this to increased CBT vice experiential hands-on training. Users of CBT courses reported they frequently circumvent the learning process by focusing on the test vice the mastery of course material. Further, anecdotal information indicates that commands do not routinely schedule time for General Military Training (GMT), General Navy Training (GNT) or refresher training and instead place the burden of finding time to complete training upon the Sailor. We have also noted a high incidence of access and connectivity issues (particularly for deployed/overseas units) that negatively impact the Sailors' ability to effectively participate in CBT.

Additionally, recent material inspections indicate Navy forces are in a lesser condition of readiness than previously reported. Insufficient or inadequate maintenance training, either in the schoolhouse or aboard ships, squadrons and submarines, has been noted as a possible root cause (United States Fleet Forces Command Personal For dated 171535APR08). Also, the Bureau of Medicine (BUMED) is moving away from CBT and returning to hands-on-training (e.g. the new Traumatic Combat Casualty Care course) as the most effective learning medium for the skills required of a Hospital Corpsman. Finally, senior officer/enlisted leadership is voicing a concern over the loss of the "human element" in training as having an adverse impact on military bearing and good order and discipline.

With these factors in mind, we propose to assess the effectiveness of the execution and learning piece of CBT at the Sailor level. The question we intend to pose is: "Does the Integrated Learning Environment (ILE), as supported by CBT, meet its goal of delivering a trained and Sailorized asset to the Fleet?"

Background: In October of 2000, the. Navy embarked upon the Revolution in Training (RIT), as recommended by the Executive Review of Navy Training (ERNT). The ERNT was a Chief of Naval Operations (CNO) directed working group tasked to improve training, education, and learning throughout the Navy through delivery of an agile training system that fosters continuous innovation and improvement. In December 2002, as a result of the ERNT, the Naval Education and Training Command (NETC) created the ILE, a strategic initiative that encompasses all forms of training methods including instructor-led, computer/web-based, and blended instruction. The ILE supports readiness by exploiting current technologies and best practices to enhance institutional and

individual learning and performance support for the Navy's Total Force. The overarching promise of ILE, was to deliver a fully trained and "Sailorized" asset to the Fleet.

The Navy E-Learning (NEL) component of the ILE provides enterprise-wide self-paced training opportunities to NETC commands, Navy system commands (SYSCOMS) and other naval activities. Under ILE, the Navy has shifted from a training model that emphasized instructor-led training (ILT) to CBT. CBT involves self-monitored instructional modules with computerized tests. CBT is now the norm for entry level "A" School training, periodic training such as GMT and NMT, and in-rate training.

Methodology: Our intent is to conduct a "top down" study, from the policy makers to the schoolhouse to the end-user to the "customer" who receives the trained end-user. We propose an approach that includes interviews with policy makers and visits to selected Naval Professional Development Command (NPDC) Learning Centers and schoolhouses, where we will conduct interviews with command leadership and focus groups with student populations. We intend to conduct research at a cross-section of Naval activities for the purpose of interviewing senior enlisted leadership and division/department heads and by conducting focus groups for CBT end-users. We will also include reserve component commands as we recognize the unique access challenges associated with CBT for Selected Reserve (SELRES) personnel.

We envision review and analysis in the areas listed below. Our goals will be to review existing policies and procedures and their practical application across the force, assess their effectiveness, identify opportunities for improvement, and to recommend options for change where appropriate. Areas we intend to review are:

1) Does CBT encourage the Sailor to circumvent the learning process by focusing on "test taking" vice mastery and understanding of course content?
2) How does "A" School Training curricula incorporate CBT? Are there differences in the way CBT is used for administrative ratings, mechanical ratings and technical ratings? Is CBT more/less effective for different rates? How does this relate to rating knowledge in the Fleet?
3) Who determines the content of "A" School training curricula? Are Navy Occupational Standards being used? How are courses updated?
4) What metric does the Navy use to measure the effectiveness of CBT? Has the level of Sailors' knowledge (as reflected in advancement test scores) changed since the implementation of CBT?
5) To what extent do connectivity and access issues impact the availability of CBT, particularly for Navy Knowledge Online (NKO)?
6) What affect has access (i.e. connectivity, computers and software) to CBT had on its overall effectiveness?
7) What are the policies and procedures for ILE content design, development, and deployment? Do they provide for consistency across all CBT developers?
8) The Navy Leadership Training Continuum has moved from a schoolhouse environment to unit training. What is the impact of this change on quality of instruction?

9) How are Afloat Training Group Self-Assessments being conducted? Are they effective?
10) Has the removal of the human element from training evolutions impacted the Fleet's standard for military bearing/good order and discipline?
11) Are there any second and third order effects associated with CBT and the RIT, such as cost/timeliness of course updates, a lesser knowledge base for Fleet Sailors, lost productivity, impact on Sailor' quality of life (QOL)?

Our assessment plan includes three phases:

Phase 1: Planning and Research

- Review information from NAVINSGEN command inspections/area visits.
- Review and evaluate the Navy's Training Matrix in terms of time required to complete all required training. Is it realistic?
- Interview and collaborate with sources of expertise at the Naval Education and Training Center (NETC), the Naval Personnel Development Center (NPDC), the Center for Career Development (CCD), noting aspects of recent internal or available studies. We will also visit the Bureau of Medicine (BUMED) and the Naval Medicine Manpower, Personnel, Training & Education (MPT&E) Command to collect insights and lessons learned as to reasons they have reduced CBT in favor of hands-on-training.

Phase 2: Field Data Collection

- Visit selected NPDC Learning Centers and schoolhouses chosen to represent a cross-section of occupational fields and mission areas to assess use of CBT vice hands-on instruction, review use of adult learning methodologies and determine how CBT enhances or detracts from the professional occupational field of study.
- Collect data at the Naval Education and Training Professional Development and Technology Center (NETPDTC) to measure the effectiveness of CBT by examining advancement test scores, noting trends over the last five years.
- Visit selected commands to collect data on access and connectivity issues.
- Visit selected units at Fleet concentration areas (surface, air, submarine) to interview and conduct focus groups with the end-user—Sailors trained through CBT—and the leadership who receives the trained Sailor (chief petty officer/division officer/department head (CPO/DIVO/DH).
- Visit selected reserve component commands to collect data on unique, reserve-specific issues.

Phase 3: Analyze data, develop recommendations and policy options.

Team Composition:

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Site Visits: See attached Proposed Schedule.

NETC, NETPDTC, Pensacola FL

NPDC, Norfolk VA

BUMED and Naval Medicine MPT&E, WDC

NPDC Learning Centers: Center for Submarine Learning, New London CT; Center for Naval Leadership, Norfolk VA; Center for Surface Combat Systems (CSCS), Dahlgren VA; Center for Aviation Technical Training (CNATT), Pensacola FL

Schoolhouses: Recruit Training Center (RTC) and "A" Schools at Navy Training Center (NTC), Great Lakes IL; Officer Training Command (OTC), Newport RI; Surface Warfare Officer School (SWOS), Newport RI

Navy Reserve Component Command Midwest, Great Lakes IL

NOSC Milwaukee WI

CCD, Millington TN

CNSL, Norfolk VA

NRD Philadelphia

Cost: Estimated at $40,000

Appendix B: Team Composition

NAVINSGEN Staff

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Consultant NAVINSGEN Staff

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Appendix C: Site Visit Schedule

Naval Education and Training Center (NETC)	(14 July 2008)
Integrated Learning Environment (ILE)	(14 July 2008)
Training Wing (TRAWING) SIX	(14 July 2008)
Center for Information Development (CID)	(15 July 2008)
Center for Naval Aviation Technical Training (CNATT)	(15 July 2008)
Training Wing (TRAWING) FIVE	(15 July 2008)
Naval Education and Training Professional Development and Technology Center (NETPDTC)	(16 July 2008)
NETC Learning and Development Division (N7) (formerly Naval Personnel Development Command and the Human Performance Center)	(22 July 2008)
Center for Personal and Professional Development (CPPD)	(23 July 2008)
Center for Naval Intelligence	(23 July 2008)
Journeyman Instructor Training (JIT)	(23 July 2008)
Center for Naval Aviation Technical Training Unit (CNATTU) "C" School, NAS Norfolk	(23 July 2008)
Center for Surface Combat Systems (CSCS) Learning, Dam Neck	(23 July 2008)
Operations Specialist Journeyman Training	(23 July 2008)
Center for Security Forces (CSF) "A" School	(23 July 2008)
Center for Surface Combat Systems (CSCS) Learning, Norfolk	(24 July 2008)
Center for Naval Engineering (CNE)	(24 July 2008)
VAW-120, NAS Norfolk	(24 July 2008)
Navy Operational Support Center (NOSC) Milwaukee	(1 August 2008)
Navy Reserve Component Command (NRCC) Midwest	(7 August 2008)

Naval Service Training Command (NSTC)	(11 August 2008)
Center for Naval Engineering (CNE), Great Lakes	(11 August 2008)
CSCS Unit, Great Lakes	(12 August 2008)
CSCS ATT	(12 August 2008)
CSCS "A" School	(12 August 2008)
Hospital Corpsman "A" School	(13 August 2008)
Center for Surface Combat Systems (CSCS) Learning, Dahlgren	(3 September 2008)
Aegis Training Center (ATRC)	(3 September 2008)
Bureau of Medicine (BUMED)	(11 September 2008)
Naval Air Systems Command (NAVAIR), NAS Patuxent River	(18 September 2008)
Naval Base Norfolk -Sailors from surface, aviation and submarine ratings -Fleet and Force Master Chiefs	(6-8 October 2008)
Senior Enlisted Academy (SEA)	(4 November 2008)
Naval Justice School	(4 November 2008)
Surface Warfare Officer School (SWOS)	(4 November 2008)
Officer Training Command (OTC)	(5 November 2008)
Officer Candidate School (OCS)	(5 November 2008)
Naval Submarine School (NSS), Groton	(6 November 2008)
Submarine Learning Center (SLC), Groton	(6-7 November 2008)

Appendix D
Course Length for Legacy Training and CBT

Below are a few examples of course length under legacy training as compared to CBT curricula.

Course	Legacy Training (days)	CBT TTT (days)
CSCS "A" Schools		
ET	141	98
FC	89	64
GM	59	59
IC	36	36
OS	75	63
QM	47	51
CSS "A" Schools		
AZ	53	43
PS	45	26
RP	37	25
SH	24	17
SK	44	37
YN	32	28
Apprentice Technical Training		
AE	51	32
ATI	51	36
ATO	51	32
CTM	89	43
CTT	72	51
EM	71	32
ET	89	66
FC	89	70
GSE	77	35
IC	79	64

Appendix E
Fleet Feedback—Selected Excerpts

We facilitated 32 focus groups with 419 participants from the surface, aviation, and submarine communities. The quotations below are representative of a larger set of qualitative data points. Only a few participants shared positive comments while the preponderance of feedback indicated dissatisfaction with CBT as it is currently designed and delivered.

While we [the new generation] are familiar with working on computers, we aren't used to learning on them.

If the training is on NKO that tells me the Navy doesn't think it's important.

They wanted to save money but they haven't. The cost just gets shifted to another area.

I spend more time, about 50% more, than previous for getting a Sailor some basic system knowledge.

What happens when the jets get older and the real troubleshooters are gone?

I at least expect them to know the difference between a wrench and a hammer.

I just click through as fast as I can. All I need is the certificate.

I'm not rated on this equipment. I can't answer most questions they have.

I don't know what is important, what to really study.

Show me a high school that teaches only by CBT.

Squadrons with newer platforms can afford to train new personnel, but those of us with high maintenance man-hours per flight hour don't have that luxury.

I can set my watch by watching our training server slow down– I know students in Texas are in the classroom.

Sailors feel demotivated when they do not meet the expectations of their leadership in the fleet.

...calling for outside tech support more often because the technical rates are not trained to maintain anymore; they are trained to operate.

I won't see my actual equipment until I get to the ship. I have reservations that my training will not meet the demands of my new command.

Appendix F: Learning Theory

Learning Styles: The VAK Model

Learning styles are approaches or ways of learning. They involve educating methods, particular to an individual that are presumed to allow that individual to learn best. It is commonly believed that most people favor some particular method of interacting with, taking in, and processing information. A widely used neuro-linguistic programming model, the VAK model, characterizes the various learning styles as:

- Visual
- Auditory
- Kinesthetic/kinesthetic

According to the VAK model, visual learners have a preference for seeing, think in pictures, and learn through visual aids such as overhead slides, diagrams, handouts. Auditory learners best learn through listening, such as lectures, discussions, and tapes. Tactile/kinesthetic learners prefer to learn via experience—moving, touching, and doing in an active exploration of the world. The VAK model was later expanded upon to include Reading/Writing as a learning style—this is known as the VARK model.

While a person may prefer one method over another, most people combine the various learning styles. Current learning theory holds that instruction should stimulate as many senses as possible to achieve maximum learning effectiveness.

Critical Elements of Learning

According to Adult Learning Theory, learning occurs within each individual as a continual process throughout life. In a learning situation, adults are more concerned with process rather than content. There are four critical elements of learning that must be addressed to ensure that participants learn. These elements are:

- Motivation
- Reinforcement
- Retention
- Transference

Motivation. Motivation refers to a person's perceived need for engaging in a certain behavior, in this case learning. Students' reasons to do well in a course relate directly to a perceived reward or ability to relate the information being learned to future success. If the participant does not recognize the need for the information or see a positive return for learning the information, all of the instructor's effort to assist the participant to learn will

be in vain. The instructor must establish rapport with participants and prepare them for learning; this provides motivation.

Reinforcement. Reinforcement is the process whereby behavior, in this case learning, is encouraged, either through positive or negative means. It is a necessary part of the teaching-learning interaction process to ensure learning occurs. Instructors need to use it on a frequent and regular basis early in the process to help the students retain what they have learned. Then they should use reinforcement only to maintain consistent, positive behavior.

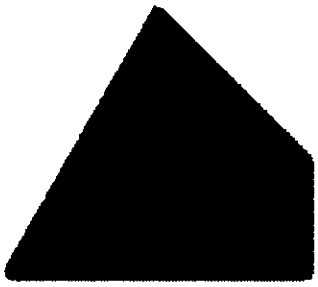
Retention. Retention is the ability to remember. Students must retain information in order to benefit from the learning. In order for participants to retain the information taught, they must see a meaning or purpose for that information. The must also understand and be able to interpret and apply the information. This understanding includes their ability to assign the correct degree of importance to the material.

Transference. Transfer of learning is the result of training; it is the ability to use the information learned in a new setting. Transference is most likely to occur when students can associate new information with something that they already know; the information is similar to material they already know, meaning it revisits a logical framework or pattern; the student's degree of original learning was high; and the information learned contains elements that are critical in terms of actual job performance (work).

Assessing Training Effectiveness: Kirkpatrick's Four Levels of Evaluation

Donald Kirkpatrick's four-level model for the evaluation of training and learning, first defined in 1959, is arguably the most widely used and popular model is considered an industry standard across the human resource and training communities. He later refined and updated his model in *Evaluating Training Programs: The Four Levels*, published in 1998. The four levels of Kirkpatrick's evaluation model essentially measure:

- Reaction of the Student: what they thought and felt about the training
- Learning: the resulting increase in knowledge or capability
- Behavior: the extent of behavior and capability improvement and implementation/application
- Results: the effects on the business or environment resulting from the trainee's performance



In Kirkpatrick's model each successive evaluation level is built on information provided by the lower level. Evaluation should always begin with level one, and then, as time and budget allow, should move sequentially through levels two, three, and four. Information from each prior level serves as a base for the next level's evaluation. Each successive level thus represents a more precise measure of the effectiveness of the training program that requires a more rigorous and time-consuming analysis.

Appendix G: Abbreviations

AIP	Awaiting Instruction Program
BECC	Basic Engineering Common Core
CAC	Common Access Card
CBT	Computer Based Training
CNE	Center for Naval Engineering
DoD	Department of Defense
DoN	Department of the Navy
ECR	Electronic Classroom
ERNT	Executive Review of Navy Training
GMT	General Military Training
GNT	General Navy Training
GSA	Global War on Terrorism Support Assignment
HMIC	Hospital Corpsman Interactive Course
IA	Individual Augmentee
ILE	Integrated Learning Environment
ILT	Instructor-led Training
ISP	Internet Service Provider
IT	Information Technology
JTA	Job Task Analysis
KSA	Knowledge, Skills, Abilities
LCPO	Leading Chief Petty Officer
LPO	Leading Petty Officer

LMS	Learning Management System
MPTE	Manpower, Personnel, Training and Education
NAVINSGEN	Naval Inspector General
NEL	Navy E-Learning
NETC	Naval Education and Training Command
NKO	Navy Knowledge Online
RC	Reserve Component
RIT	Revolution in Training
RTC	Recruit Training Center
SCORM	Sharable Content Object Reference Model
SELRES	Selected Reserve
SME	Subject Matter Expert
TCR	Training Change Request
TIMS	Training Integration Management System
TTT	Time to Train
VAK	Visual, Auditory, Kinesthetic